The Impact of Early Cognitive and Non-Cognitive Skills on Later Outcomes

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Executive Summary

1) When describing the determinants of economic or social outcomes, economists often have a very simplified view of skill. Failure to take into account the fact that skill is intrinsically a multidimensional object may misguide both research and the design of social policy.

2) In this paper, we analyse the consequences and determinants of cognitive and non-cognitive (social) skills at age 11, using data for Great Britain from the National Child Development Survey (NCDS). We document the importance of these skills for schooling attainment, labour market outcomes and social behaviours at various ages, and analyse the role of family background and the home learning environment in the formation of these skills.

3) We find that an overall measure of non-cognitive skill is important for a host of outcomes, including whether or not an individual stays on at school beyond the age of 16, whether they have obtained a degree by age 42, employment status at age 42, work experience between ages 23 and 42, wages at age 42, smoking at age 16, truancy before age 16, exclusion from school, teenage pregnancy, involvement with crime (ages 16 and 42), and health at age 42.[1]

4) Furthermore, the impact of this measure of non-cognitive skill does not differ in any systematic way across particular subgroups of interest (including those defined according to parental education, or father's socioeconomic status).

5) We go on to split this measure of non-cognitive skill into twelve different domains.[2] As an example, we find that "inconsequential behaviour" at age 11 (for example, misbehaviour in class) is associated with a reduction in the probability that an individual will stay on at school beyond age 16, a reduction in their wages at age 42, an increase in the likelihood that they will be a heavy smoker at age 16, and an increase in

[1] It should be noted that all models contain controls for cognitive skill and a host of other family background characteristics (see Appendix A for more details), such that these are net effects.
[2] These are: anxiety for acceptance by children, hostility towards children, hostility towards adults, "writing off" adults and adult standards, withdrawal, unforthcomingness, depression, anxiety for acceptance by adults, restlessness, inconsequential behaviour, miscellaneous symptoms, and miscellaneous nervous symptoms.

the probability that they will have played truant or been involved in crime by age 16. Further, we find that depression at age 11 is associated with a reduction in the probability that an individual will have obtained a degree by age 42, an increase in the probability that the individual will be a heavy smoker at age 16, an increase in the likelihood that they will have been excluded from school, and an increase in the probability that they will report symptoms of depression at age 42.

6) These findings together make it clear that a vision of the world in which skill is thought of as a one-dimensional object is extremely inadequate.

7) Further, we show that both cognitive and non-cognitive skills are strongly dependent on family background and other characteristics of the home learning environment, and that this is likely to be for both genetic and environmental reasons. More importantly, our work suggests that social skills may be more malleable than cognitive skills, which – if true – suggests that there may be greater scope for education policy to affect social skills rather than cognitive skills.

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Acknowledgments

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1 Introduction

Each of us is endowed with a unique set of skills that we use in all aspects of our everyday life. If we were asked to name the skills that we thought were valuable, we would find ourselves enumerating a never-ending list of attributes. Nevertheless, when describing the determinants of economic or social outcomes - or even the learning process - economists often have a very simplified view of skill. Our failure to take into account the fact that skill is intrinsically a multidimensional object is not only nonsensical, but also misguides both our research and the design of social policy.

In this paper, we analyse the consequences and determinants of cognitive and non-cognitive (social) skills at age 11, using data for Great Britain from the National Child Development Survey (NCDS).[1] We document the importance of these skills for schooling attainment, labour market outcomes and social behaviours at various ages, and analyse the role of family background and the home learning environment in the formation of these skills. We find that non-cognitive skills are very important for a host of outcomes, including schooling, social behaviours, and labour market success. We also find that the early home environment is an important determinant of non-cognitive skills, and that these skills appear more malleable than cognitive skills between the ages of 7 and 11.

This paper builds on Carneiro, Crawford & Goodman (2006) by considering additional social outcomes (including adolescent smoking and truancy behaviour, and adult crime and health outcomes), and by analysing the impact of social and cognitive skills on subgroups that may be of particular interest to policymakers (for example, children from families with low parental education, or low socioeconomic status). Furthermore, we are able to examine the impact of different types of social skills on our outcomes of interest, and can also investigate the extent to which the impact of social and cognitive skills on labour market outcomes differs according to highest qualification held.

This paper now proceeds as follows: in Section 2 we provide a brief summary of some recent literature in this area; in Section 3 we describe the data that we use; in Section 4 we analyze the relationship between one measure of non-cognitive skills at age 11 and a range of later

[1] We describe the cognitive and non-cognitive skills measures used in more detail in Section 2.

outcomes – including educational attainment, employment status, wages, smoking, truancy, involvement in crime, and health status - for the sample as a whole; in Section 5 we analyze the same relationships for selected subgroups – namely boys vs. girls, low parental education vs. high parental education, and low father's socioeconomic status vs. high father's socioeconomic status[2]; in Section 6, we consider the impact of different elements of non-cognitive skills on our outcomes of interest, while in Section 7 we study the determinants of non-cognitive skills at ages 7 and 11. Section 8 concludes.

2 Literature Review

The number of studies documenting the importance of social skills for a range of outcomes has grown substantially in recent years. Here, we provide a short summary of some of the most recent papers on this topic.[3] As expected, social skills are found to be very important. They are strong determinants of employment status, work experience, and wages; they are also important predictors of schooling outcomes. Finally, they are shown to be strongly correlated with engagement in a variety of risky behaviours, such as smoking, teenage pregnancy, and crime.

One of the most striking examples of the importance of non-cognitive skills is provided by Heckman, Hsee & Rubinstein's (2000) study of the General Educational Development (GED) program in the US. High school dropouts in the US (individuals who stop attending high school before they have enough credits for a high school diploma) have the opportunity of achieving high school certification by taking the GED exam. However, it was observed by Cameron & Heckman (1993) that GED recipients earned much lower wages than regular high school graduates, even though their degrees were supposed to be equivalent, and – as shown by Heckman, Hsee & Rubinstein (2000) – they demonstrated similar cognitive ability. In fact, controlling for cognitive skill, job training and years of schooling, GED recipients have lower wages than high school dropouts *without* a GED degree!

[2] We describe the definition of these subgroups in Section 5.
[3] Note that this is not meant to be an exhaustive survey of the literature, but one that provides a sample of representative work in this area.

Heckman, Hsee & Rubinstein (2000) go on to investigate why this might be the case. They find that GED recipients are much more likely to exhibit delinquent behaviours in adolescence (such as skipping school, getting into fights, or engaging in crime) than either high school graduates or high school dropouts (without a GED degree). They are also less likely to be able to hold a job as adults. This indicates that GED recipients are relatively qualified and intelligent individuals, but that they lack skills such as discipline, patience or motivation, and as a result are penalized in the labour market.

In another paper, Heckman, Urzua & Sixtrud (2006) provide direct evidence of the importance of non-cognitive skills by modelling labour market outcomes as a function of measures of self esteem and locus of control. They show that these variables strongly affect employment status, work experience, occupational choice, and wages. In their paper, if one moves an individual from the 25th to the 75th percentile of the non-cognitive skill distribution, wages improve by about 10 percent for males, and 40 percent for females. As a comparison, a similar movement in the cognitive skill distribution leads to a wage increase of about 20 percent for males, and 30 percent for females. Once they condition on schooling, the authors generally find that wages exhibit a stronger gradient with non-cognitive skills than with cognitive skills. In terms of employment probabilities, moving a male up in the non-cognitive skill distribution as described above increases the probability of employment at age 30 by 15 percent in their paper. Effects on work experience are equally important.

Another interesting paper, by Kuhn & Weinberger (2005), finds that males who occupied leadership positions in high school earn between 4 percent and 33 percent higher wages as adults; Duncan & Dunifon (1998) show that several measures of motivational traits are good predictors of wages, while Osborne-Groves (2005) shows that personality measures predict labour market outcomes. Bowles, Gintis & Osborne (2001) provide a comprehensive survey of the literature, discussing several studies that find large effects of what they call "psychological" variables on earnings.

In terms of findings for the UK, Feinstein (2000) uses the British Cohort Study (BCS) to document the economic importance of behavioural and psychological attributes of children measured by age 10. In his paper, going from the 20th to the 80th percentile of the distribution of anti-social disorder increases the probability that one experiences an episode of unemployment that lasts for longer than 4 months by 6 percent for boys. Similarly, an

increase from the 20th to the 80th percentile of the self-esteem distribution is associated with an increase in earnings of 5.6 percent for boys. For girls, the self-esteem variable is not significantly important in predicting wages, but locus of control and other behavioural scores have strong effects: moving up the distribution of these skills as described above leads to increases in wages of 6.3 percent and 5 percent respectively.

Blanden, Gregg and MacMillan (2006) argue that non-cognitive variables are important determinants of the degree of intergenerational transmission of income, but that much of this effect can be attributed to the effect of non-cognitive skills on schooling, rather than to their direct effect on earnings.

Given the findings in these papers, it is natural to discuss the role of social skills in promoting educational attainment: Duckworth & Seligman (2005) and Duckworth, Peterson, Matthews & Kelly (2007) are two fascinating examples. The first paper uses two different samples of data to show that self-discipline (on several measures) outdoes IQ as a predictor of the academic performance of adolescents: they find that self-discipline measured in the autumn accounts for twice as much variance as IQ in explaining final grades.

The second of these studies examines the relationship between perseverance and long term goals, again using more than one dataset. The main results show that perseverance accounts, on average, for 4 percent of the variance in outcomes such as educational attainment among adults, university marks among students in elite universities, performance in military school, and performance in spelling bees. Surprisingly, the authors find that perseverance is not related to IQ.[4]

The paper by Duncan et al (2006) focuses on school readiness measured at school entry and later educational achievement. This paper is remarkable in examining in a uniform way six different longitudinal studies of children that cover the UK, the US, and Canada. The paper reports that, across the six studies, the best predictors of educational achievement at school entry are math and reading scores, and attention skills. Other measures of socio-emotional behaviours at school entry had limited power in explaining educational success.

[4] Heckman, Urzua & Sixtrud (2006) report a similar result. In their sample, you cannot reject that the correlation between cognitive and non-cognitive skills is equal to zero.

Heckman, Sixtrud & Urzua (2006) also examine this issue, and find that non-cognitive skills have a very strong impact on educational attainment. For example, an increase in the non-cognitive score from the 25th to the 75th percentile of its distribution is associated with a 30 percent increase in the probability of graduating from a four year college.

We end this short and selective review of the literature by focusing on risky behaviours (such as teenage pregnancy, substance use, and crime) of adolescents and adults. Risky behaviours are of interest for several reasons. First, they are often undesirable in their own right, because they generate large costs to society. Second, they are likely to influence the life of the individuals engaged in such behaviours, preventing them from performing in school or in work, increasing the probability that they spend time in prison or suffer from poor health (for several reasons), or even influencing their chances of forming stable families.

Heckman, Sixtrud & Urzua (2006) show that both cognitive and non-cognitive skills influence smoking by age 18, imprisonment, participation in illegal activities, pregnancy by age 18, and marital status. It is both interesting and important that, for many of these behaviours, non-cognitive skills are much more important than cognitive skills.

In this report, we are able to build on the literature discussed above in several important dimensions. First, most economics studies rely on measures of non-cognitive skills in adolescence and adulthood to explain the relevance of such skills for contemporaneous outcomes. In contrast, the essays in Tremblay, Artup and Archer (2005) show how the origins of aggression in adolescence and adulthood lie very early in the life-cycle, underlining the importance of studying this relationship in a life-cycle setting.[5] Because our data follows individuals through childhood, into adolescence and adulthood, we can analyze the relationship between early non-cognitive skills and later outcomes, thus overcoming potential endogeneity problems.

Second, since we have detailed information on each individual, we can consider a wide range of outcomes beyond schooling and labour market variables. In particular, as in Heckman, Sixtrud & Urzua (2006), we can analyze the relationship between early social skills and

[5] Carneiro & Heckman (2003), and Carneiro, Heckman & Masterov (2005) also document how gaps in non-cognitive skills emerge early in the life-cycle and persist (although they do not analyze the relationship between early measures of non-cognitive skill and later outcomes).

engagement in risky behaviours - such as teenage motherhood and criminal activity, plus smoking and truancy - at different ages.

Third, our measures of non-cognitive skills during childhood come from teacher assessments, while the early measures of non-cognitive skills used in studies such as Carneiro & Heckman (2003) and Carneiro, Heckman & Masterov (2005) come from maternal assessments.[6] This may be an advantage if one believes that teachers provide more objective measures of social skills than parents.[7]

3 Data

The National Child Development Study (NCDS) comprises detailed longitudinal records for all children born in Great Britain in a single week in March 1958. There have been eight sweeps, the first of which was carried out at birth, with follow-ups at ages 7, 11, 16, 23, 33, 42 and 46. We make use of background characteristics for both the child and their family at birth and age 7, of social and cognitive test results at ages 7[8] and 11, and of various schooling, behavioural and labour market outcomes at ages 16 and 42.[9]

In this section, we provide further details of the measures of cognitive and social skills that we use, and define the outcome variables under consideration in this report. Details of other background characteristics for which we control can be found in Appendix A.

[6] Currie & Thomas (2001) and Fronstin, Greenberg & Robins (2005) both use the same teacher assessment measures to study the relationship between early test scores and future schooling and labour market outcomes in the NCDS; however, they do not consider adolescent or adult social outcomes.
[7] Parental assessments of social skills are also available in the NCDS, and in future work, we plan to make use of both measures.
[8] Note that we use measures of social and cognitive skills at age 7 only in assessing the development of such skills over time (see Section 6).
[9] Unfortunately, the final sweep of the data was only made available to researchers relatively recently, thus we have not been able to make use of the latest outcomes in this report.

Cognitive skills at age 11

We use an average of test results – normalised to have mean zero, variance one - in maths, reading, copying and general ability as our measure of cognitive skills at age 11.[10]

- The arithmetic test comprised a wide variety of questions, of varying degrees of difficulty. One mark was awarded for each correct answer, giving a total score between 0 and 40.
- The reading comprehension exercise required the child to pick the correct word to complete a sentence (from a choice of five). One mark was awarded for each correctly completed sentence, giving a total score between 0 and 35.
- In the copying test, the child was given 6 shapes and asked to copy each of them twice. They were awarded one mark for each correct attempt, giving an overall score between 0 and 12.
- The general ability test required the child to recognise patterns in either words or pictures and select the next word/picture in the sequence. Each correct answer was rewarded with a mark, giving intermediate verbal and non-verbal scores (between 0 and 40), and a total score (between 0 and 80).

Social skills at age 11

The Bristol Social Adjustment Guide (BSAG) is used to measure social *mal*adjustment at ages 7 and 11 in the NCDS. Teachers are given a series of phrases describing particular aspects of behaviour (often ranked according to severity) and are asked to underline those that apply to the child. The phrases are grouped into 12 domains: anxiety for acceptance by children, hostility towards children, hostility towards adults, "writing off" adults and adult standards, withdrawal, unforthcomingness, depression, anxiety for acceptance by adults, restlessness, inconsequential behaviour, miscellaneous symptoms, and miscellaneous nervous symptoms. Each domain contains a different number of phrases, with one point allocated to each sentence that the teacher underlines.[11]

[10] See Appendix A for a graph showing the distribution of cognitive skills at ages 7 and 11.
[11] The distribution of sentences underlined for each domain at age 11 – and in total at ages 7 and 11 – can be found in Appendix A.

The BSAG has been used extensively in previous research, and has been externally validated in two key ways: first, the results have been checked against other teacher assessments of social maladjustment (plus assessments from professional observers, parents and peers), and have been found to be significantly positively correlated with these measures (see Achenbach, McConaughy & Howell (1987) for a summary of this literature). Secondly, greater maladjustment (a higher number of sentences underlined) is frequently associated with more negative social outcomes: for example, individuals who re-offended whilst on probation tended to be more maladjusted than those who did not (Stott, 1960), and of those who had been caught truanting, first time offenders were found to be less maladjusted than repeat offenders (Stott, 1966).

To generate our primary measure of social skills, the number of sentences underlined in each of the 12 domains (described in more detail in Appendix A) were added together to give a total "social maladjustment" score: we reversed the sign of this score, and normalised it to have mean zero, variance one.[12]

Outcomes

We make use of the following outcomes in our analysis:

Education outcomes

- Stay on at 16: dummy variable indicating whether the cohort member stayed on at school beyond the age of 16 (as reported by the individual at age 23).
- HE highest qualification: dummy variable indicating whether the individual held a Higher Education degree as their highest qualification (at age 42).[13]
- Literacy: literacy score normalised to have mean zero, variance one (recorded for a subset of the sample only - at age 37).
- Numeracy: numeracy score normalised to have mean zero, variance one (recorded for a subset of the sample only - at age 37).

[12] The reason for the reversal of sign on the social adjustment measure is to ensure that the likely impacts of social and cognitive skills on particular outcomes go in the same direction – for ease of interpretation.
[13] All variables indicating the cohort member's highest qualification were derived by comparing qualification levels reported in Waves 4 (age 23), 5 (age 33) and 6 (age 42), plus details that were provided via the exam boards in 1978.

Labour market outcomes

- Work experience: accumulated work experience (in months) between ages 23 and 42.[14]
- Employment status: dummy variable indicating whether the cohort member is employed (as reported by the individual at age 42).
- Log hourly wages (calculated using gross hourly pay and usual hours per week, as reported by the individual at age 42).

Adolescent social outcomes

- Smoking: dummy variable indicating whether the cohort member smoked more than 40 cigarettes per week at the age of 16 (as reported by the individual at age 16).
- Truancy: dummy variable indicating whether the cohort member had ever played truant (recorded at age 16 – takes value 1 if the individual or the parent or the teacher reported that they had).
- Exclusion: dummy variable indicating whether the cohort member was ever excluded (suspended) from school (as reported by the individual at age 42).
- Crime: dummy variable indicating whether the cohort member had ever been in trouble with the police (as reported by the school at age 16), or if they had ever been to court (as reported by the parent at age 16).
- Teenage mother: dummy variable indicating whether the cohort member gave birth as a teenager (as reported by the individual at age 23).

Adult social outcomes

- Crime: dummy variable indicating whether the cohort member had dealings with the police or a court between ages 33 and 42 (as reported by the individual at age 42).
- Poor or fair health: dummy variable indicating whether the cohort member's health was poor or fair (rather than good or excellent) (as reported by the cohort member at age 42).
- Depression: dummy variable indicating whether the cohort member showed signs of depression – defined as having a malaise index[15] score greater than 7 (as reported by the individual at age 42).

[14] Generated using information reported by the cohort member in Waves 5 (age 33) and 6 (age 42). We would like to thank Dan Andenberg for providing us with some code for calculating these outcomes.

[15] The malaise index is one element of the Cornell Medical Index questionnaire, and uses questions defined on a relative scale. For example, "Have you recently been losing confidence in yourself?" Answer: not at all, no more than usual, rather more than usual, or much more than usual? This questionnaire was also used to identify depression in NCDS4, with a dummy variable indicating malaise derived by the NCDS team: we follow their methodology in defining our dummy variable.

- Mental health problems: dummy variable indicating whether the cohort member showed signs of psychological distress – defined as having a General Health Questionnaire[16] score greater than 15 (as reported by the individual at age 42).[17]

Table 1 provides mean outcomes for the sample as a whole, and separately for individuals who have above- or below-median social adjustment at age 11.[18]

This table pre-empts the results discussed in the remainder of this report, to the extent that there is often a significant difference between the mean outcomes for individuals with above- and below-median social adjustment at age 11. For example, the proportion of individuals with above-median social skills at age 11 that stay on at school beyond age 16 is 38.6 percent, compared with only 19.8 percent of those with below-median social skills at the same age. Similarly, the proportion of individuals with above-median social skills who smoke more than 40 cigarettes per week at age 16 is 10.2 percent, compared with 15.9 percent of individuals with below-median social skills.

4 Impact of Skills at Age 11 on Later Outcomes

In this section, we consider the impact of social and cognitive skills (measured at age 11) on education outcomes, labour market outcomes, adolescent social outcomes and adult social outcomes. We then go on to consider whether the impact of social and cognitive skills on labour market outcomes differs according to highest qualification held.

The basic regression has the following format[19]:

$$D_i = 1 \; if \; \alpha + \beta C_i + \gamma S_i + \phi C_i * S_i + X_i \varphi + \varepsilon_i > 0$$

[16] For more details on the General Health Questionnaire, see: www.workhealth.org/UCLA%20OHP%20class%202004/GHQ%20and%20scoring.pdf

[17] This index relies more heavily on physiological symptoms of mental health difficulties than the malaise index (described above): for example, "Is your appetite poor?", or "Does your heart often race like mad?" Furthermore, the questions have "yes/no" answers (rather than being defined relative to how the individual usually feels, as in the malaise index).

[18] Note that the median value of social adjustment at age 11 is 0.389. It is greater than the mean (zero by construction) because the distribution is skewed to the right (i.e. towards individuals showing no signs of maladjustment) – see Appendix A for further details.

[19] The only outcome for which this model is not relevant is log hourly wages (Section 3.2), for which we use an ordinary least squares (OLS) regression; C, S, C*S, X and ε are defined in the same way.

where D is a dummy variable indicating whether the individual displays the outcome of interest (for example, whether they have attained a particular qualification or demonstrated a particular social behaviour), C is cognitive skill, S is social skill, C*S is the interaction between C and S, X is a vector of other controls (including gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics – including socioeconomic status and years of schooling – and local area variables[20]), and ε is a residual which is assumed to have a standard normal distribution. We estimate probit regressions (ordinary least squares (OLS) regressions for log hourly wages) and report marginal effects (evaluated at the mean value of the covariates).

Education outcomes

Table 2 reports estimates of our measures of social and cognitive skills (plus a host of other variables[21]) on four indicators of educational attainment: whether the cohort member stayed on in school beyond age 16, whether they have a degree from a higher education institution by age 42, and – for a 10% clustered sample of the NCDS population only – indicators of basic literacy and numeracy skills at age 37.[22]

Table 2 shows that social skills are very important for some schooling outcomes: children who exhibited greater social adjustment at age 11 were both more likely to stay on at school post-16, and more likely to have a higher education degree, accounting for cognitive ability and other background factors[23]; however, social skills are not particularly important for basic literacy or numeracy attainment.[24]

Although performance in cognitive tests is more important for all of these educational outcomes, social skills matter too. In fact, an increase of one standard deviation of social

[20] See Appendix A for the full list of background characteristics for which we control.
[21] See Appendix A for the full list of background characteristics for which we control.
[22] The literacy and numeracy scores have been normalised to have mean zero, variance one.
[23] Appendix B provides estimates of the impact of social and cognitive skills (plus their interaction) on these education outcomes, both with and without controlling for other background characteristics: this is to enable us to assess the extent to which the impact of family background on educational attainment is channelled via social and cognitive skills at age 11. From Table B.1, it is clear that the coefficient on social skills changes very little once family background characteristics are included, suggesting that social skills have an independent effect on educational attainment, over and above that of family background (which also appears important).
[24] It should be remembered, however, that the smaller sample size for these outcomes makes small effects difficult to estimate precisely.

adjustment at age 11 has the same impact on educational attainment as a one year increase in the number of years of mother's education: both cause the probability of staying on at school to increase by approximately 4 percentage points, and the probability of having a degree to rise by approximately 2 percentage points (holding all else constant).

It is also interesting to report that there is a strong interaction between cognitive and social skills in the production of educational attainment (for those outcomes for which social skills are important): the higher the level of social skills, the larger the impact of cognitive ability, and the higher the level of cognitive ability, the larger the impact of social skills - the two types of skill reinforce each other. This is illustrated graphically in Figures 1 and 2.

Figure 1 presents the predicted probability that an individual stays on in school beyond age 16 for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample.[25] It is quite striking that the marginal effect of cognitive skills on the probability of staying on at school beyond age 16 is quite low if social skills are fixed at a low value, but very high if social skills are fixed at a high value: this effect is even more pronounced for social skills. This interaction is extremely important, and suggests that an individual with very high cognitive skills but very poor social skills is relatively unlikely to stay on at school beyond age 16 (at least at the mean value of the remaining regressors).

Figure 2 presents the predicted probability that an individual obtains a degree as their highest qualification by age 42. The results are similar to those for staying on at school beyond age 16 (described above), although the increase in the marginal effect of cognitive skills as social skills improve is less pronounced.

Labour market outcomes

Social skills also matter for labour market outcomes (namely work experience (in months) between ages 23 and 42, and employment status and log hourly wages (in pounds) at age 42), as shown in Table 3. For each outcome, two specifications are considered: the first controls only for social and cognitive skills at age 11 (and their interaction), plus the range of background characteristics specified in Appendix A, while the second additionally controls

[25] See Table A.1 in Appendix A for some mean values of key covariates.

for educational attainment: this allows us to assess whether the impact of social and cognitive skills works solely through the impact on educational attainment (seen in Table 2), or whether there is an additional impact over and above that on qualifications.[26]

Looking first at the "without education" specification, it is clear that social adjustment at age 11 has a significant impact on all labour market outcomes under consideration.[27] Interestingly, however, whilst the interaction terms between social and cognitive skills are always significant, they are of opposite signs for employment and wage outcomes: while cognitive skills alone have a large and significant impact on log hourly wages, social skills alone do not (holding all else constant). Further, individuals that possess a combination of good cognitive and good social skills receive an even greater return, indicating that the two skills are complementary. This is illustrated graphically in Figure 3.

In terms of employment status, on the other hand, it appears that possessing *either* good social skills *or* good cognitive skills is sufficient for an individual (with characteristics held constant at the mean for the sample[28]) to find work – indicating that the two types of skill are substitutes. Furthermore, the combination of poor social skills and poor cognitive skills exerts a negative and significant impact on the probability of employment (shown in Figure 4).[29]

Turning now to our second specification – "with education" – it is clear that even conditioning on educational attainment, good teacher-rated social behaviour at age 11 is still associated with a higher probability of employment at age 42 (and of having been in work for longer between the ages of 23 and 42): in fact, a one standard deviation increase in social adjustment (holding all else constant) gives rise to a 2.4 percentage point increase in the likelihood of being in work at age 42 (and an 8-month increase in total work experience between ages 23 and 42). This suggests that social skills are important both because they influence achievement at school, but also because they impact on labour market performance directly.

[26] Table B.2 in Appendix B additionally provides estimates of the impact of social and cognitive skills (plus their interaction) on labour market outcomes without ANY other controls. Interestingly, the impact of social skills *increases* once family background characteristics are taken into account, indicating that when you compare individuals from similar backgrounds, the importance of social skills in determining labour market outcomes actually increases.
[27] Although the impact is smaller than that of cognitive skills, particularly on wages.
[28] See Table A.1 in Appendix A for more details.
[29] The work experience graph shows similar results, and is available from the authors on request.

This is not the case for wages: once we control for highest qualification (recorded at age 42), the effects of both cognitive and non-cognitive skills are greatly reduced and become statistically insignificant, suggesting that these two variables are important for log hourly wages mainly through their effect on schooling (once we account for a large set of controls).

Adolescent social outcomes

Given that the outcomes considered in Table 4 – whether the individual was a heavy smoker at age 16, whether they ever played truant from school, whether they were ever excluded from school, whether they had been in trouble with the police or a court by age 16, and (for girls) whether they had their first child as a teenager – can be thought of as negative social outcomes, it is important (but perhaps somewhat unsurprising) that the impact of good social skills at age 11 has a negative (and significant) impact on each of them (often larger than the positive impact of cognitive skills at the same age).[30] Amongst these outcomes, the coefficient on social skills is greatest for truancy, where a one standard deviation increase in social adjustment at age 11 is associated with a 3.6 percentage point reduction in the likelihood that the individual had played truant from school by age 16 (other things being equal).[31]

The results for smoking and truancy are particularly interesting (shown graphically in Figures 5 and 6 respectively). Figure 5 shows that - when social skills are fixed at a low level - the probability that an individual smokes more than 40 cigarettes per week (at age 16) is increasing in cognitive skills. Furthermore, when cognitive skills are fixed at a *high* level, the likelihood of being a heavy smoker is *decreasing* in social skills. Taken together, these results suggest that it is individuals with good cognitive skills and poor social skills who are most likely to be heavy smokers at age 16. This may seem an unlikely combination, but would be consistent with a story in which children from high income families rebel and take up smoking: these individuals probably exhibit relatively high cognitive skills, and are more

[30] Appendix B provides evidence of the impact of cognitive and social skills (plus their interaction) on adolescent social outcomes - both with and without the inclusion of family background variables. It is clear from Table B.3 that - in general - the impact of social (and cognitive) skills is reduced by the presence of other characteristics, suggesting that the impact of family background is channelled – to some extent - through skills measures at age 11 (when controls are not included).

[31] In percentage (rather than percentage point) terms, the largest coefficient is that for exclusion from school: a one standard deviation increase in social adjustment at age 11 is associated with a 29 percent (0.4/1.4 percentage points) reduction in the likelihood of being excluded from school by age 16.

likely to have access to the resources to buy at least two packets of cigarettes per week than are children from less affluent backgrounds.

Figure 6 shows that – in accordance with the findings for smoking – when social skills are fixed at a low level, the probability of being reported to have played truant by age 16 is increasing in cognitive skills, and when cognitive skills are fixed at a high level, it is decreasing in social skills. Moreover, when social skills are fixed at a *high* level, the probability of being reported to have played truant is *decreasing* in cognitive skills, whilst when cognitive skills are fixed at a *low* level, it is *increasing* in social skills. These findings together suggest that the individuals who are most likely to have played truant are those who either have good cognitive skills and poor social skills, or poor cognitive skills and good social skills: this latter group may perhaps consist of children who have become disillusioned with school, because they are unable to meet the required academic standards.[32] (Of course, this is only one of a number of potential hypotheses that may fit these facts.)

Adult social outcomes

Table 5 provides estimates of the impact of social and cognitive skills (plus a range of other variables[33]) on the probability that: a) individuals have been in trouble with the police between ages 33 and 42; b) self-reported health status is fair or poor (compared to good or excellent) at age 42, and; c) responses to two separate medical questionnaires indicate that individuals are suffering from depression or other mental health problems (assessed at age 42).[34]

As was the case for adolescent social outcomes, all coefficients on social adjustment at age 11 are negative and significant, ranging from 1.8 (crime) to 2.8 (mental health problems) percentage points: this means that a one standard deviation increase in social adjustment at age 11 is associated with a 1.8 percentage point (7 percent) reduction in the likelihood that

[32] This story is consistent – to some extent – with the results found in Section 5, in which we consider the impact of different types of social maladjustment on adolescent social outcomes.
[33] See Appendix A for the full list of background characteristics for which we control.
[34] Table B.4 in Appendix B provides estimates of the impact of social and cognitive skills on adult social outcomes, both with and without family background controls. In terms of crime outcomes, the impact of social skills is reduced by the inclusion of other characteristics, indicating that the impact of family background is to some extent channelled through social skills (as with adolescent social outcomes, described above). In terms of health outcomes, on the other hand, the impact of social skills remains virtually identical regardless of the inclusion of family background controls.

you will have been involved in a crime between the ages of 33 and 42, and with a 2.8 percentage point (20 percent) reduction in the probability that you are deemed to be suffering from mental health problems at the age of 42 (holding all else constant).

Interestingly, whether your mother was a heavy smoker during pregnancy has a large and significant impact on self-reported health status at age 42 – it gives rise to a 4.1 percentage point (23 percent) increase in the probability that the individual reports poor or fair health (vs. good or excellent) at age 42 - while low birth weight does not appear to be important.[35]

Interaction between skills and qualifications in the labour market

This section considers what we can learn from this cohort about the way in which qualifications and skills interact in the labour market. Specifically, we look more closely than hitherto at the impact of the different skills and qualifications on individuals' employment probabilities and wages.

Table 6 first provides some context, by showing average standardised social and cognitive test scores at ages 7 and 11 for different individuals, depending on their highest qualification level (by age 42).[36] Here we rank qualifications both according to their level (Levels 1- 4+)[37], and according to whether the qualification is academic or vocational. Note that where an individual has both an academic and a vocational qualification at a particular level, we count the academic one as their highest.

Unsurprisingly, individuals showing higher cognitive and social skills during childhood typically end up with higher qualifications later in life. For example, among those whose highest qualification is vocational Level 2 or below, the mean standardised scores on social and cognitive tests at ages 7 and 11 are negative, i.e. below average for their cohort.[38] Those

[35] This may be, for example, because of the U-shaped relationship between birth weight and adult health status, as found for this cohort in Case, Fertig & Paxson (2003).
[36] As these are standardised skills measures (with mean zero, variance one), a value greater than zero indicates above average social or cognitive skills, while a value less than zero indicates below average social or cognitive skills.
[37] See Note 1) to Table 6 for more details about qualification levels in the UK.
[38] Remember that our measures of social and cognitive skills have been normalised to have mean zero, variance one.

with Level 2 academic qualifications and above displayed above-average social and cognitive skills.

However, there are some interesting variations to this pattern. Of particular policy interest is the group of individuals from this cohort whose highest qualification by age 42 is a vocational Level 2: while these people scored similarly in cognitive tests during childhood to those whose highest qualification was an academic Level 1, their social adjustment scores, on average, were lower. Similarly, those whose highest qualification is a vocational Level 3 scored lower, on average, in both the cognitive and social skills tests compared to individuals whose highest qualification was an academic Level 2. This suggests that it is important to take account of both prior social and cognitive skills when considering the impact of these qualifications in the labour market.

Table 7 considers directly the impact of different qualifications and skills on the probability of being in employment at age 42, and on log hourly wages at the same age. The first specification shows the "raw" returns to different qualifications, controlling only for gender. The omitted category is those with no qualifications, so each coefficient measures the average percentage point (percentage) difference between the probability of being in work (hourly wages) for those with a particular qualification compared to having no qualifications at all.

This specification shows the familiar story that there is - in general - a strong positive association between gaining qualifications, and subsequent labour market outcomes. While those with qualifications (of any level) appear to do better in the labour market than those with none, it is interesting to note - given the policy emphasis on encouraging individuals to gain a first Level 2 qualification - that for this cohort there appears little difference between the average employment probabilities and wages of those with Level 1 qualifications, and those who have gained Level 2 vocational qualifications.

How does taking into account social and cognitive skills alter this picture? The second specification in Table 7 shows how our picture of the 'returns' to different qualifications changes when we control for social and cognitive skills at age 11 (and the interaction between them), as well as for a range of other background characteristics (see Appendix A for the full

list).[39] This analysis again shows a familiar result, namely that taking into account prior skills and other background characteristics reduces the returns directly associated with the attainment of qualifications: this is to be expected, given the pattern shown in Table 6, where those with higher qualifications - in general - tend to show higher prior 'ability' (both in terms of cognitive and social skills in childhood).[40]

Specification 3 then goes on to consider whether social or cognitive skills are particularly valuable (in the labour market) for individuals with certain types of qualification. This is done through the inclusion of a full set of interactions between social and cognitive skills, and academic and vocational qualification levels. The fact that none of the interaction terms are significantly different from zero suggests that there are no additional returns (or penalties) to social or cognitive skills for individuals with particular qualification levels, suggesting that such skills are equally valuable for all individuals.

5 Subgroup Analysis

In this section, we consider whether the impact of social and cognitive skills on each of our outcomes varies across subgroups. We split the sample in three ways:

- Boys vs. girls
- Low parental education vs. high parental education
- Low father's socioeconomic status (SES) vs. high father's SES

Cohort members are assigned to the "low parental education" subgroup if both parents left school by age 15; to the "high parental education" subgroup otherwise. Further, they are assigned to the "low father's SES" subgroup if their father worked in a manual occupation (or lower) at the time of their birth; to the "high father's SES" subgroup otherwise.

In each table in this section, we show the coefficients on the social and cognitive skills variables (plus their interaction) for each subgroup of interest, and indicate whether these

[39] This is similar to the "with education" specification considered in Table 3, except here we have split highest qualification levels into academic and vocational.
[40] Table 7 also confirms the positive labour market returns associated with social and cognitive skills found in Table 3.

coefficients are significantly different from zero. In Appendix C, we show the difference between the estimates for boys and girls (for example), and whether these estimates differ significantly from one another.

Education outcomes

Table 8 provides estimates of the impact of social and cognitive skills on educational outcomes separately for each subgroup of interest. As one would expect, there are large differences in the mean educational outcomes according to parental education and father's socioeconomic status: for example, individuals from the low parental education subgroup are 20.9 (=0.377-0.168) percentage points less likely to stay at school beyond age 16 than are individuals from the high parental education subgroup, while cohort members from the low father's SES subgroup are 17.6 (=0.327-0.140) percentage points less likely to obtain a degree than cohort members from the high father's SES subgroup.

It is clear from Table 8 that – in line with the overall findings discussed in Section 3.1 – social adjustment at age 11 has a positive impact on the probability that an individual will stay on at school beyond age 16, and that they will have obtained a degree as their highest qualification by age 42[41], but has no impact on basic literacy and numeracy skills at age 37[42] for any of the subgroups of interest: in all cases, however, this coefficient is considerably smaller than that for cognitive skills.

Interestingly, while the impact of social skills does not appear to differ significantly across any of the subgroups of interest, the impact of cognitive skills does - for the subgroups defined according to parental education and father's SES.[43] As an illustration: a one standard deviation increase in cognitive skills at age 11 increases the probability of a child from a high parental education family staying on at school beyond age 16 by 28.6 percentage points, while it increases the likelihood that a child from a low parental education background stays on by only 13.6 percentage points (holding all else constant).

[41] Further, all coefficients are significantly different from zero, with the exception of the HE qualification estimates for the low parental education and low father's SES subgroups.
[42] These scores have been normalised to have mean zero, variance one.
[43] This is only true in terms of the probability of staying on at school beyond age 16 and the probability of having obtained a degree by age 42, not in terms of basic literacy and numeracy skills at age 37.

These differences may arise for one of two reasons: first, the technology of cognitive skill formation between ages 11 and 16 may differ according to parental education, such that children of similar cognitive abilities at age 11 end up with different cognitive abilities at age 16. For example, if poorly educated parents are ill-equipped to be good teachers for their children (for example, in terms of helping them with their homework) whilst they are at secondary school, then children from high parental education backgrounds will tend to have better cognitive skills at age 16 than children from low parental education backgrounds, thus increasing the likelihood that they can stay on at school beyond age 16.

Second, children from different parental education backgrounds may have similar cognitive abilities at age 16, but may differ in terms of their propensity to stay on: so, for example, if we assume that families with low parental education are also the relatively poorer families, then this difference may have something to do with the need to increase family income (by ensuring that children enter the labour market as early as possible); alternatively, it may have something to do with aspirations.

Labour market outcomes

Table 9 shows how the labour market outcomes of each of our subgroups of interest are affected teacher-assessed by social and cognitive skills.[44] Once again, where estimates are significantly different from zero, they provide evidence that social skills have a positive impact on work experience, employment status and log hourly wages: for example, in terms of employment probabilities, a one standard deviation increase in social adjustment at age 11 gives rise to a 4.2 percentage point (5 percent) increase in the likelihood of being in work at age 42 for individuals in the low father's SES subgroup.

However, there is evidence of only one significant difference between the coefficients on the impact of social skills for our subgroups of interest. For individuals whose parents had both left school by age 15 (the low parental education subgroup), a one standard deviation increase in social adjustment at age 11 would have virtually no impact on hourly wages at age 42; the same increase in social adjustment for individuals from higher parental education families, on

[44] It is interesting to note that the well-established differences in employment probabilities and log hourly wages between men and women are greater than the differences between high and low parental education – or high and low father's SES – subgroups.

the other hand, would give rise to a 5.4 percent increase in hourly wages. Interestingly, the coefficients on cognitive skills are virtually identical for these two subgroups. These facts taken together may perhaps provide some insight into the type of jobs carried out by individuals from different family backgrounds.

Adolescent social outcomes

Table 10 presents estimates of the impact of social and cognitive skills (and their interaction) on adolescent social outcomes – namely, smoking, truancy, exclusion from school, involvement in crime and teenage motherhood.

There are often large differences in mean outcomes across subgroups: in particular, girls are 11.4 percentage points less likely to have been in trouble with the police than boys, and cohort members from high father's SES backgrounds are 11.9 percentage points less likely to have played truant than cohort members from low father's SES backgrounds.

In line with the findings for the sample as a whole (discussed in Section 4, *Adolescent and social outcomes*), social adjustment at age 11 exerts a negative and significant impact on all outcomes across all subgroups. Furthermore, the impact is greatest on truancy rates: for example, for individuals in the low father's SES subgroup, a one standard deviation increase in social adjustment at age 11 is associated with a 5.8 percentage point (11 percent) reduction in the probability that the individual has played truant at school (holding all else constant). This impact is 2.9 percentage points greater than that for individuals in the high father's SES subgroup, implying that individuals from low SES backgrounds would benefit more from policies designed to improve social skills in childhood than would individuals from high SES backgrounds.[45] Interestingly, the opposite is true in terms of the impact of cognitive skills on truancy rates: it seems that individuals from high SES backgrounds would benefit significantly more from policies designed to improve cognitive skills in childhood than would individuals from low SES backgrounds.[46]

[45] This also holds true in terms of involvement in crime and teenage motherhood.
[46] Boys would also appear to benefit significantly more from policies designed to improve cognitive skills at age 11 than girls in terms of truancy rates.

Adult social outcomes

Table 11 documents the impact of social and cognitive skills at age 11 on adult social outcomes by subgroup. From the table, it is clear that between the ages of 33 and 42, men are 23.7 percentage points more likely to have been involved in crime than women (up from 11.4 percentage points at age 16[47]); girls, on the other hand, are 5.8 percentage points more likely to show signs of depression at age 42. Interestingly, individuals from the low father's SES subgroup are 7.1 percentage points less likely to report poor or fair health (compared to good or excellent) at age 42 than are individuals from the high father's SES subgroup.

As can be seen from Table 11, the impact of social adjustment at age 11 on most adult social outcomes does not differ significantly across subgroups: the only exceptions are for subgroups defined according to father's socioeconomic status. For these individuals, a one standard deviation increase in social adjustment at age 11 is associated with a 5.4 percentage point reduction in the likelihood of reporting poor or fair health at age 42 (vs. good or excellent) for individuals from low SES backgrounds, but only a 1.4 percentage point reduction for individuals from high SES backgrounds; in terms of the likelihood of showing signs of depression at age 42, a one standard deviation improvement in social skills at age 11 is associated with a significantly greater fall amongst individuals from low SES backgrounds than amongst individuals from high SES backgrounds (see Table C.4 in Appendix C for details). This means that policies designed to develop social adjustment at age 11 may improve health outcomes more for individuals from low SES backgrounds than they do for individuals from high SES backgrounds, thus potentially reducing inequality (at least in terms of these outcomes).

6 Impact of Different Types of Social Skills at Age 11 on Later Outcomes

The measure of social skills that we have used thus far comprises (the negative of) the total number of sentences underlined by the teacher as part of the Bristol Social Adjustment Guide (BSAG) at age 11. This measure compounds the effects of 12 different types of social maladjustment: anxiety for acceptance by children, hostility towards children, hostility

[47] See Table 4 for details.

towards adults, "writing off" adults and adult standards, withdrawal, unforthcomingness, depression, anxiety for acceptance by adults, restlessness, inconsequential behaviour, miscellaneous symptoms, and miscellaneous nervous symptoms. In this section, we investigate which types of social maladjustment[48] (as represented by separate standardised scores for each of the 12 domains[49]) matter for particular outcomes.[50]

Given that the domains of the BSAG are designed to capture different elements of maladjustment, it is not unreasonable to expect that the degree of correlation between them would not be overly large: the covariance matrix for our cohort is presented in Table 12. Furthermore, when factor analysis has been carried out, the results have not suggested that there are many fewer factors than domains (see, for example, McDermott, 1980)[51], thus it does not seem unreasonable to expect these standardised domain scores to pick up the impact of different social skills on particular outcomes.

Education outcomes

Table 13 provides estimates of the impact of different types of social maladjustment on the probability that an individual will stay on at school beyond age 16, the probability that they will obtain a degree (by age 42), and on basic literacy and numeracy skills at age 37 (normalised to have mean zero, variance one).

Given that – as we saw in Section 4, *Adolescent and social outcomes* – overall social skills at age 11 have no impact on literacy or numeracy scores at age 37, it is unsurprising to see that none of the domains considered here exert individually significant effects on these outcomes: further, they are jointly insignificant from zero.

The impact of different elements of social maladjustment is more clearly demonstrated by the other two outcomes, however: from Table 9, it is clear that exhibiting signs of depression at

[48] In this section, we use the number of sentences underlined (rather than minus the number of sentences underlined): this is because we are no longer comparing the impact of social skills with the impact of cognitive skills (as in previous sections).
[49] This is the number of sentences underlined in each domain, normalised to have mean zero, variance one.
[50] Graphs showing the distribution of the number of sentences underlined by the teacher at age 11 for each domain can be found in Appendix A.
[51] Although Stott (1974) argues that factor analysis is not particularly meaningful, given that the social maladjustment scores are clearly non-normally distributed (see Appendix A).

age 11 has a significant negative impact on both staying on at school beyond age 16, and on the probability of having a degree (by age 42): a one standard deviation increase in maladjustment on this dimension gives rise to a 2 percentage point reduction in both probabilities (holding all other skills – and all other background characteristics[52] – constant). Given that apathy features strongly amongst the types of behaviour that comprise the "depression" domain (see Appendix A), this is perhaps not overly surprising.

Interestingly, two domains that try to capture individuals' attitudes towards their teachers and towards their work (respectively "writing off adults and standards" and "inconsequential behaviour") also have a negative and significant impact on the probability of staying on at school beyond the age of 16 (but not on the likelihood of obtaining a degree): perhaps individuals exhibiting these types of behaviour are less likely to be encouraged by teachers to stay on at school (if they are considered to be disruptive), and/or are less able to (if they have not worked hard enough to achieve the necessary grades).

Labour market outcomes

Table 14 shows how different types of social maladjustment observed at age 11 affect labour market outcomes at age 42[53]: interestingly, different skills appear to be important for employment status and log hourly wages.

Hostility towards adults (at age 11) has a negative and significant impact on the probability of being in work at age 42, such that a one standard deviation increase in this type of maladjustment is associated with a 1.5 percentage point (2 percent) reduction in the likelihood of being employed (holding all else constant): this may not be altogether surprising, given that this particular domain seems to capture problems with authority (see Appendix A for details). Interestingly, anxiety for acceptance by adults has a *positive* and significant impact on employment status: this may be because children who are maladjusted on this dimension are judged by their teachers to be over-zealous - which may be better rewarded in the labour market.

[52] See Appendix A for the full list of background characteristics for which we control.
[53] Note that we are NOT controlling for highest qualification in these regressions.

The two types of maladjustment that appear to have a negative and significant influence on log hourly wages are inconsequential behaviour and "miscellaneous symptoms": these miscellaneous symptoms include evidence of truancy and lack of punctuality - not sought-after qualities in the labour market. Furthermore, a one standard deviation increase in inconsequential behaviour at age 11 is linked to a 2.7 percent reduction in hourly wages at age 42. Interestingly, inconsequential behaviour also exerts a negative and significant impact on the probability of staying on at school beyond age 16 (see Table 9), such that it is not clear whether these skills (or lack thereof) act on wages directly, or indirectly via poorer educational attainment.[54]

Adolescent social outcomes

Table 15 illustrates the impact of different types of social maladjustment at age 11 on adolescent social outcomes. From these results, it is clear that a one standard deviation increase in hostility towards adults (at age 11) exerts a positive[55] and significant impact on every outcome under consideration, ranging from 0.1 percentage points (7 percent) on exclusion from school to 2.1 percentage points (17 percent) on the likelihood of being a teenage mum. This is an extremely consistent finding, and one which is not overly surprising, given that the "hostility towards adults" domain largely reflects issues with authority, which might be expected to increase engagement in negative social behaviour amongst teenagers.[56]

What is perhaps more surprising is that the impacts of the group of "under-reactive" domains (see Stott, 1974) - withdrawal, unforthcomingness and depression - are sometimes positive and significant, and sometimes negative and significant (whereas we might have expected them all to act in the same direction). For example, a one standard deviation increase in depression at age 11 is associated with a 1.1 percentage point (8 percent) increase in the likelihood of smoking more than 40 cigarettes per week (at 16), while a one standard deviation increase in unforthcomingness at age 11 is associated with a 1.3 percentage point (10 percent) *decrease* in the same outcome.

[54] Remember that we are not controlling for highest qualification in these regressions.
[55] Remember that these may be considered negative social outcomes, such that maladjustment at age 11 might be expected to exert a positive influence on them (in contrast to the negative impact anticipated for education and labour market outcomes).
[56] Inconsequential behaviour at age 11 is also positively associated with heavy smoking, truancy and involvement with crime at age 16.

Adult social outcomes

Table16 provides estimates of the impact of different aspects of social maladjustment at age 11 on adult crime and health outcomes. Whilst there are relatively few significant results on which to comment, two are of particular interest: the first is that depression (as reported by the child's teacher) at age 11 is significantly positively associated with depression (as measured by the malaise index) at age 42. This is a striking finding, indicating that depression in childhood may persist into later adulthood, thus highlighting the potential importance of mental health interventions for such children: for example, a reduction of one standard deviation in terms of depressive behaviour at age 11 is associated with a 1.6 percentage point (12 percent) reduction in the likelihood of being assessed as suffering from depression at age 42.

The second is the *negative* and significant relationship between unforthcomingness at age 11 and crime carried out between the ages of 33 and 42: it is clear from Table 16 that a one standard deviation increase in unforthcomingness at age 11 is associated with a 2.3 percentage point (9 percent) *reduction* in the probability of being involved in crime between these ages. This may be reasonable if, for example, crimes tend to be committed by gangs (with which shy individuals are less likely to be involved) than by individuals working alone.

7 The Home Learning Environment and Skill Formation

In Section 4, we saw the importance of social and cognitive skills for a range of education, labour market and social outcomes. In this section, we explore the development of these skills from birth to age 11. Table 17 presents results from a simple OLS model, in which we regress our standardised measures of social and cognitive skills at ages 7 and 11 on a host of background characteristics (see Appendix A for details). From these results, it is clear that both family background and the home learning environment are extremely important for skill development.

By age 7, gaps in social and cognitive abilities have already emerged according to socio-economic status (captured here by father's social class), with children from both professional and non-manual family backgrounds exhibiting significantly greater cognitive and social skills than children from manual backgrounds (holding all else constant).

Interestingly, in contrast to the findings for socioeconomic status, years of mother's and father's education do not affect social skills – as assessed by the teacher - at either age 7 or age 11: this is in contrast to the findings for cognitive skills, on which years of parental education exert a positive and significant effect at both ages. For example, if the child's mother had undertaken an additional year of education, this would – other things being equal - be associated with an increase of 3.2 percent of a standard deviation in cognitive skills at age 7.

Whilst the number of years of formal education of the parents does not appear to matter for social skill development, other aspects of the home learning environment - such as how much the parents (particularly the father) reads each week, and whether the parents show an interest in their child's education – are extremely important. We can see from Table 17 that if mothers who currently show little interest in their child's education were to change their behaviour in this respect, the additional attention would be associated with an increase of nearly half a standard deviation in social skills at age 7 (and a smaller – but still significant – increase at age 11).

The home environment more generally also plays a valuable role in early skill development: serious difficulties in the family - such as alcoholism, mental health issues, divorce, and so on - observed by the health visitor at age 7 were associated with lower social and cognitive skills at both ages 7 and 11; birth order was also important over time, with only children and those with many younger siblings faring worse than those with only older siblings.[57]

The child's own early developmental outcomes - including whether or not they could walk alone by age 1.5 years, whether they could speak by age 2, and whether they still wet themselves by day beyond age 3 (described together as "slow early development" in Table 12), plus poor health or disability at birth and/or during early childhood - are also extremely

[57] This result is inferred from the birth order variables included in our model.

important in explaining social and cognitive skills at age 7, but only have a direct impact on cognitive skills at age 11.

The results in Table 17 also confirm the notion that 'skills beget skills': both cognitive and social skills (and their interaction) at age 7 are important factors in explaining social and cognitive performance at age 11. However, the magnitude of these coefficients provides some suggestive evidence that - on average at least - social skills may be more malleable than cognitive skills between the ages of 7 and 11. This is because the regressions reveal a stronger correlation (conditional on other background factors) between cognitive skills over time than between social skills over time - with a coefficient of 0.65 on the age 7 cognitive test score in the age 11 cognitive test regression, compared with a coefficient of 0.27 on the age 7 social adjustment score in the age 11 social adjustment regression.

The intuition that social skills exhibit greater mobility than cognitive skills is also confirmed in Tables 18 and 19, which show transition matrices for social adjustment and cognitive test scores respectively between the ages of 7 and 11. To produce these, we divide the population into quartiles[58] at each age, and calculate the probabilities of moving between quartiles over time. These probabilities can provide useful information about the potential malleability of social versus cognitive skills.

From Table 18, we see that 47 percent of children in the most socially maladjusted quartile of the population at age 7 were still in the most socially maladjusted quartile at age 11, while 30 percent had moved into the quartile above, i.e. moved into a relatively less maladjusted group over time. For cognitive test scores, the proportions were 65 percent and 26 percent respectively.

The matrices as a whole suggest considerably more mobility in social skills than cognitive skills; to summarise the degree of mobility across all quartiles, we calculate immobility indices for social adjustment and cognitive test scores.[59] Here, we see that the immobility

[58] As a result of the rather skewed nature of the distribution of social adjustment scores (see Appendix A for details), our social adjustment quartiles do not contain exactly 25 percent of the NCDS population (see notes to Table 6.2 for more information).

[59] We calculate the immobility indices by summing proportions on the leading diagonal and all adjacent squares, i.e. for social adjustment, the immobility index is calculated using the following figures: 0.47+0.33+0.25+0.40+0.30+0.24+0.31+0.25+0.28+0.27 = 3.09.

index for cognitive test scores (3.59) is higher than for measures of social maladjustment (3.09), which may in turn imply that social skills are more malleable than cognitive skills.

It should be noted, however, that apparent differences in the degree of mobility between cognitive and social skills shown in these transition matrices - and in the regression coefficients in Table 17 - could also arise from differences in the extent to which measurement error is a problem for these scores. In particular, if there were greater measurement error in the social adjustment scores (which is plausible, given that these measures are likely to be assessed by different teachers at ages 7 and 11, whilst cognitive tests may be scored more objectively), then this would be recorded as greater mobility in socials skills compared to cognitive skills: for this reason our findings should be taken as suggestive.[60]

8 Conclusion

In this report, we make clear that a vision of the world in which skill is a one dimensional object is extremely inadequate. For the most part, we grouped skill into only two categories (cognitive and non-cognitive), but it is quite likely that a much larger variety of skills is important, as shown in the latter part of our report (see also, for example, Duncan et al. (2006), or Feinstein (2000)). There is substantial evidence that non-cognitive skills are important determinants of schooling and labour market outcomes - both directly and indirectly (through their effect on educational attainment). Moreover, non-cognitive skills are very strong predictors of engagement in risky behaviours – for example, involvement in crime or exclusion from school - which impose costs not only for the individual, but also for society as a whole.

Furthermore, as suggested by a large literature (see, for example, Carneiro & Heckman (2003)), both cognitive and non-cognitive skills are malleable. We show in this paper that they are strongly dependent on family background and other characteristics of the home learning environment, and that this is likely to be for both genetic and environmental reasons. More importantly, our work has suggested that social skills may be *more* malleable than

[60] Note that in future work we plan to calculate how much greater the measurement error in social skills would have to be for these apparent differences in malleability to be undermined.

cognitive skills (see also Carneiro & Heckman (2003)). If this is true, then there may be greater scope for education policy to affect social skills rather than cognitive skills.

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Table 1 Mean outcomes for our sample

Outcome	Overall	Above-median social skills	Below-median social skills
Education outcomes			
Stay on at 16	0.288	0.386	0.198
HE highest qualification	0.331	0.419	0.248
Literacy score (standard deviations)	0.027	0.207	-0.134
Numeracy score (standard deviations)	0.031	0.224	-0.144
Labour market outcomes			
Work experience (months)	238	240	236
Employment status	0.847	0.877	0.820
Log hourly wages (£)	2.11	2.17	2.06
Adolescent social outcomes			
Smoking	0.132	0.102	0.159
Truancy	0.512	0.455	0.560
Exclusion	0.013	0.006	0.020
Crime	0.101	0.055	0.141
Teenage motherhood	0.120	0.079	0.169
Adult social outcomes			
Crime	0.251	0.223	0.277
Poor or fair health	0.181	0.143	0.216
Depression	0.130	0.104	0.155
Mental health problems	0.144	0.127	0.160

Notes to Table 1

1. The median value of social adjustment at age 11 is 0.389. Note that we only summarise the outcomes of individuals for whom we observe both social and cognitive skills at age 11.
2. With the exception of the literacy and numeracy scores (reported in standard deviations), work experience (reported in months) and log hourly wages (reported in pounds), all outcomes are dummy variables, such that the values in the table represent the proportion of individuals in our sample who take value one for the outcome of interest.

Table 2 Impact of a standardised social adjustment score (and other variables) on selected education outcomes

	Stay on at 16	Standardised literacy score	Standardised numeracy score	HE highest qualification
Mean outcome in population	0.288	0[61]	0[62]	0.331[63]
Social skills at age 11	0.038 [0.006]**	-0.01 [0.026]	0.022 [0.025]	0.023 [0.006]**
Cognitive skills at age 11	0.215 [0.007]**	0.601 [0.036]**	0.665 [0.034]**	0.224 [0.008]**
Cognitive*social skills at age 11	0.05 [0.007]**	-0.055 [0.031]	-0.049 [0.030]	0.027 [0.008]**
Female	-0.015 [0.009]	-0.226 [0.046]**	-0.335 [0.044]**	-0.047 [0.010]**
Father's years of education	0.012 [0.003]**	0.002 [0.017]	-0.003 [0.017]	0.017 [0.004]**
Mother's years of education	0.036 [0.004]**	-0.021 [0.021]	-0.004 [0.020]	0.017 [0.004]**
High father's SES[64]	0.129 [0.016]**	0.018 [0.082]	0.128 [0.078]	0.111 [0.018]**
Medium father's SES[65]	0.041 [0.013]**	-0.018 [0.058]	0.074 [0.055]	0.05 [0.014]**
Any serious difficulties in the family (age 7)	-0.042 [0.016]**	-0.142 [0.074]	-0.08 [0.071]	-0.026 [0.018]
Low birth weight or premature	-0.02 [0.017]	0.057 [0.089]	0.036 [0.085]	-0.022 [0.020]
Mother a heavy smoker (during pregnancy)	-0.014 [0.012]	0.003 [0.060]	0.029 [0.057]	-0.012 [0.014]
Constant		0.515 [0.834]	1.175 [0.584]*	
Observations	10,723	1,450	1,433	9,750
R-squared		0.34	0.412	

Notes to Table 2

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

[61] The literacy score has been normalised to have mean zero, variance one, thus the mean outcome in the population is zero by construction.

[62] The numeracy score has been normalised to have mean zero, variance one, thus the mean outcome in the population is zero by construction.

[63] It must be remembered that highest qualification is recorded at age 42, but whether or not the individual stays on at school beyond 16 is recorded at age 23; thus the fact that 33.1 percent of individuals are recorded as having a degree at age 42 - whilst only 28.8 percent stay on at school - may be reasonable if a relatively high proportion of those who stay on at 16 go on to higher education, and some who did not stay on at 16 go on to higher education at a later date.

[64] High SES (socio-economic status) is defined here as working in a professional occupation.

[65] Medium SES (socio-economic) is defined as working in a non-manual (non-professional) occupation.

Table 3 Impact of a standardised social adjustment score (and other variables) on labour market outcomes

	Work experience (months)		Employment status		Log hourly wage (£)	
	Without education	With education	Without education	With education	Without education	With education
Mean outcome in population	238		0.847		2.11	
Social skills at age 11	5.004 [0.881]**	8.413 [2.744]**	0.026 [0.018]**	0.024 [0.019]*	0.033 [0.007]**	0.013 [0.022]
Cognitive skills at age 11	3.884 [1.124]**	35.384 [4.586]**	0.036 [0.024]**	0.048 [0.037]**	0.194 [0.009]**	0.055 [0.035]
Cognitive*social skills at age 11	-9.251 [1.006]**	-2.787 [1.178]*	-0.015 [0.011]**	-0.01 [0.009]	0.018 [0.009]*	-0.005 [0.010]
Female	-60.196 [1.441]**	-59.293 [1.420]**	-0.126 [0.082]**	-0.12 [0.081]**	-0.397 [0.012]**	-0.37 [0.011]**
Father's years of education	-1.287 [0.529]*	-0.837 [0.517]	-0.002 [0.003]	-0.002 [0.003]	0.018 [0.004]**	0.012 [0.004]**
Mother's years of education	-2.247 [0.641]**	-1.784 [0.626]**	0 [0.003]	-0.001 [0.003]	0.009 [0.005]	0.001 [0.005]
High father's SES[66]	-0.959 [2.628]	0.208 [2.567]	-0.007 [0.014]	-0.014 [0.016]	0.086 [0.022]**	0.052 [0.021]*
Medium father's SES[67]	3.968 [1.870]*	2.946 [1.823]	0.013 [0.012]	0.008 [0.010]	0.051 [0.015]**	0.041 [0.014]**
Any serious difficulties in the family (age 7)	-4.887 [2.348]*	-4.347 [2.289]	-0.042 [0.030]**	-0.039 [0.029]**	-0.004 [0.019]	0.001 [0.019]
Low birth weight or premature	3.388 [2.788]	4.226 [2.716]	-0.006 [0.015]	-0.004 [0.014]	-0.026 [0.023]	-0.024 [0.022]
Mother a heavy smoker	-0.582 [1.910]	-0.674 [1.861]	-0.002 [0.009]	-0.001 [0.009]	0 [0.015]	0.008 [0.015]
Highest qualification L1 (age 42)		15.607 [5.540]**		0.052 [0.042]**		0.061 [0.039]
Highest qualification L2 (age 42)		22.901 [5.007]**		0.054 [0.042]**		0.152 [0.034]**
Highest qualification L3 (age 42)		20.556 [5.164]**		0.064 [0.050]**		0.243 [0.035]**
Highest qualification L4 (age 42)		21.621 [5.140]**		0.092 [0.069]**		0.396 [0.035]**
Highest qualification L5 (age 42)		-9.658 [7.126]		0.083 [0.069]**		0.461 [0.052]**
Constant	317.694 [30.595]**	296.541 [30.269]**			2.075 [0.158]**	1.971 [0.155]**
Observations	8,347		9,737		6,826	
R-squared	0.215	0.258			0.289	0.342

Notes to Table 3:

1) Models using the "without education" specification control for gender, ethnicity, early health/ development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for more details). Models using the "with education" specification additionally control for a series of dummy variables indicating the cohort member's highest qualification at age 42 (the missing dummy is having no qualifications); each of these education variables is also interacted with our measures of social and cognitive skills at age 11.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

[66] High SES (socio-economic status) is defined here as working in a professional occupation..

[67] Medium SES (socio-economic status) is defined as working in a non-manual (non-professional) occupation

Table 4 Impact of a standardised social adjustment score (and other variables) on adolescent social outcomes

	Smoking	Truancy	Exclusion	Crime	Teen mum
Mean outcome in population	0.132	0.512	0.013	0.101	0.120
Social skills at age 11	-0.03	-0.036	-0.004	-0.023	-0.022
	[0.004]**	[0.006]**	[0.001]**	[0.029]**	[0.005]**
Cognitive skills at age 11	0.002	-0.04	0	-0.019	-0.044
	[0.005]	[0.007]**	[0.001]	[0.024]**	[0.006]**
Cognitive*social skills at age 11	-0.018	-0.038	0	-0.001	-0.007
	[0.004]**	[0.006]**	[0.001]	[0.003]	[0.006]
Female	-0.063	-0.002	-0.003	-0.09	
	[0.006]**	[0.010]	[0.001]**	[0.109]**	
Father's years of education	-0.001	-0.001	0	-0.003	-0.006
	[0.003]	[0.004]	[0.000]	[0.004]	[0.004]
Mother's years of education	-0.001	-0.018	0.001	-0.002	-0.006
	[0.003]	[0.004]**	[0.001]	[0.003]	[0.005]
High father's SES[68]	-0.016	-0.093	-0.003	-0.025	-0.041
	[0.012]	[0.018]**	[0.002]	[0.032]**	[0.016]*
Medium father's SES[69]	-0.008	-0.021	-0.001	-0.006	-0.006
	[0.008]	[0.012]	[0.001]	[0.009]	[0.009]
Any serious difficulties in the family (age 7)	0.024	0.017	0.001	0.021	0.02
	[0.009]*	[0.015]	[0.002]	[0.027]**	[0.011]
Low birth weight or premature	0.004	-0.049	0.001	0.005	-0.008
	[0.013]	[0.018]**	[0.002]	[0.011]	[0.013]
Mother a heavy smoker	0.016	0.054	0.003	0.019	0.016
	[0.008]	[0.012]**	[0.001]*	[0.024]**	[0.009]
Observations	10,260	12,183	9,380	11,760	5,372

Notes to Table 4:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (the only exception being that the teenage motherhood equation does not – for obvious reasons – include a female dummy). Details can be found in Appendix A.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

[68] High SES (socio-economic status) is defined here as working in a professional occupation..
[69] Medium SES (socio-economic status) is defined as working in a non-manual (non-professional) occupation.

Table 5 Impact of a standardised social adjustment score (and other variables) on adult social outcomes

	Crime	Poor or fair health	Depression	Mental health problems
Mean outcome in population	0.251	0.181	0.130	0.144
Social skills at age 11	-0.018 [0.005]**	-0.021 [0.007]**	-0.025 [0.004]**	-0.028 [0.012]**
Cognitive skills at age 11	-0.012 [0.007]	-0.049 [0.014]**	-0.03 [0.005]**	0.002 [0.006]
Cognitive*social skills at age 11	-0.002 [0.006]	0.005 [0.005]	0 [0.004]	-0.002 [0.005]
Female	-0.235 [0.009]**	0.007 [0.008]	0.063 [0.007]**	0.059 [0.026]**
Father's years of education	-0.001 [0.003]	0 [0.003]	-0.004 [0.003]	0.001 [0.003]
Mother's years of education	0.006 [0.004]	-0.005 [0.004]	0.005 [0.003]	0.005 [0.004]
High father's SES[70]	-0.002 [0.016]	-0.024 [0.016]	-0.013 [0.013]	0.001 [0.013]
Medium father's SES[71]	-0.007 [0.012]	-0.024 [0.011]*	-0.008 [0.008]	0.001 [0.009]
Any serious difficulties in the family (age 7)	0.022 [0.014]	0.037 [0.015]**	0.039 [0.010]**	0.029 [0.016]**
Low birth weight or premature	0.006 [0.017]	0.016 [0.016]	0.017 [0.014]	0.015 [0.016]
Mother a heavy smoker	0.027 [0.012]*	0.041 [0.015]**	0.014 [0.008]	0.012 [0.011]
Observations	9,640	9,750	9,635	9,644

Notes to Table 5

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

[70] High SES (socio-economic status) is defined here as working in a professional occupation.
[71] Medium SES (socio-economic status) is defined as working in a non-manual (non-professional) occupation.

Table 6 Mean standardised test scores, by highest qualification level

	Age 7		Age 11		% sample	% of sample with non-missing qualifications
Highest Qualification (recorded at age 42)	Social skills	Cognitive skills	Social skills	Cognitive skills		
None	-0.59	-0.66	-0.59	-0.82	6.4%	9.2%
Level 1 vocational	-0.36	-0.41	-0.53	-0.58	1.3%	1.8%
Level 1 academic	-0.11	-0.30	-0.11	-0.45	6.1%	8.8%
Level 2 vocational	-0.26	-0.32	-0.33	-0.45	4.5%	6.5%
Level 2 academic	0.16	0.10	0.14	0.06	16.2%	23.4%
Level 3 vocational	0.08	0.06	0.08	0.02	7.3%	10.5%
Level 3 academic	0.26	0.33	0.28	0.48	4.7%	6.9%
Degree or higher (Level 4 or Level 5)	0.31	0.36	0.32	0.54	22.9%	33.0%
Missing qualification	-0.16	-0.11	-0.17	-0.17	30.8%	
Total	0.00	0.00	0.00	0.00	100.0%	100.0%

Notes to Table 3.5:

1) Examples of each qualification level (for more information, see: www.qca.org.uk/493_15772.html):
   - Level 1 vocational: National Vocational Qualification (NVQ) Level 1
   - Level 1 academic: General Certificate of Secondary Education (GCSE), grades D-G
   - Level 2 vocational: NVQ Level 2
   - Level 2 academic: GCSE, grades A*-C
   - Level 3 vocational: NVQ Level 3
   - Level 3 academic: A-levels
   - Level 4: undergraduate degree or NVQ Level 4
   - Level 5: postgraduate degree or NVQ Level 5
2) Where an individual holds both an academic and a vocational qualification at the same level, we count the academic qualification as their highest.

Table 7 Impact of the interaction between qualifications and skills at age 11 (both social and cognitive) on labour market outcomes

	Employment status (age 42)			Log hourly wage (age 42)		
	1	2	3	1	2	3
Level 1 vocational	0.093 [0.013]**	0.082 [0.014]**	0.075 [0.065]*	0.124 [0.046]**	0.094 [0.045]*	0.17 [0.065]**
Level 1 academic	0.096 [0.008]**	0.067 [0.010]**	0.053 [0.043]**	0.082 [0.028]**	0.028 [0.028]	0.054 [0.039]
Level 2 vocational	0.076 [0.010]**	0.053 [0.012]**	0.058 [0.048]**	0.114 [0.031]**	0.061 [0.031]	0.101 [0.042]*
Level 2 academic	0.116 [0.008]**	0.07 [0.010]**	0.058 [0.044]**	0.251 [0.024]**	0.123 [0.025]**	0.175 [0.034]**
Level 3 vocational	0.12 [0.007]**	0.083 [0.010]**	0.072 [0.058]**	0.278 [0.027]**	0.163 [0.028]**	0.217 [0.036]**
Level 3 academic	0.1 [0.008]**	0.059 [0.012]**	0.05 [0.041]*	0.438 [0.030]**	0.233 [0.032]**	0.312 [0.042]**
Degree (Level 4 or 5)	0.165 [0.009]**	0.107 [0.011]**	0.096 [0.071]**	0.613 [0.023]**	0.398 [0.026]**	0.409 [0.034]**
Female	-0.108 [0.007]**	-0.12 [0.007]**	-0.12 [0.081]**	-0.373 [0.011]**	-0.376 [0.011]**	-0.375 [0.011]**
Social skills at age 11		0.024 [0.004]**	0.018 [0.025]		0.022 [0.007]**	-0.017 [0.033]
Cognitive skills at age 11		0.019 [0.006]**	0.032 [0.048]		0.115 [0.010]**	0.162 [0.069]*
Cognitive*social skills at age 11		-0.013 [0.005]**	-0.007 [0.007]		0.01 [0.008]	-0.004 [0.010]
No qualifications*social skills at age 11			0.013 [0.025]			0.033 [0.039]
Level 1 vocational*social skills at age 11			dropped			0.029 [0.049]
Level 1 academic*social skills at age 11			0.004 [0.024]			0.026 [0.039]
Level 2 vocational*social skills at age 11			0.027 [0.031]			0.04 [0.041]
Level 2 academic*social skills at age 11			0.002 [0.023]			0.044 [0.036]
Level 3 vocational*social skills at age 11			0.005 [0.026]			-0.006 [0.038]
Level 3 academic*social skills at age 11			0.01 [0.028]			0 [0.000]

Degree*social skills at age 11			0.007 [0.024]			0.059 [0.035]
No qualifications* cognitive skills at age 11			0.006 [0.045]			-0.118 [0.076]
Level 1 vocational* cognitive skills at age 11			dropped			0 [0.000]
Level 1 academic* cognitive skills at age 11			-0.018 [0.049]			-0.096 [0.077]
Level 2 vocational* cognitive skills at age 11			0.017 [0.050]			-0.072 [0.080]
Level 2 academic* cognitive skills at age 11			-0.015 [0.045]			-0.097 [0.071]
Level 3 vocational* cognitive skills at age 11			-0.015 [0.048]			-0.059 [0.074]
Level 3 academic* cognitive skills at age 11			-0.028 [0.051]			-0.071 [0.078]
Degree*cognitive skills at age 11			-0.022 [0.046]			0.022 [0.070]
Constant					1.951 [0.153]**	1.964 [0.155]**
Observations	9,737			6,826		

Notes to Table 7

1) Specification 1 controls for highest qualification at age 42 (no qualifications is the missing category), plus a gender dummy. Specification 2 builds on Specification 1 by adding social and cognitive skills (and their interaction) at age 11, plus controls for ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for details). Specification 3 further adds a series of interactions between social and cognitive skills and the dummies for highest qualification.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table 8 Impact of a standardised social adjustment score (and other variables) on education outcomes for selected subgroups

	Stay on at 16	Standardised literacy score	Standardised numeracy score	HE highest qualification
Boys				
Mean outcome in population	0.289	0.105	0.152	0.347
Social skills at age 11	0.043 [0.008]**	-0.012 [0.032]	-0.011 [0.034]	0.022 [0.008]**
Cognitive skills at age 11	0.222 [0.010]**	0.543 [0.046]**	0.612 [0.049]**	0.235 [0.012]**
Cognitive*social skills at age 11	0.044 [0.010]**	0.056 [0.036]	-0.036 [0.039]	0.019 [0.010]
Observations	5,340	683	678	4,816
R-squared		0.405	0.428	
Girls				
Mean outcome in population	0.289	-0.092	-0.134	0.313
Social skills at age 11	0.029 [0.011]**	0.012 [0.044]	0.058 [0.040]	0.027 [0.010]**
Cognitive skills at age 11	0.21 [0.046]**	0.706 [0.056]**	0.72 [0.052]**	0.21 [0.012]**
Cognitive*social skills at age 11	0.065 [0.017]**	-0.25 [0.057]**	-0.097 [0.053]	0.042 [0.012]**
Observations	5,372	767	755	4,927
R-squared		0.400	0.446	

Low parental education				
Mean outcome in population	0.168	-0.131	-0.174	0.234
Social skills at age 11	0.027 [0.008]**	-0.045 [0.060]	0.034 [0.057]	0.004 [0.010]
Cognitive skills at age 11	0.136 [0.010]**	0.633 [0.073]**	0.727 [0.070]**	0.193 [0.013]**
Cognitive*social skills at age 11	0.042 [0.009]**	-0.008 [0.069]	-0.011 [0.068]	-0.017 [0.014]
Observations	3,191	415	411	2,793
R-squared		0.448	0.524	
High parental education				
Mean outcome in population	0.377	0.116	0.118	0.399
Social skills at age 11	0.035 [0.010]**	0.03 [0.040]	0.022 [0.038]	0.022 [0.010]*
Cognitive skills at age 11	0.286 [0.013]**	0.585 [0.054]**	0.635 [0.051]**	0.237 [0.013]**
Cognitive*social skills at age 11	0.045 [0.013]**	-0.128 [0.052]*	-0.058 [0.050]	0.038 [0.013]**
Observations	4,796	684	676	4,379
R-squared		0.379	0.444	

Low father's SES				
Mean outcome in population	0.14	-0.209	-0.242	0.191
Social skills at age 11	0.031 [0.007]**	-0.045 [0.068]	0.051 [0.070]	0.01 [0.010]
Cognitive skills at age 11	0.084 [0.009]**	0.592 [0.088]**	0.711 [0.093]**	0.148 [0.014]**
Cognitive*social skills at age 11	0.023 [0.008]**	-0.019 [0.071]	0.024 [0.080]	0.006 [0.013]
Observations	2,278	311	307	2,036
R-squared		0.566	0.551	
High father's SES				
Mean outcome in population	0.327	0.07	0.084	0.367
Social skills at age 11	0.035 [0.007]**	-0.005 [0.030]	0.034 [0.028]	0.024 [0.007]**
Cognitive skills at age 11	0.264 [0.009]**	0.583 [0.040]**	0.64 [0.038]**	0.246 [0.010]**
Cognitive*social skills at age 11	0.051 [0.009]**	-0.06 [0.038]	-0.073 [0.035]*	0.035 [0.010]**
Observations	8,182	1,116	1,103	7,466
R-squared		0.344	0.414	

Notes to Table 5.1:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for more details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table 9 Impact of a standardised social adjustment score (and other variables, excluding qualifications) on labour market outcomes for selected subgroups

	Work experience (months)	Employment status	Log hourly wage (£)
Boys			
Mean outcome in population	267.56	0.904	2.31
Social skills at age 11	3.884 [0.962]**	0.023 [0.004]**	0.037 [0.010]**
Cognitive skills at age 11	-3.525 [1.312]**	0.029 [0.006]**	0.207 [0.012]**
Cognitive*social skills at age 11	-9.542 [1.110]**	-0.008 [0.004]	0.017 [0.011]
Observations	4,006	4,809	3,397
R-squared	0.103		0.23
Girls			
Mean outcome in population	209.46	0.788	1.917
Social skills at age 11	6.709 [1.552]**	0.024 [0.008]**	0.024 [0.012]*
Cognitive skills at age 11	11.572 [1.855]**	0.04 [0.009]**	0.177 [0.014]**
Cognitive*social skills at age 11	-11.096 [1.773]**	-0.017 [0.008]*	0.024 [0.014]
Observations	4,341	4,928	3,429
R-squared	0.075		0.165

Low parental education			
Mean outcome in population	240.376	0.841	2.023
Social skills at age 11	5.26 [1.759]**	0.025 [0.008]**	-0.007 [0.013]
Cognitive skills at age 11	10.583 [2.204]**	0.046 [0.010]**	0.199 [0.016]**
Cognitive*social skills at age 11	-9.059 [2.083]**	-0.012 [0.009]	-0.009 [0.015]
Observations	2,406	2,796	1,997
R-squared	0.261		0.315
High parental education			
Mean outcome in population	237.189	0.864	2.173
Social skills at age 11	4.513 [1.284]**	0.026 [0.006]**	0.054 [0.012]**
Cognitive skills at age 11	-3.089 [1.636]	0.021 [0.007]**	0.201 [0.015]**
Cognitive*social skills at age 11	-7.066 [1.528]**	-0.012 [0.006]	0.006 [0.014]
Observations	3,830	4,381	3,114
R-squared	0.219		0.287

Low father's SES			
Mean outcome in population	233.495	0.815	1.967
Social skills at age 11	6.716 [2.234]**	0.042 [0.011]**	0.019 [0.016]
Cognitive skills at age 11	8.874 [2.740]**	0.031 [0.013]*	0.187 [0.020]**
Cognitive*social skills at age 11	-5.076 [2.491]*	-0.017 [0.011]	0.012 [0.019]
Observations	1,685	2,026	1,418
R-squared	0.264		0.277
High father's SES			
Mean outcome in population	238.844	0.855	2.148
Social skills at age 11	4.545 [0.975]**	0.022 [0.013]**	0.036 [0.008]**
Cognitive skills at age 11	2.009 [1.248]	0.035 [0.021]**	0.198 [0.011]**
Cognitive*social skills at age 11	-10.245 [1.132]**	-0.014 [0.009]**	0.017 [0.010]
Observations	6,474	7,461	5,249
R-squared	0.214		0.287

Notes to Table 9

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for more details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES. Note that we do NOT include controls for highest qualification in these models.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table 10 Impact of a standardised social adjustment score (and other variables) on adolescent social outcomes for selected subgroups

	Smoking	Truancy	Exclusion	Crime	Teen mum
Boys					
Mean outcome in population	0.165	0.514	0.019	0.157	
Social skills at age 11	-0.032 [0.005]**	-0.031 [0.007]**	-0.005 [0.103]**	-0.04 [0.041]**	
Cognitive skills at age 11	-0.007 [0.008]	-0.055 [0.010]**	0.003 [0.056]*	-0.031 [0.032]**	
Cognitive*social skills at age 11	-0.028 [0.006]**	-0.035 [0.008]**	0 [0.006]	-0.003 [0.006]	
Observations	5,205	6,260	4,577	6,027	
Girls					
Mean outcome in population	0.093	0.506	0.01	0.043	0.125
Social skills at age 11	-0.028 [0.005]**	-0.047 [0.009]**	-0.001 [0.000]**	-0.009 [0.106]**	-0.022 [0.005]**
Cognitive skills at age 11	0.011 [0.006]	-0.021 [0.011]	-0.001 [0.001]*	-0.01 [0.126]**	-0.044 [0.006]**
Cognitive*social skills at age 11	-0.01 [0.005]	-0.05 [0.010]**	0 [0.000]	0 [0.003]	-0.007 [0.006]
Observations	5,035	5,923	4,399	5,711	5,372

Low parental education					
Mean outcome in population	0.136	0.547	0.011	0.114	0.135
Social skills at age 11	-0.026 [0.412]**	-0.037 [0.011]**	0.00005 [0.000]**	-0.024 [0.248]**	-0.028 [0.011]*
Cognitive skills at age 11	0.002 [0.038]	-0.033 [0.013]*	0 [0.000]	-0.022 [0.222]**	-0.049 [0.012]**
Cognitive*social skills at age 11	-0.022 [0.347]**	-0.027 [0.011]*	0 [0.000]	-0.002 [0.022]	-0.003 [0.012]
Observations	3,126	3,862	1,590	3,784	1,556
High parental education					
Mean outcome in population	0.111	0.456	0.011	0.081	0.099
Social skills at age 11	-0.026 [0.022]**	-0.033 [0.008]**	-0.001 [0.087]**	-0.018 [0.028]**	-0.006 [0.006]
Cognitive skills at age 11	0.002 [0.006]	-0.042 [0.010]**	0 [0.018]	-0.015 [0.023]**	-0.032 [0.007]**
Cognitive*social skills at age 11	-0.013 [0.011]*	-0.041 [0.009]**	0 [0.022]	-0.002 [0.004]	0.008 [0.007]
Observations	4,931	5,872	4,147	5,769	2,384

Low father's SES					
Mean outcome in population	0.165	0.604	0.02	0.154	0.187
Social skills at age 11	-0.036 [0.009]**	-0.058 [0.013]**	-0.001 [0.001]**	-0.034 [0.007]**	-0.052 [0.015]**
Cognitive skills at age 11	0.016 [0.012]	0 [0.015]	0 [0.000]	-0.021 [0.009]*	-0.062 [0.017]**
Cognitive*social skills at age 11	-0.034 [0.010]**	-0.048 [0.012]**	0 [0.000]	-0.006 [0.007]	-0.022 [0.016]
Observations	2,212	2,684	1,522	2,578	1,140
High father's SES					
Mean outcome in population	0.122	0.485	0.012	0.086	0.105
Social skills at age 11	-0.028 [0.004]**	-0.029 [0.007]**	-0.001 [0.000]**	-0.019 [0.002]**	-0.016 [0.005]**
Cognitive skills at age 11	-0.005 [0.005]	-0.055 [0.008]**	0 [0.000]	-0.018 [0.003]**	-0.039 [0.006]**
Cognitive*social skills at age 11	-0.011 [0.004]*	-0.034 [0.007]**	0 [0.000]	-0.001 [0.003]	-0.004 [0.006]
Observations	7,745	9,133	7,006	8,831	4,091

Notes to Table 10

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for more details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES. Further, the teenage motherhood equations (for subgroups defined according to parental education and father's SES) do not include female dummies.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table 11 Impact of a standardised social adjustment score (and other variables) on adult social outcomes for selected subgroups

	Crime	Poor or fair health	Depression	Mental health problems
Boys				
Mean outcome in population	0.373	0.181	0.103	0.117
Social skills at age 11	-0.018 [0.008]*	-0.023 [0.006]**	-0.02 [0.004]**	-0.023 [0.089]**
Cognitive skills at age 11	-0.033 [0.011]**	-0.051 [0.008]**	-0.015 [0.006]*	0.009 [0.036]
Cognitive*social skills at age 11	-0.004 [0.009]	0.001 [0.006]	0.006 [0.005]	0.003 [0.014]
Observations	4,745	4,816	4,733	4,723
Girls				
Mean outcome in population	0.136	0.183	0.161	0.167
Social skills at age 11	-0.018 [0.006]**	-0.018 [0.007]*	-0.031 [0.007]**	-0.033 [0.007]**
Cognitive skills at age 11	0.011 [0.008]	-0.046 [0.009]**	-0.045 [0.008]**	-0.007 [0.009]
Cognitive*social skills at age 11	-0.008 [0.007]	0.01 [0.008]	-0.006 [0.007]	-0.009 [0.008]
Observations	4,895	4,934	4,879	4,895

Low parental education				
Mean outcome in population	0.257	0.195	0.148	0.146
Social skills at age 11	-0.03 [0.010]**	-0.029 [0.009]**	-0.018 [0.008]*	-0.015 [0.008]
Cognitive skills at age 11	0.005 [0.014]	-0.053 [0.012]**	-0.036 [0.010]**	0.003 [0.011]
Cognitive*social skills at age 11	-0.006 [0.012]	-0.002 [0.010]	0.006 [0.009]	0.006 [0.010]
Observations	2,765	2,795	2,755	2,759
High parental education				
Mean outcome in population	0.257	0.16	0.12	0.14
Social skills at age 11	-0.007 [0.008]	-0.009 [0.007]	-0.026 [0.005]**	-0.029 [0.006]**
Cognitive skills at age 11	-0.022 [0.011]*	-0.053 [0.008]**	-0.021 [0.007]**	0.007 [0.008]
Cognitive*social skills at age 11	-0.004 [0.009]	0.018 [0.007]*	-0.001 [0.006]	-0.005 [0.007]
Observations	4,351	4,370	4,345	4,331

Low father's SES				
Mean outcome in population	0.264	0.235	0.171	0.153
Social skills at age 11	-0.014 [0.012]	-0.054 [0.012]**	-0.045 [0.010]**	-0.038 [0.010]**
Cognitive skills at age 11	-0.025 [0.016]	-0.048 [0.015]**	-0.031 [0.013]*	0.007 [0.012]
Cognitive*social skills at age 11	0.012 [0.013]	-0.015 [0.012]	-0.006 [0.010]	0.006 [0.010]
Observations	2,004	2,033	2,003	1,999
High father's SES				
Mean outcome in population	0.248	0.164	0.121	0.139
Social skills at age 11	-0.019 [0.006]**	-0.014 [0.005]**	-0.023 [0.004]**	-0.026 [0.005]**
Cognitive skills at age 11	-0.007 [0.008]	-0.049 [0.007]**	-0.027 [0.006]**	0.002 [0.006]
Cognitive*social skills at age 11	-0.006 [0.007]	0.008 [0.006]	0.001 [0.005]	-0.007 [0.005]
Observations	7,398	7,466	7,384	7,390

Notes to Table 11

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for more details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table 12 Degree of correlation between the (standardised) domains of social maladjustment

	Domains of social maladjustment											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00											
2	0.45	1.00										
3	0.43	0.59	1.00									
4	0.31	0.42	0.43	1.00								
5	0.04	0.16	0.18	0.43	1.00							
6	-0.05	0.02	0.06	0.29	0.46	1.00						
7	0.19	0.30	0.42	0.42	0.47	0.41	1.00					
8	0.35	0.27	0.22	0.07	-0.01	-0.07	0.11	1.00				
9	0.36	0.27	0.25	0.30	0.13	0.05	0.23	0.27	1.00			
10	0.51	0.48	0.51	0.50	0.17	0.07	0.41	0.28	0.55	1.00		
11	0.20	0.28	0.28	0.35	0.38	0.42	0.48	0.25	0.28	0.34	1.00	
12	0.20	0.19	0.19	0.18	0.15	0.11	0.21	0.15	0.24	0.29	0.23	1.00

Notes to Table 12:

1) The different domains of social maladjustment are as follows:
   - Domain 1: Anxiety for acceptance by kids
   - Domain 2: Hostility towards kids
   - Domain 3: Hostility towards adults
   - Domain 4: Writing off adults and standards
   - Domain 5: Withdrawal
   - Domain 6: Unforthcomingness
   - Domain 7: Depression
   - Domain 8: Anxiety for acceptance by adults
   - Domain 9: Restlessness
   - Domain 10: Inconsequential behaviour
   - Domain 11: Miscellaneous symptoms
   - Domain 12: Miscellaneous nervous symptoms

Table 13 Impact of different domains of social maladjustment (standardised) on education outcomes

	Stay on at 16	Standardised literacy score	Standardised numeracy score	HE highest qualification
Mean outcome in population	0.288	0	0	0.331
Anxiety for acceptance by kids	0.005	0.007	0.019	0.009
	[0.007]	[0.030]	[0.029]	[0.007]
Hostility towards kids	-0.006	0.035	0.022	0.003
	[0.008]	[0.032]	[0.030]	[0.008]
Hostility towards adults	-0.006	-0.099	-0.023	-0.005
	[0.007]	[0.035]**	[0.034]	[0.008]
Writing off adults & standards	-0.015	-0.041	-0.041	-0.006
	[0.007]*	[0.031]	[0.030]	[0.008]
Withdrawal	0.006	0.034	0.02	0.004
	[0.007]	[0.031]	[0.030]	[0.007]
Unforthcomingness	-0.005	0.025	0.024	-0.023
	[0.006]	[0.028]	[0.027]	[0.007]**
Depression	-0.019	-0.01	-0.06	-0.02
	[0.007]**	[0.034]	[0.032]	[0.008]**
Anxiety for acceptance by adults	0.005	0.038	0.022	0.007
	[0.006]	[0.025]	[0.024]	[0.006]
Restlessness	-0.013	0.002	-0.043	-0.007
	[0.007]	[0.032]	[0.031]	[0.007]
Inconsequential behaviour	-0.023	0.066	0.06	-0.014
	[0.008]**	[0.037]	[0.036]	[0.009]
Miscellaneous symptoms	0.008	-0.005	-0.019	0.016
	[0.007]	[0.031]	[0.029]	[0.007]*
Miscellaneous nervous symptoms	-0.001	-0.019	-0.007	0.009
	[0.006]	[0.025]	[0.024]	[0.006]
Test for joint significance (Prob > chi/F)	0.000	0.164	0.399	0.000
Observations	10,723	1,450	1,433	9,750
R-squared		0.374	0.431	

Notes to Table 13

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.
3) The test for joint significance reports the probability that the twelve domains of social maladjustment are jointly significantly different from zero – against the chi-squared statistic for probit models and the F statistic for regression models.

Table 14 Impact of different domains of social maladjustment (standardised) on labour market outcomes

	Work experience (months)	Employment status	Log hourly wage (£)
Mean outcome in population	238	0.847	2.11
Anxiety for acceptance by kids	0.452 [0.979]	0.005 [0.005]	0.002 [0.008]
Hostility towards kids	1.532 [1.181]	0.001 [0.006]	0.001 [0.010]
Hostility towards adults	-1.083 [1.149]	-0.015 [0.005]**	0.012 [0.010]
Writing off adults & standards	-0.429 [1.068]	0.001 [0.005]	-0.001 [0.009]
Withdrawal	0.489 [1.014]	-0.006 [0.005]	-0.004 [0.008]
Unforthcomingness	-3.307 [0.921]**	-0.004 [0.004]	-0.012 [0.007]
Depression	-1.462 [1.091]	-0.006 [0.005]	-0.001 [0.009]
Anxiety for acceptance by adults	0.07 [0.862]	0.009 [0.004]*	-0.002 [0.007]
Restlessness	-0.914 [1.065]	-0.004 [0.005]	-0.003 [0.009]
Inconsequential behaviour	-0.564 [1.262]	-0.009 [0.006]	-0.027 [0.010]**
Miscellaneous symptoms	-2.192 [1.019]*	-0.008 [0.005]	-0.019 [0.008]*
Miscellaneous nervous symptoms	0.586 [0.873]	0.002 [0.004]	0 [0.007]
Constant	139.58 [57.272]*		1.486 [0.389]**
Test for joint significance (Prob > chi/F)	0.000	0.000	0.000
Observations	8,346	9,737	6,826
R-squared	0.222		0.292

Notes to Table 14

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A. Note that we do NOT include controls for highest qualification in these models.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.
3) The test for joint significance reports the probability that the twelve domains of social maladjustment are jointly significantly different from zero – against the chi-squared statistic for probit models and the F statistic for regression models.

Table 15 Impact of different domains of social maladjustment (standardised) on adolescent social outcomes

	Smoking	Truancy	Exclusion	Crime	Teen mum
Mean outcome in population	0.132	0.512	0.013	0.101	0.120
Anxiety for acceptance by kids	0.002 [0.004]	0 [0.006]	0 [0.001]	-0.002 [0.003]	-0.005 [0.007]
Hostility towards kids	0.004 [0.004]	0.002 [0.007]	0 [0.001]	0.003 [0.003]	-0.009 [0.007]
Hostility towards adults	0.013 [0.004]**	0.016 [0.007]*	0.001 [0.001]**	0.011 [0.003]**	0.021 [0.006]**
Writing off adults & standards	0.007 [0.004]	0.007 [0.007]	0 [0.001]	0.005 [0.003]	-0.006 [0.007]
Withdrawal	-0.002 [0.004]	0.014 [0.007]*	-0.001 [0.001]	0.003 [0.003]	-0.003 [0.007]
Unforthcomingness	-0.013 [0.004]**	-0.013 [0.006]*	-0.001 [0.001]	-0.004 [0.003]	-0.003 [0.005]
Depression	0.011 [0.005]*	0.009 [0.007]	0.002 [0.001]**	0.001 [0.003]	0.01 [0.006]
Anxiety for acceptance by adults	0.002 [0.004]	-0.001 [0.006]	0 [0.001]	-0.004 [0.003]	-0.002 [0.005]
Restlessness	0.004 [0.004]	0.004 [0.007]	0 [0.001]	0 [0.003]	0.01 [0.006]
Inconsequential behaviour	0.02 [0.005]**	0.033 [0.008]**	0.001 [0.001]	0.017 [0.003]**	0.009 [0.008]
Miscellaneous symptoms	-0.011 [0.005]*	-0.017 [0.007]*	0 [0.001]	-0.005 [0.003]	0.006 [0.006]
Miscellaneous nervous symptoms	-0.002 [0.004]	-0.002 [0.006]	0 [0.000]	0.001 [0.002]	-0.003 [0.006]
Test for joint significance (Prob > chi)	0.000	0.000	0.000	0.000	0.000
Observations	10,260	12,183	9,380	11,760	5,371

Notes to Table 15:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (the only exception being that – for obvious reasons – the teenage motherhood equation does not include a female dummy). Details can be found in Appendix A.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.
3) The test for joint significance reports the probability that the twelve domains of social maladjustment are jointly significantly different from zero – against the chi-squared statistic.

Table 16 Impact of different domains of social maladjustment (standardised) on adult social outcomes

	Crime	Poor or fair health	Depression	Mental health problems
Mean outcome in population	0.251	0.181	0.130	0.144
Anxiety for acceptance by kids	0	0.001	-0.007	0.001
	[0.006]	[0.005]	[0.005]	[0.005]
Hostility towards kids	0.013	-0.002	-0.003	-0.002
	[0.007]	[0.006]	[0.005]	[0.005]
Hostility towards adults	0.012	0.008	0.014	0.009
	[0.007]	[0.006]	[0.005]**	[0.005]
Writing off adults & standards	0.009	0	0.002	0.006
	[0.006]	[0.006]	[0.005]	[0.005]
Withdrawal	0.006	-0.01	0.001	0.004
	[0.006]	[0.006]	[0.005]	[0.005]
Unforthcomingness	-0.023	-0.001	-0.001	-0.001
	[0.006]**	[0.005]	[0.004]	[0.005]
Depression	0.003	0.008	0.016	0.006
	[0.007]	[0.006]	[0.005]**	[0.005]
Anxiety for acceptance by adults	0.003	-0.002	0.005	0.004
	[0.005]	[0.005]	[0.004]	[0.004]
Restlessness	0.003	0.007	0.005	0.003
	[0.006]	[0.006]	[0.005]	[0.005]
Inconsequential behaviour	0.004	0.004	0.006	0.007
	[0.007]	[0.007]	[0.006]	[0.006]
Miscellaneous symptoms	-0.003	0.02	0.002	0.008
	[0.006]	[0.005]**	[0.005]	[0.005]
Miscellaneous nervous symptoms	-0.002	-0.011	-0.005	-0.002
	[0.005]	[0.005]*	[0.004]	[0.004]
Test for joint significance (Prob > chi)	0.000	0.000	0.000	0.000
Observations	9,640	9,750	9,635	9,644

Notes to Table 16:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
2) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.
3) The test for joint significance reports the probability that the twelve domains of social maladjustment are jointly significantly different from zero – against the chi-squared statistic.

Table 17 Impact of family background and the home environment on social and cognitive skills at ages 7 and 11

	Age 7		Age 11	
	Social skills	Cognitive skills	Social skills	Cognitive skills
Female	0.282 [0.015]**	0.033 [0.011]**	0.211 [0.016]**	-0.049 [0.009]**
Father's years of education	0.006 [0.006]	0.02 [0.004]**	-0.001 [0.006]	0.02 [0.004]**
Mother's years of education	0 [0.007]	0.032 [0.005]**	0.011 [0.007]	0.033 [0.004]**
Father's social class - professional	0.104 [0.028]**	0.205 [0.020]**	0.081 [0.029]**	0.188 [0.017]**
Father's social class – non-manual	0.052 [0.019]**	0.1 [0.014]**	0.055 [0.020]**	0.051 [0.012]**
Mother shows little interest in child's education	-0.445 [0.030]**	-0.265 [0.022]**	-0.09 [0.031]**	-0.041 [0.018]*
Father shows little interest in child's education	-0.312 [0.031]**	-0.211 [0.022]**	-0.036 [0.032]	-0.089 [0.019]**
Mother reads news most days and books most weeks	-0.012 [0.019]	0.064 [0.013]**	-0.012 [0.019]	0.066 [0.011]**
Father reads news most days and books most weeks	0.076 [0.018]**	0.089 [0.013]**	-0.013 [0.018]	0.038 [0.011]**
Low birth weight or premature	-0.096 [0.030]**	-0.168 [0.021]**	-0.024 [0.031]	-0.067 [0.018]**
Early illness or handicap	-0.308 [0.077]**	-0.602 [0.052]**	0.152 [0.082]	-0.201 [0.049]**
Slow early development	-0.249 [0.024]**	-0.283 [0.017]**	-0.035 [0.025]	-0.081 [0.015]**
Mother a heavy smoker	-0.055 [0.020]**	-0.011 [0.014]	-0.066 [0.021]**	-0.009 [0.012]
Ever in care (by age 7)	-0.376 [0.058]**	-0.143 [0.041]**	-0.049 [0.059]	-0.015 [0.035]
Only child (by age 7)	-0.084 [0.035]*	-0.018 [0.025]	-0.065 [0.036]	-0.053 [0.021]*
Number of younger siblings at age 7	-0.032 [0.009]**	-0.042 [0.007]**	-0.037 [0.009]**	-0.02 [0.006]**
Any serious difficulties in the family at age 7	-0.169 [0.023]**	-0.162 [0.016]**	-0.087 [0.024]**	-0.043 [0.014]**
Social skills at age 7			0.269 [0.009]**	0.079 [0.006]**
Cognitive ability at age 7			0.23 [0.013]**	0.648 [0.008]**
Cognitive*social skills at age 7			-0.023 [0.011]*	0.021 [0.006]**
Constant	-0.746 [0.629]	-1.295 [0.230]**	-0.115 [0.458]	-1.196 [0.344]**
Observations	14,932	15,038	12,765	12,756
R-squared	0.146	0.208	0.236	0.591

Notes to Table 6.1:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
2) Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table 18 Transition matrix for social adjustment scores, age 7 to 11

Age 7 ↓ Age 11 →	Most maladjusted	2nd	3rd	Least maladjusted
Most maladjusted	0.47	0.30	0.13	0.09
2nd	0.25	0.33	0.24	0.18
3rd	0.16	0.28	0.25	0.31
Least maladjusted	0.09	0.24	0.27	0.40
Immobility index for social adjustment: 3.09				

Notes to Table 18:

1) Individuals are only counted in these transition matrices if they have both age 7 and age 11 social adjustment scores recorded. This is to ensure that the transition probabilities are not biased by differential composition of the age 7 and age 11 populations.
2) Because of the distribution of social adjustment scores (shown in Appendix A), each 'quartile' contains approximately, rather than exactly, one quarter of the population. Transition probabilities are therefore presented for transitions from age 7 to age 11, i.e. the row probabilities sum to one. Immobility indices based on column rather than row probabilities show a very similar picture, with an index of 3.11 for social adjustment.

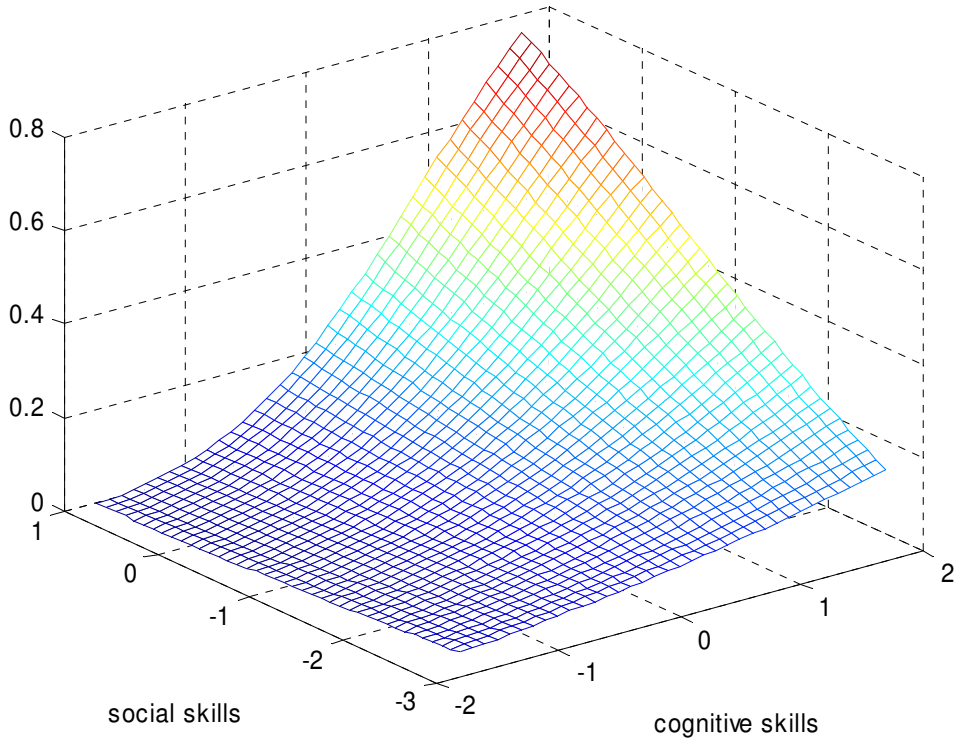
Table 19 Transition matrix for cognitive test scores, age 7 to 11

Age 7 ↓ Age 11 →	Most maladjusted	2nd	3rd	Least maladjusted
Most maladjusted	0.65	0.26	0.08	0.02
2nd	0.25	0.37	0.26	0.11
3rd	0.07	0.27	0.37	0.28
Least maladjusted	0.03	0.10	0.28	0.59
Immobility index for cognitive test scores: 3.59				

Notes to Table 19

1) Individuals are only counted in these transition matrices if they have both age 7 and age 11 cognitive test scores recorded. This is to ensure that the transition probabilities are not biased by differential composition of the age 7 and age 11 populations.

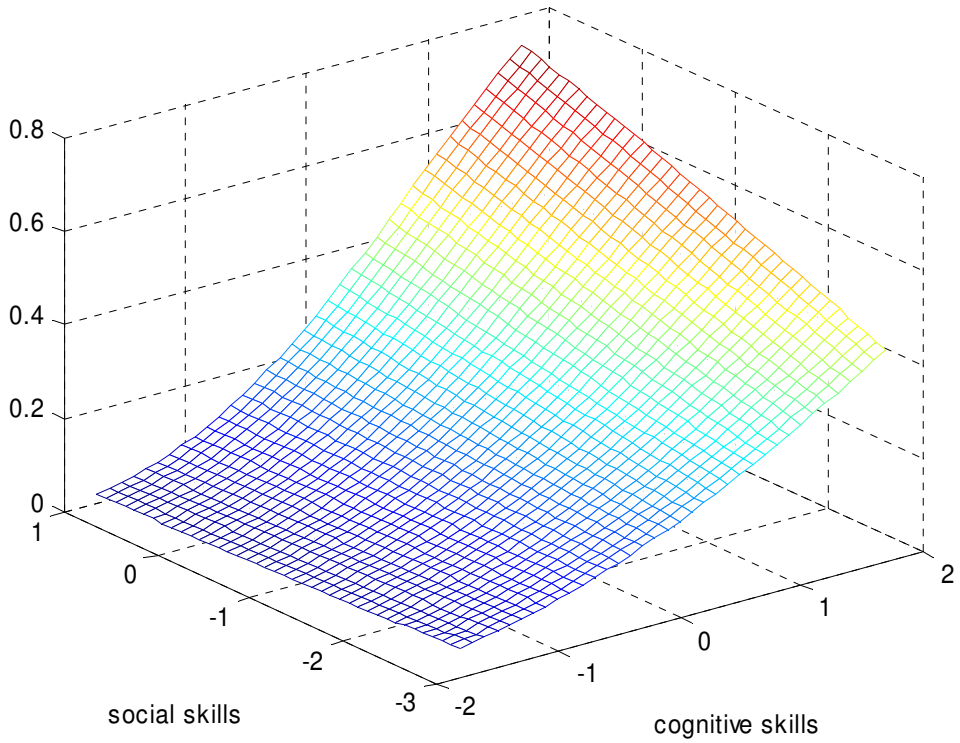
Figure 1 Stayed on at 16 as a function of social and cognitive skills at age 11



Notes to Figure 1:

1. Figure 1 presents the predicted probability that an individual stays on at school beyond age 16 for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample (see Table A.1 in Appendix A for some mean values of key variables).
2. The control variables include gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.

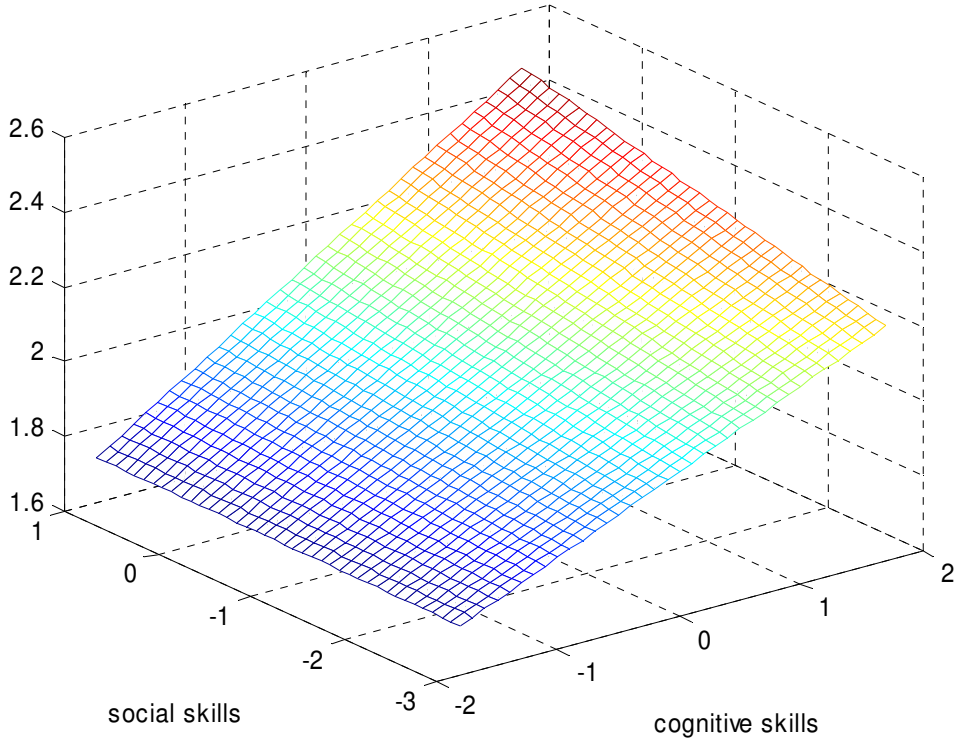
Figure 2 HE degree highest qualification (by age 42) as a function of social and cognitive skills at age 11



Notes to Figure 2:

1) Figure 2 presents the predicted probability that an individual obtains a degree as their highest qualification (by age 42) for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample (see Table A.1 in Appendix A for some mean values of key variables).
2) The control variables include gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.

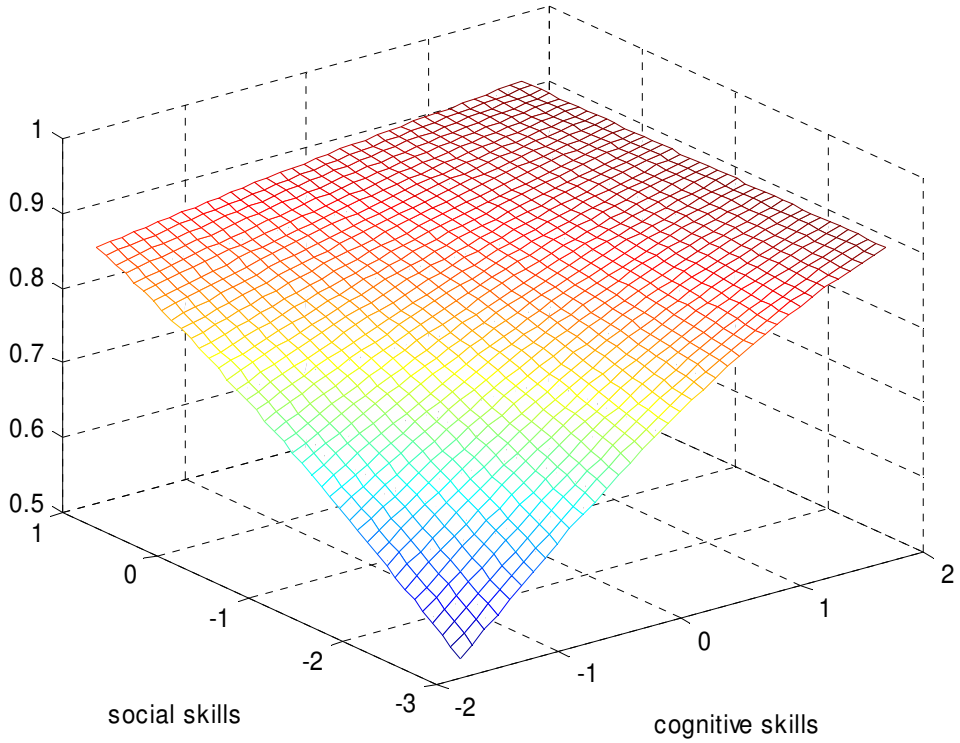
Figure 3 Log hourly wages (at age 42) as a function of social and cognitive skills at age 11



Notes to Figure 3:

1) Figure 3 presents predicted log hourly wages (at age 42) for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample (see Table A.1 in Appendix A for some mean values of key variables).
2) The control variables include gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.

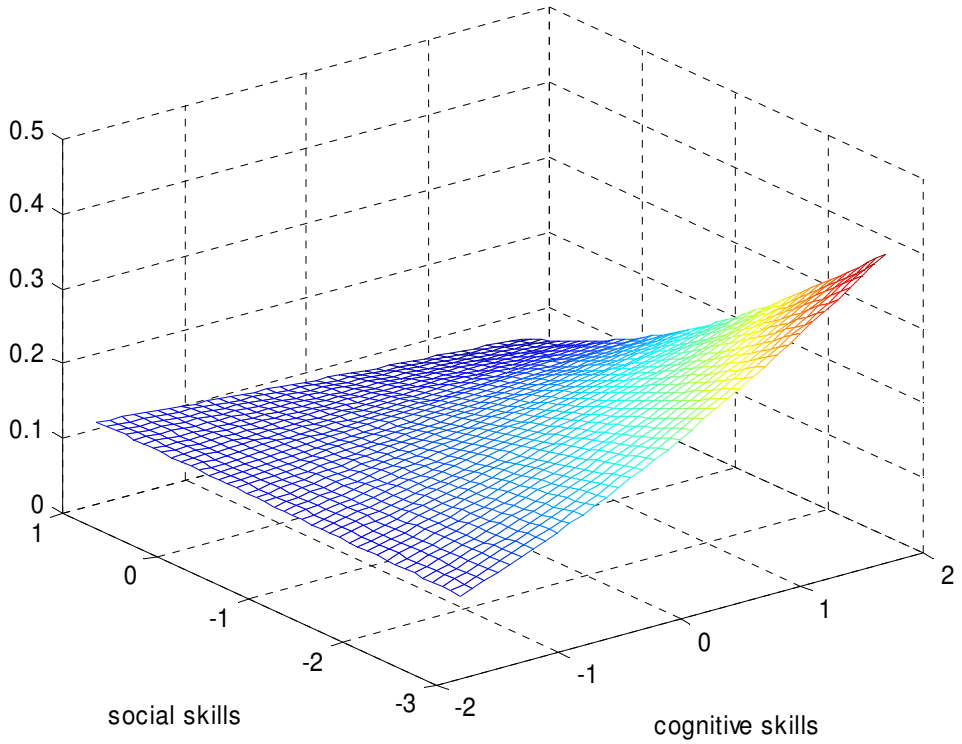
Figure 4 Employment status (at age 42) as a function of social and cognitive skills at age 11



Notes to Figure 4:

1) Figure 4 presents the predicted probability that an individual is in employment at age 42 for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample (see Table A.1 in Appendix A for some mean values of key variables).
2) The control variables include gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.

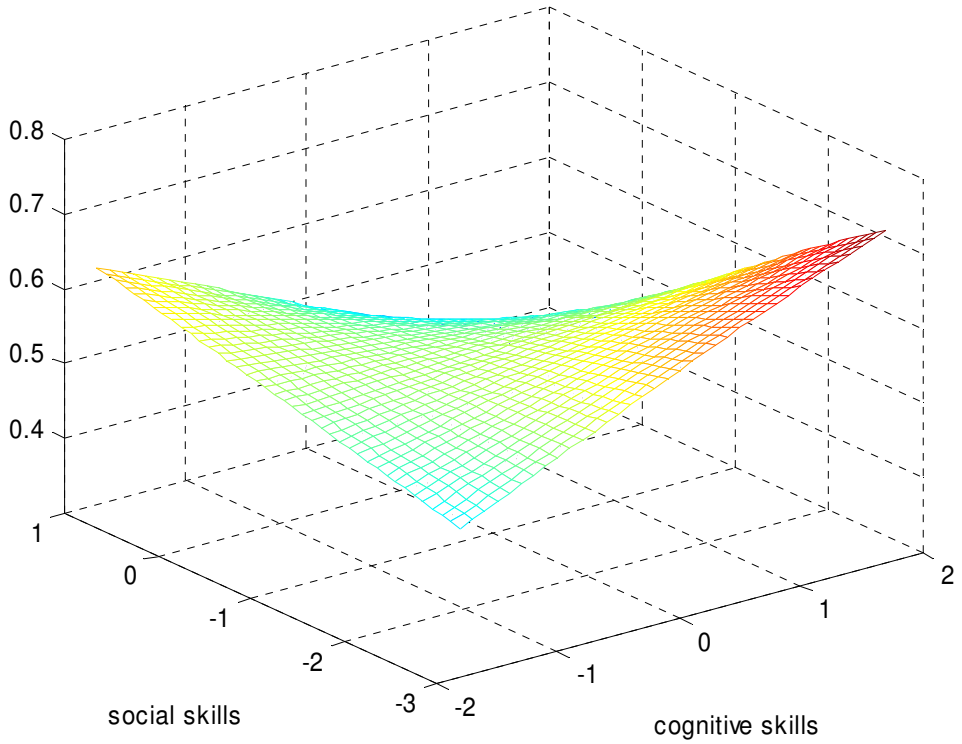
Figure 5 Whether the individual was a heavy smoker (at age 16) as a function of social and cognitive skills at age 11



Notes to Figure 5:

1) Figure 5 presents the predicted probability that an individual is a heavy smoker (defined as smoking more than 40 cigarettes per week) at age 16 for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample (see Table A.1 in Appendix A for some mean values of key variables).
2) The control variables include gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.

Figure 6 Whether the individual ever played truant from school (by age 16) as a function of social and cognitive skills at age 11



Notes to Figure 6:

1) Figure 6 presents the predicted probability that an individual has ever played truant from school (by age 16) for different values of cognitive and social skills, fixing all other control variables at their mean values in the sample (see Table A.1 in Appendix A for some mean values of key variables).
2) The control variables include gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.

Appendix A: Data

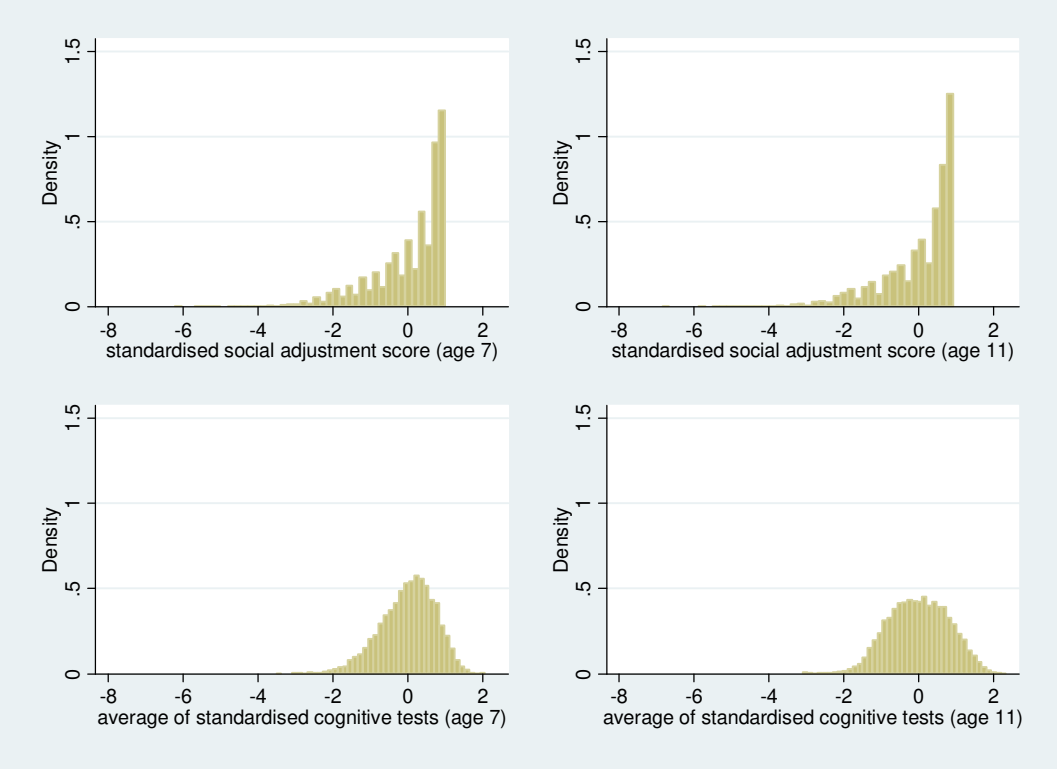
A.1 Our measure of cognitive skills at age 7

We use an average of standardised test results in maths, reading, copying and drawing as our measure of cognitive skills at age 7.

- The Southgate Group reading test was used. In this test, the child is given a choice of five words. On 16 (of 30) occasions, the child was given a picture of an object and had to ring the word describing that object. On the other 14 occasions, the teacher read out a word and the child had to circle the correct one. One mark was awarded for each correct answer, giving a score between 0 and 30.
- The arithmetic test comprised 10 questions, which the teacher could read to the child. They were awarded one mark for each correct answer, giving a score between 0 and 10.
- In the copying test, the child was given 6 shapes and asked to copy each of them twice. They were awarded one mark for each correct attempt, giving an overall score between 0 and 12.
- For the drawing test, the child was asked to draw a picture of a man, which was then awarded a mark out of 100 according to the features that were included.

A.2 Distribution of social and cognitive skills measures at ages 7 and 11

Figure A.1 Distribution of standardised social adjustment and cognitive test scores at ages 7 and 11



A.3 Further details of our measure of social skills at ages 7 and 11

Below, we present the sentences contained within each of the 12 domains of the Bristol Social Adjustment Guide, together with the distribution of the number of sentences underlined by the teacher at age 11.

A.3.1 Anxiety for acceptance by kids

1) Plays the hero (attitude to correction).

2) Can't resist playing to the crowd (effect of correction).

3) Inclined to fool around in team games.

4) Over-brave (takes unnecessary risks) in team games.

5) Over-anxious to be in with the gang (tries to curry favour, toadies, easily led) (companionship).

6) Likes to be the centre of attention (companionship).

7) Plays only or mainly with elder children (ways with other children).

8) Strikes brave attitude but funks (physical prowess).

9) Brags to other children (liking the limelight).

10) Shows off (pulls silly faces, mimics, clowns) (liking the limelight).

11) Spivish hair style (care for appearance).

12) Damage to public property, etc (of school, fences, unoccupied houses) (nuisance).

A.3.2 Hostility towards kids

1) In informal play disturbs others' games, teases, likes frightening.

2) Sometimes nasty to those outside own set (ways with other children).

3) Hurts by pushing about, hitting (ways with other children).

4) Squabbles, makes insulting remarks (ways with other children).

5) Tells tales, underhand (tries to get others into trouble) (ways with other children).

6) Spoils or hides other children's things (nuisance).

7) Mostly on bad terms with others (companionship).

8) Spiteful to weaker children (ways with other children).

9) Disliked, shunned (attitude to other children).

10) Fights viciously (bites, kicks, scratches, uses dangerous objects as weapons) (physical prowess).

A.3.3 Hostility towards adults

1) Ability at class jobs varies with mood.

2) In answering questions eager except when in one of his moods.

3) Persistence in manual tasks depends on his moods.

4) In talking to teacher inclined to be moody.

5) Offers to help teacher with jobs except when in a bad mood.

6) In asking teacher's help sometimes very forward, sometimes sulky.

7) In greeting teacher sometimes eager, sometimes definitely avoids.

8) Response to greeting can be surly or suspicious.

9) General manner with teacher is sometimes friendly, sometimes in a bad mood.

10) Standard (manual) very variable (seems at times to do badly on purpose).

11) Damage to personal property (cars, tradesman's belongings, etc) (nuisance).

12) Bad language, vulgar stories, rhymes, drawings (nuisance).

13) Suspicious (on the defensive) (liking for attention).

14) Resentful mutterings or expression at times (attitude to correction).

15) Sometimes a fluent liar (truthfulness).

16) Has stolen money, sweets, valued objects once or twice (honesty).

17) Bears a grudge, always regards punishment as unfair (effect of correction).

18) Has a wild, hostile look in the eyes.

19) Very naughty, difficult to discipline (class room behaviour).

20) Aggressive defiance (screams, threats, violence) (attitude to correction).

21) Associates mostly with unsettled types (attitude of other children).

22) Has stolen money, sweets, valued objects frequently (honesty).

23) Obscene behaviour (nuisance).

A.3.4 Writing off adults and adult standards

1) Won't bother to learn (attentiveness).

2) Only works when watched or compelled (persistence) (classwork).

3) Only works when watched or compelled (persistence) (manual tasks).

4) When answering questions not shy but unconcerned.

5) Not shy but never comes for help willingly (asking teacher's help).

6) Has no wish to volunteer help teacher with jobs.

7) Unconcerned about approval or disapproval (liking for attention).

8) Minimises contact with teacher but not backward with other children.

9) Avoids talking to teacher but talks to other children.

10) Copies from others (honesty).

11) Takes books from others without permission (honest).

12) Selfish, scheming, a spoilsport (ways with other children).

13) Cunning, dishonest in individual games.

14) Bad sportsman (plays for himself only, cheats, fouls) in team games.

15) Can't look you in the face (eyes).

16) Not open or friendly; sometimes "seems to be watching you to see if you know" (general manner with teacher).

17) Can never keep a friend long (tries to pal up with newcomers) (companionship).

18) Untrustworthy (ability at class jobs).

19) Treats lenience as weakness (effect of correction).

20) Plausible, sly; will abuse trust, hard to catch (classroom behaviour).

21) Habitual slick liar; has no compunction about lying (truthfulness).

A.3.5 Withdrawal

1) Absolutely never greets teacher.

2) Does not answer when greeted.

3) Makes no friendly or eager response (general manner with teacher).

4) Avoids talking to teacher (distant, deep).

5) Dreamy and distracted (lives in another world) (attentiveness).

6) Distant and uninterested (persistence in manual tasks).

7) Dreamy, uninterested in team games.

8) Distant, shuns others' company.

9) Keeps clear of adults even when hurt or wronged (liking for sympathy).

10) Quite cut off from people, you can't get near him as a person (general with teacher).

11) Unresponsive eyes.

12) Speech is an incoherent rumbling chatter.

13) In contacts with teacher, is like a suspicious animal.

A.3.6 Unforthcomingness

1) Chats only when alone with teacher.

2) Bursts into tears (attitude to correction).

3) Never offers to help teacher with jobs by pleased when asked.

4) Submissive, takes less wanted position, a ball fetcher (team games).

5) Too timid to be naughty (class room behaviour).

6) Lies from timidity (truthfulness).

7) Likes sympathy but reluctant to ask.

8) Never brings flowers, gifts, although classmates often do.

9) Never brings objects he has found, drawings, models, etc, to show teacher although classmates often do.

10) Associates only with one other child and mostly ignores the rest.

11) Waits to be noticed before greeting teacher.

12) Never makes first approach (talking to teacher).

13) Too shy to ask teacher's help.

14) When answering questions, gets nervous, blushes, cries when questioned.

15) Shrinks from active play in informal play.

16) Mumbles shyly, awkwardly in response to greeting.

17) Can't get a word out of child (talking to teacher).

18) Says very little when talking to teacher.

A.3.7 Depression

1) Depends on how he feels (asking teacher's help).

2) Varies noticeably from day to day (persistence in class work).

3) Sometimes alert, sometimes lethargic in team games.

4) In free activity sometimes lacks interest.

5) Persistence in manual tasks varies greatly.

6) Impatient, loses temper with job (persistence - manual tasks).

7) Flies into a temper if provoked (physical prowess).

8) Can work alone but has no energy (persistence in class work).

9) Lacks physical energy (persistence – manual tasks).

10) Has no life in him (class room behaviour).

11) Apathetic (just sits) (attentiveness).

12) Shuffles restlessly (posture).

13) In asking teacher's help too apathetic to bother.

14) Dull listless eyes.

15) Always sluggish, lethargic in team games.

16) Sometimes wanders off alone (companionship).

17) Speech is thick, mumbling, inaudible.

18) Expression is miserable, depressed ('under the weather') seldom smiles.

A.3.8 Anxiety for acceptance by adults

1) Very anxious to do jobs (helping teacher with jobs).

2) In greeting teacher, over-eager to greet.

3) In talking to teacher, over-talkative (tires with constant chatter).

4) Very anxious to bring flowers, gifts (contact with teacher).

5) Very often brings objects he has found, drawings, models, etc, to show teacher (contact with teacher).

6) Over-friendly (general manner with teacher).

7) Talks excessively to teacher about own doings, family or possessions.

8) Sidles up to or hangs around teacher (contact with teacher).

9) Always finding excuses for engaging teacher (asking teacher's help).

10) Craves for sympathy (comes unnecessarily with minor scratches, bumps, etc, complains of being hurt by others (liking for sympathy).

11) Tries to monopolise teacher (liking for attention).

12) Tells fantastic yarns (truthfulness).

13) Wants adult interest but can't put himself forward (liking for attention).

14) Trades sympathy or interest (liking for sympathy).

15) Put out if can't get attention (liking for attention).

A.3.9 Restlessness

1) Gives up easily, persistence (manual tasks).

2) Too restless in individual games.

3) Feckless, scatterbrain (ability at class jobs).

4) Too restless to work alone (persistence in class work).

A.3.10 Inconsequential behaviour

1) Sometimes eager, sometimes doesn't bother (answering questions).

2) Constantly needs petty correction (classroom behaviour).

3) Too restless to remember for long (effect of correction).

4) Cannot attend or concentrate for long (cannot sit still when read to or during broadcasts, plays with things under desk, etc) (attentiveness).

5) Rough and ready, slapdash (standard) (manual).

6) In informal play starts off others in scrapping and rough play.

7) Does not know what to do with himself, can never stick at anything long (free activity).

8) Misbehaves when teacher is out of room (liking the limelight).

9) Careless, untidy, often loses or forgets books, pen (belongings).

10) Gets very dirty during day (care for appearance).

11) Slumps, lolls about (posture).

12) Foolish pranks when with a gang (nuisance).

13) Follower in mischief (nuisance).

A.3.11 Miscellaneous symptoms

1) In informal play, plays childish games for his age.

2) In team games eager to play but loses interest.

3) Babyish (mispronounces simple words) (speech).

4) Too immature to heed (effect of correction).

5) Plays only or mainly with younger children (ways with other children).

6) In team games, timid or poor spirited.

7) Gets bullied (physical prowess).

8) Has truanted once or twice, often suspected of truancy (attendance).

9) Often late (punctuality).

10) Has cut lessons (punctuality).

11) Destructive, defaces with scribbling (belonging).

12) On the fringe, somewhat of an outsider (attitude of other children).

A.3.12 Miscellaneous nervous symptoms

1) Stutters, halts (can't get the words out) (speech).

2) Jumbled speech.

3) Blinking (eyes).

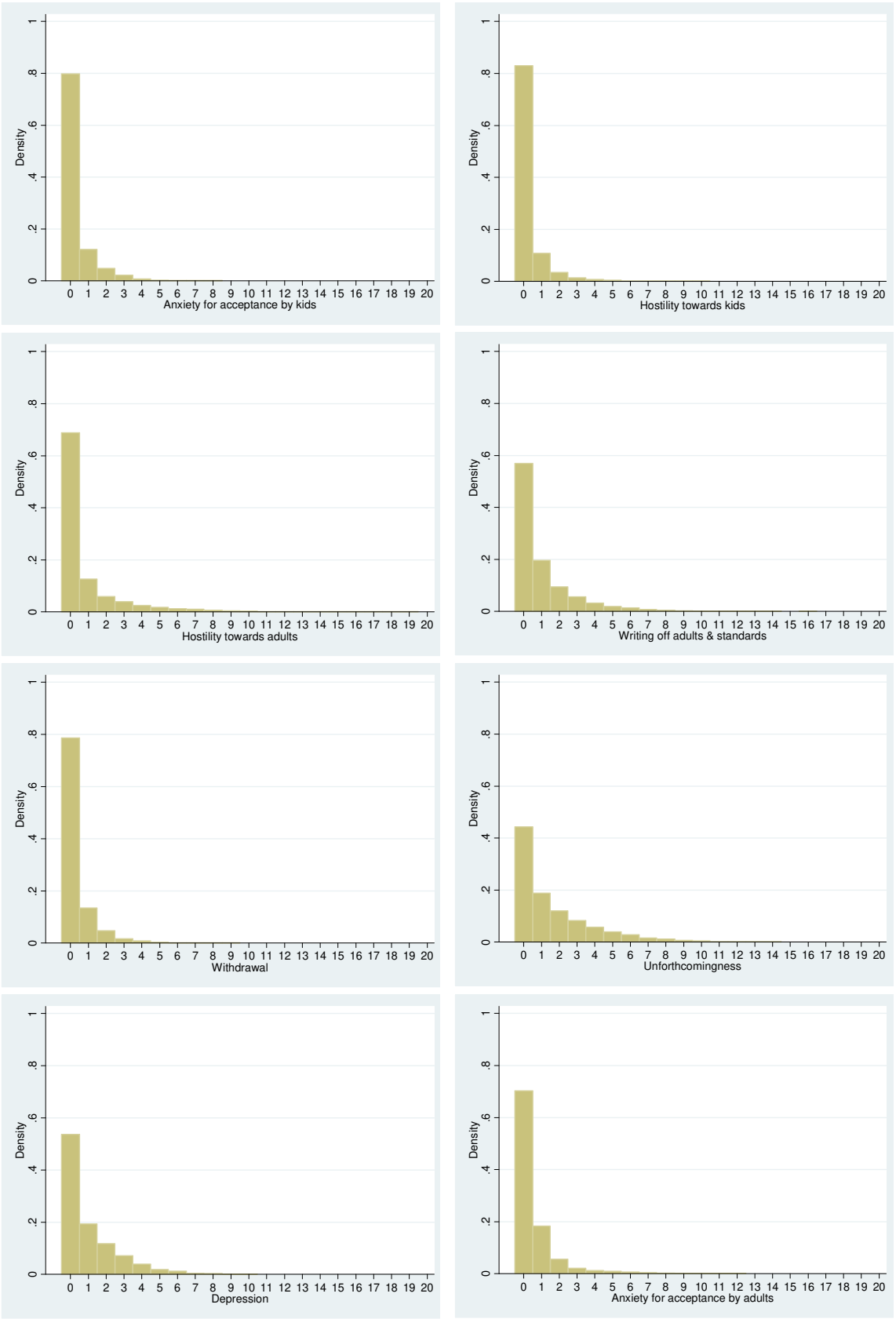
4) Unwilled twitches, jerks, makes aimless movements with hands (fidgets, etc).

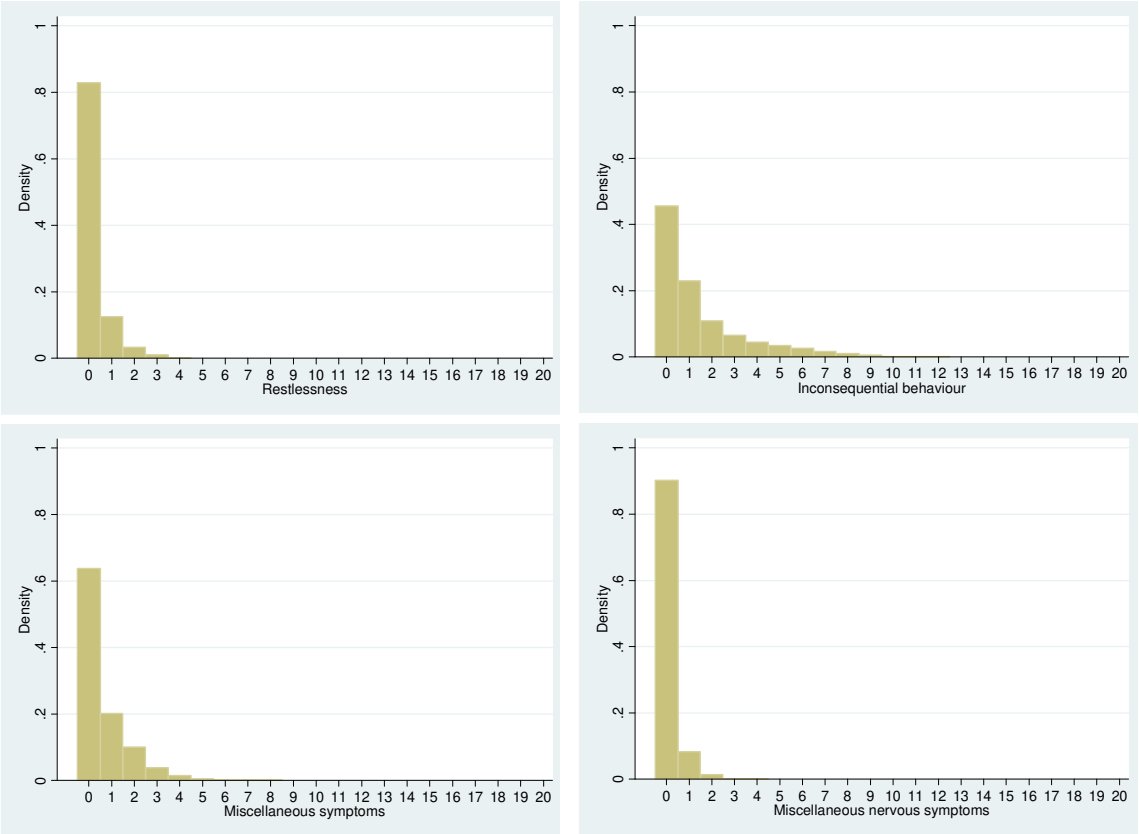
5) Bites nails badly (fidgets, etc).

6) Jumpy (fidgets, etc).

7) Sucks fingers (over ten years) (fidgets, etc).

Figure A2 Distribution of the number of sentences underlined by the teacher in each of the twelve domains (age 11)





A.4 Background characteristics used

All models contain controls for child characteristics, parental characteristics and local area characteristics (except where otherwise specified in the text).

A.4.1 Child characteristics

The following child characteristics are controlled for: gender, ethnicity, whether the cohort member had low birth-weight or was born prematurely, illness and/or handicap at birth, twin status, whether the cohort member was an only child (by age 7), birth order, number of older brothers, number of older sisters, whether next oldest sibling was born within 2 years of the cohort member, number of younger siblings, number of household members, whether the cohort member was breastfed, whether they were walking alone before the age of 1.5 years,

whether they were speaking by age 2 years, whether they were wetting by day after age 3 years, whether the cohort member attended a welfare clinic as a baby;

A.4.2 Parental characteristics (at child's birth unless otherwise stated)

The following parental characteristics are controlled for: father's age, mother's age, education of both parents, high father's SES and medium father's SES[72], marital status of the mother, whether the mother was a heavy smoker, and if she stopped, during pregnancy, previous complications in pregnancy, interval between marriage and birth, whether the mother was obese (at birth), whether the mother worked during pregnancy, and number of hours, whether English is the mother's usual language with the child, whether or not each parent reads books and newspapers regularly, whether each parent shows interest in the cohort member's education (age 7), whether the cohort member has ever lived in care (measured at age 7), health visitor reports of serious family difficulties (including disability, mental illness, divorce, alcoholism);

A.4.3 Local characteristics

The following local characteristics are controlled for: broad region (North West, North, East & West Riding, North Midlands, East, London & South East, South, South West, Midlands, Wales, Scotland), urban vs. rural, % semi- and unskilled males as a proportion of economically active males in local authority, % economically active females/economically active males in local authority (both 1961).

[72] High SES (socio-economic status) is defined here as working in a professional occupation; medium SES is defined as working in a non-manual (non-professional) occupation.

Table A.1 Mean values of selected child and parental characteristics

Variable	Mean value
Child characteristics	
Female	0.487
White	0.967
Low birth weight or premature	0.070
Early illness or handicap	0.095
Slow early development	0.123
Breastfed	0.438
Only child (by age 7)	0.073
Number of younger siblings (by age 7)	0.973
Parental characteristics	
Father's age (at time of child's birth)	30.6
Mother's age (at time of child's birth)	27.5
Father's years of education	9.98
Mother's years of education	9.97
Father's social class – professional	0.173
Father's social class – non-manual	0.600
Father shows little interest in child's education	0.243
Mother shows little interest in child's education	0.157
Father reads a lot	0.468
Mother reads a lot	0.319
Ever in care (by age 7)	0.023
Family difficulties (at age 7)	0.153
Mother a heavy smoker (at time of child's birth)	0.190

Notes to Table A.1:

1) Variables are only summarised for individuals for whom both age 11 social and cognitive skills measures are recorded.

Appendix B: Impact of family background controls

Table B.1 Impact of a standardised social adjustment score (and other variables) on education outcomes

	Stay on at 16		Standardised literacy score		Standardised numeracy score		HE highest qualification	
	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls
Mean outcome in population	0.288						0.331	
Social skills at age 11	0.04 [0.006]**	0.038 [0.006]**	-0.015 [0.026]	-0.01 [0.026]	0.004 [0.025]	0.022 [0.025]	0.02 [0.006]**	0.023 [0.006]**
Cognitive skills at age 11	0.281 [0.007]**	0.215 [0.007]**	0.658 [0.032]**	0.601 [0.036]**	0.72 [0.031]**	0.665 [0.034]**	0.277 [0.007]**	0.224 [0.008]**
Cognitive*social skills at age 11	0.055 [0.007]**	0.05 [0.007]**	-0.064 [0.030]*	-0.055 [0.031]	-0.051 [0.030]	-0.049 [0.030]	0.027 [0.008]**	0.027 [0.008]**
Female		-0.015 [0.009]		-0.226 [0.046]**		-0.335 [0.044]**		-0.047 [0.010]**
Father's years of education		0.012 [0.003]**		0.002 [0.017]		-0.003 [0.017]		0.017 [0.004]**
Mother's years of education		0.036 [0.004]**		-0.021 [0.021]		-0.004 [0.020]		0.017 [0.004]**
High father's social class		0.129 [0.016]**		0.018 [0.082]		0.128 [0.078]		0.111 [0.018]**
Medium father's social class		0.041 [0.013]**		-0.018 [0.058]		0.074 [0.055]		0.05 [0.014]**
Any serious difficulties in the family (age 7)		-0.042 [0.016]**		-0.142 [0.074]		-0.08 [0.071]		-0.026 [0.018]
Low birth weight or premature		-0.02 [0.017]		0.057 [0.089]		0.036 [0.085]		-0.022 [0.020]
Mother a heavy smoker (during pregnancy)		-0.014 [0.012]		0.003 [0.060]		0.029 [0.057]		-0.012 [0.014]
Constant			-0.022 [0.024]	0.515 [0.834]	-0.037 [0.023]	1.175 [0.584]*		
Observations	10,723		1,450		1,433		9,750	
R-squared			0.262	0.340	0.314	0.412		

Notes to Table B.1:

1) Models with "no controls" include only social skills, cognitive skills and an interaction term.
2) Models with "family background controls" contain these skills measures, plus controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
3) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table B.2 Impact of a standardised social adjustment score (and other variables) on labour market outcomes

	Work experience (months)		Employment status		Log hourly wage (£)	
	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls
Mean outcome in population	238		0.847		2.11	
Social skills at age 11	-0.292 [0.956]	5.004 [0.881]**	0.016 [0.004]**	0.026 [0.018]**	-0.004 [0.008]	0.033 [0.007]**
Cognitive skills at age 11	6.268 [1.103]**	3.884 [1.124]**	0.049 [0.005]**	0.036 [0.024]**	0.259 [0.009]**	0.194 [0.009]**
Cognitive*social skills at age 11	-11.012 [1.110]**	-9.251 [1.006]**	-0.02 [0.005]**	-0.015 [0.011]**	0.02 [0.009]*	0.018 [0.009]*
Female		-60.196 [1.441]**		-0.126 [0.082]**		-0.397 [0.012]**
Father's years of education		-1.287 [0.529]*		-0.002 [0.003]		0.018 [0.004]**
Mother's years of education		-2.247 [0.641]**		0 [0.003]		0.009 [0.005]
High father's social class		-0.959 [2.628]		-0.007 [0.014]		0.086 [0.022]**
Medium father's social class		3.968 [1.870]*		0.013 [0.012]		0.051 [0.015]**
Any serious difficulties in the family (age 7)		-4.887 [2.348]*		-0.042 [0.030]**		-0.004 [0.019]
Low birth weight or premature		3.388 [2.788]		-0.006 [0.015]		-0.026 [0.023]
Mother a heavy smoker (during pregnancy)		-0.582 [1.910]		-0.002 [0.009]		0 [0.015]
Constant	240.549 [0.858]**	317.694 [30.595]**			2.08 [0.007]**	2.075 [0.158]**
Observations	8,347		9,737		6,826	
(Pseudo) R-squared	0.017	0.215			0.127	0.289

Notes to Table B.2:

1) Models with "no controls" include only social skills, cognitive skills and an interaction term.
2) Models with "family background controls" contain these skills measures, plus controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A. Note that controls for highest qualification are NOT included in either specification.
3) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Table B.3 Impact of a standardised social adjustment score (and other variables) on adolescent social outcomes

	Smoking		Truancy		Exclusion		Crime		Teen mum	
	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls
Mean outcome in population	0.132		0.512		0.013		0.101		0.120	
Social skills at age 11	-0.039 [0.004]**	-0.03 [0.004]**	-0.046 [0.006]**	-0.036 [0.006]**	-0.007 [0.001]**	-0.004 [0.001]**	-0.041 [0.003]**	-0.023 [0.029]**	-0.031 [0.005]**	-0.022 [0.005]**
Cognitive skills at age 11	-0.018 [0.004]**	0.002 [0.005]	-0.1 [0.006]**	-0.04 [0.007]**	-0.002 [0.001]	0 [0.001]	-0.044 [0.003]**	-0.019 [0.024]**	-0.081 [0.006]**	-0.044 [0.006]**
Cognitive*social skills at age 11	-0.019 [0.004]**	-0.018 [0.004]**	-0.041 [0.006]**	-0.038 [0.006]**	0 [0.001]	0 [0.001]	-0.004 [0.003]	-0.001 [0.003]	-0.011 [0.006]	-0.007 [0.006]
Female		-0.063 [0.006]**		-0.002 [0.010]		-0.003 [0.001]**		-0.09 [0.109]**		
Father's years of education		-0.001 [0.003]		-0.001 [0.004]		0 [0.000]		-0.003 [0.004]		-0.006 [0.004]
Mother's years of education		-0.001 [0.003]		-0.018 [0.004]**		0.001 [0.001]		-0.002 [0.003]		-0.006 [0.005]
High father's social class		-0.016 [0.012]		-0.093 [0.018]**		-0.003 [0.002]		-0.025 [0.032]**		-0.041 [0.016]*
Medium father's social class		-0.008 [0.008]		-0.021 [0.012]		-0.001 [0.001]		-0.006 [0.009]		-0.006 [0.009]
Any serious difficulties in the family (age 7)		0.024 [0.009]*		0.017 [0.015]		0.001 [0.002]		0.021 [0.027]**		0.02 [0.011]
Low birth weight or premature		0.004 [0.013]		-0.049 [0.018]**		0.001 [0.002]		0.005 [0.011]		-0.008 [0.013]
Mother a heavy smoker (during pregnancy)		0.016 [0.008]		0.054 [0.012]**		0.003 [0.001]*		0.019 [0.024]**		0.016 [0.009]
Observations	10,281	10,260	12,183		9,625	9,380	11,787	11,760	5,372	

Notes to Table B.3:

1) Models with "no controls" include only social skills, cognitive skills and an interaction term.
2) Models with "family background controls" contain these skills measures, plus controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
3) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.
4) It should be noted that differences in the number of observations across specifications for the same outcome arise because one of the additional control variables perfectly predicts the outcome (missing dummies ARE included).

Table B.4 Impact of a standardised social adjustment score (and other variables) on adult social outcomes

	Crime		Poor or fair health		Depression		Mental health problems	
	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls	No controls	Family background controls
Mean outcome in population	0.251		0.181		0.130		0.144	
Social skills at age 11	-0.04 [0.005]**	-0.018 [0.005]**	-0.024 [0.005]**	-0.021 [0.007]**	-0.021 [0.004]**	-0.025 [0.004]**	-0.024 [0.004]**	-0.028 [0.012]**
Cognitive skills at age 11	-0.003 [0.006]	-0.012 [0.007]	-0.07 [0.005]**	-0.049 [0.014]**	-0.046 [0.005]**	-0.03 [0.005]**	-0.005 [0.005]	0.002 [0.006]
Cognitive*social skills at age 11	-0.005 [0.006]	-0.002 [0.006]	0.006 [0.005]	0.005 [0.005]	0.001 [0.004]	0 [0.004]	-0.001 [0.005]	-0.002 [0.005]
Female		-0.235 [0.009]**		0.007 [0.008]		0.063 [0.007]**		0.059 [0.026]**
Father's years of education		-0.001 [0.003]		0 [0.003]		-0.004 [0.003]		0.001 [0.003]
Mother's years of education		0.006 [0.004]		-0.005 [0.004]		0.005 [0.003]		0.005 [0.004]
High father's social class		-0.002 [0.016]		-0.024 [0.016]		-0.013 [0.013]		0.001 [0.013]
Medium father's social class		-0.007 [0.012]		-0.024 [0.011]*		-0.008 [0.008]		0.001 [0.009]
Any serious difficulties in the family (age 7)		0.022 [0.014]		0.037 [0.015]**		0.039 [0.010]**		0.029 [0.016]**
Low birth weight or premature		0.006 [0.017]		0.016 [0.016]		0.017 [0.014]		0.015 [0.016]
Mother a heavy smoker (during pregnancy)		0.027 [0.012]*		0.041 [0.015]**		0.014 [0.008]		0.012 [0.011]
Observations	9,640		9,750		9,635		9,644	

Notes to Table B.4:

1) Models with "no controls" include only social skills, cognitive skills and an interaction term.
2) Models with "family background controls" contain these skills measures, plus controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables. Details can be found in Appendix A.
3) We report the marginal effects (and associated standard errors) from the probit models; however, the significance levels are based on the coefficients (and associated standard errors). Standard errors are shown in parentheses: * denotes significance at the 5% level, ** at the 1% level.

Appendix C: Differences between subgroups of interest

Table C.1 Difference between coefficients on social and cognitive skills for selected subgroups of interest, education outcomes

	Stayed on at 16	Standardised literacy score	Standardised numeracy score	HE highest qualification
Boys – Girls				
Social skills at age 11	0.014	-0.024	-0.070	-0.006
Cognitive skills at age 11	0.012	-0.163*	-0.108	0.026
Cognitive*social skills at age 11	-0.021	0.305**	0.061	-0.023
Low parental education – high parental education				
Social skills at age 11	-0.008	-0.075	0.012	-0.018
Cognitive skills at age 11	-0.150**	0.048	0.092	-0.044*
Cognitive*social skills at age 11	-0.003	0.120	0.048	-0.055**
Low father's SES – high father's SES				
Social skills at age 11	-0.004	-0.040	0.017	-0.014
Cognitive skills at age 11	-0.179**	0.008	0.071	-0.097**
Cognitive*social skills at age 11	-0.028*	0.041	0.096	-0.029

Notes to Table C.1:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES.
2) We report differences between the coefficients (for regression models) or marginal effects (for probit models) on social and cognitive skills measures for various subgroups. (The corresponding coefficients or marginal effects can be found in Table 3.1.) * denotes that these differences are significant at the 5% level, ** at the 1% level.

Table C.2 Difference between coefficients on social and cognitive skills for selected subgroups of interest, labour market outcomes

	Work experience (months)	Employment status	Log hourly wage (£)
Boys – Girls			
Social skills at age 11	-2.826	-0.001	0.013
Cognitive skills at age 11	-15.097**	-0.011	0.031
Cognitive*social skills at age 11	1.554	0.009	-0.007
Low parental education – high parental education			
Social skills at age 11	0.747	-0.001	-0.061**
Cognitive skills at age 11	13.672**	0.025*	-0.002
Cognitive*social skills at age 11	-1.993	-0.001	-0.015
Low father's SES – high father's SES			
Social skills at age 11	2.171	0.020	-0.018
Cognitive skills at age 11	6.865*	-0.004	-0.010
Cognitive*social skills at age 11	5.169	-0.004	-0.005

Notes to Table C.2:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES.
2) We report differences between the coefficients (for regression models) or marginal effects (for probit models) on social and cognitive skills measures for various subgroups. (The corresponding coefficients or marginal effects can be found in Table 3.1.) * denotes that these differences are significant at the 5% level, ** at the 1% level.

Table C.3 Difference between coefficients on social and cognitive skills for selected subgroups of interest, adolescent social outcomes

	Smoking	Truancy	Exclusion	Crime	Teen mum
Boys – Girls					
Social skills at age 11	-0.004	0.016	-0.004	-0.032	
Cognitive skills at age 11	-0.018	-0.033*	0.004	-0.02	
Cognitive*social skills at age 11	-0.018*	0.015	0	-0.003	
Low parental education – high parental education					
Social skills at age 11	0	-0.004	0	-0.006	-0.021
Cognitive skills at age 11	0.001	0.009	0	-0.007	-0.017
Cognitive*social skills at age 11	-0.009	0.015	0	0	-0.012
Low father's SES – high father's SES					
Social skills at age 11	-0.008	-0.029*	0.001	-0.015*	-0.036*
Cognitive skills at age 11	0.021	0.055**	0.001	-0.003	-0.023
Cognitive*social skills at age 11	-0.023*	-0.014	0	-0.005	-0.017

Notes to Table C.3:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES.
2) We report differences between the coefficients (for regression models) or marginal effects (for probit models) on social and cognitive skills measures for various subgroups. (The corresponding coefficients or marginal effects can be found in Table 3.1.) * denotes that these differences are significant at the 5% level, ** at the 1% level.

Table C.4 Difference between coefficients on social and cognitive skills for selected subgroups of interest, adult social outcomes

	Crime	Poor or fair health	Depression	Mental health problems
Boys – Girls				
Social skills at age 11	0	-0.005	0.011	0.010
Cognitive skills at age 11	-0.043**	-0.004	0.031**	0.016
Cognitive*social skills at age 11	0.004	-0.009	0.011	0.012
Low parental education – high parental education				
Social skills at age 11	-0.023	-0.021	0.008	0.014
Cognitive skills at age 11	0.027	0	-0.015	-0.004
Cognitive*social skills at age 11	-0.002	-0.021	0.007	0.011
Low father's SES – high father's SES				
Social skills at age 11	0.005	-0.040**	-0.022*	-0.012
Cognitive skills at age 11	-0.018	0.001	-0.005	0.005
Cognitive*social skills at age 11	0.017	-0.023	-0.007	0.013

Notes to Table C.4:

1) All models contain controls for gender, ethnicity, early health/development, family structure, the home learning environment, parental characteristics (including socio-economic status and years of schooling), and local area variables (see Appendix A for details), excluding variables that relate directly to the definition of the subgroup of interest. So the models for boys and girls do not include a female dummy; the models for high and low parental education groups do not include indicators of father's and mother's years of schooling, and the models for high and low father's SES groups do not include indicators of medium or high father's SES.
2) We report differences between the coefficients (for regression models) or marginal effects (for probit models) on social and cognitive skills measures for various subgroups. (The corresponding coefficients or marginal effects can be found in Table 3.1.) * denotes that these differences are significant at the 5% level, ** at the 1% level.