Which Skills Matter?

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Executive Summary

Each of us is endowed with a unique set of skills that we use in all aspects of our everyday life. Nevertheless, when describing the determinants of socio-economic outcomes - or even the learning process - we often have a very simplified view of skill. Non-cognitive skills, such as interpersonal skills, and self-confidence, are potentially as important as cognitive skills for labour market success, and for many other aspects of life.

In this paper, we analyse the determinants and consequences of both cognitive skills, and one aspect of non-cognitive skills - namely social adjustment - at ages 7 and 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 families in the formation of these skills.

We find that social skills are important for a host of outcomes including schooling, social outcomes such as teenage motherhood and involvement in crime, and also for labour market outcomes. We also find that the early home environment is very important for determining social skills, whilst social skills also appear to be more malleable than cognitive skills between the ages of 7 and 11, suggesting an important role for policy. Our work contributes to a growing body of research that documents the role of non-cognitive skills in an individual's life, all indicating that a uni-dimensional vision of skill is wrong and likely to mislead both research and policy.

Our work is consistent with a growing body of evidence showing that skills formed relatively early in the life cycle have long lasting and substantial effects on a variety of important outcomes. It is quite possible that early human capital interventions, designed to take into account both the multi-dimensional nature of skills, and the dynamic nature of skill formation, can be among the most effective set of policy instruments to combat early school leaving, unemployment, teenage pregnancy, illegal behaviour and many other behaviours and outcomes.

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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 socio-economic outcomes - or even the learning process - we 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.

Suppose we had the following simple view of schools: schools provide students with academic (or vocational) skills that are useful in the labour market. Successful students are expected to become successful workers. Good students are those who learn the skills taught by schools, achieving high grades in their exams - our measure of school success - and completing degrees. This view of schools is not wrong, but it is incomplete, and it is this vision of schools that is implicit in much research and policy making. In reality, many other types of skills are also important in the labour market, and although school success (as measured by academic test results, which capture cognitive skills) are correlated with good labour market outcomes, they explain very little of the variance in labour market outcomes in Great Britain. Furthermore, schools do much more than improve an individual's knowledge; they also mould their personality. Non-cognitive skills, such as interpersonal skills, and self-confidence, are likely to be as important as cognitive skills for labour market success, and for many other aspects of life.

Take the following example from the research of Heckman, Hsee and Rubinstein (2000): these authors studied the General Education Development (GED) program in the US. The GED is a degree equivalent to high school for individuals

who do not have an official high school diploma. This program seems to be successful in the sense that GED recipients have similar levels of cognitive abilities to regular high school graduates (both have higher levels of cognitive abilities than high school dropouts). However, GED recipients receive lower wages in the labour market than regular high school graduates. Furthermore, when we compare high school graduates, GED recipients and high school dropouts with similar levels of cognitive skills, GED recipients receive the lowest wages in the labour market.

Heckman, Hsee and Rubinstein (2000) investigate this puzzling fact, and suggest that the reason GED recipients perform so poorly in the labour market is because they lack non-cognitive skills. In fact, they found that the average GED was more likely to engage in different types of illegal behaviour, to be quarrelsome in school and at work, and to have more trouble in holding stable employment than the average high school dropout or high school graduate.

There are also several other papers that document the importance of non-cognitive skills, not only for labour market outcomes, but also for schooling attainment and engagement in risky behaviour (see, for example, Heckman, Sixtrud and Urzua, 2005, Bowles, Gintis and Osborne, 2001).

The importance of understanding what skills matter is rendered even more important if, as argued in Carneiro and Heckman (2003), non-cognitive skills are likely to be more malleable than cognitive skills. For example, while IQ is believed to be relatively stable by age 8, other aspects of personality may be more open to change at later ages. Carneiro and Heckman (2003) report that the main outcome of mentoring programs targeted towards adolescents was not an increase in their cognitive ability, but a substantial change in their social behaviours. Although schools are assessed by the performance of their students on cognitive tests and this forms the

basis of education policy, schools are also likely to substantially alter students' social skills. These two roles of schools cannot be separated and one cannot be seen as more important than the other, something that receives scant attention in the literature.

Finally, both cognitive and non-cognitive skills are formed over the lifecycle, as a result of home, neighbourhood and school environments, and of family investments. Carneiro and Heckman (2003) document that gaps in cognitive and non-cognitive skills between children of different socio-economic groups emerge early (as early as age 4, and probably even earlier) and persist (if anything, gaps in cognitive ability expand over time). Given the cumulative nature of the process of skill formation, early cognitive and non-cognitive skills are therefore likely to influence future learning and the development of social abilities.

In this paper, we analyse the determinants and consequences of cognitive skills, and one aspect of non-cognitive skills - namely social adjustment - at ages 7 and 11 using data for Great Britain, from the National Child Development Survey (NCDS).[2] We document the importance of these skills for schooling attainment, labour market outcomes and social behaviours at various ages, and analyse the role of families in the formation of these skills. We find that social skills are very important for a host of outcomes including schooling, social outcomes such as teenage motherhood and involvement in crime, and also for labour market outcomes. We also find that the early home environment is very important for determining social skills, whilst social skills also appear to be more malleable than cognitive skills. Box 1 describes the social and cognitive skills measures used.

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[2] The NCDS comprises detailed longitudinal records for all children born in Great Britain in a single week in March 1958. There have been seven sweeps, the first of which was carried out at birth, with follow-ups at ages 7, 11, 16, 23, 33 and 42. We make use of background characteristics for both the child and their family at birth, and ages 7 and 11, social and cognitive test results at 7 and 11 (see Box 1 for details), and various schooling, behavioural and labour market outcomes at ages 16, 33 and 42.

Box 1 – Measures of cognitive and social skills

Cognitive skills

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.

Age 11

We use an average of standardised test results in maths, reading, copying and general ability as our measure of cognitive skills at age 11.

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.

The copying test was identical to the one carried out at age 7.

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

Our measure of social skills is in fact a measure of social *mal*adjustment. The Bristol Social Adjustment Guide was used to measure social maladjustment at ages 7 and 11 in the NCDS. Teachers were given a series of phrases and asked to underline those that they thought applied to the child. The phrases were grouped into 11 different behavioural "syndromes": unforthcomingness, withdrawal, depression, anxiety for acceptance by adults, hostility towards adults, "writing off" of adults and adult standards, anxiety for acceptance by children, hostility towards children, restlessness, inconsequential behaviour, and miscellaneous. Each category contained a different number of phrases, with one point allocated to each phrase underlined by the teacher. These scores were combined to generate a total "social maladjustment" score, which we standardised and used as our measure of social skills.

The distribution of these measures of cognitive and social skills are shown in the Appendix, Figure A1.

2.   The Home Environment and Skill Formation

The NCDS allows us to look at what aspects of the early home environment matter for cognitive and social development at ages 7 and 11. Table 1 presents some results from a simple OLS regression model. Remember that since we are measuring social *mal*adjustment, negative coefficients on the social skills regressions mean that those factors are good for social skills. These results show that family background is extremely important for skill development. We can see that by age 7, gaps in cognitive and social abilities have emerged according to socio-economic group (captured here by the father's social class): children from professional and managerial social classes have higher cognitive test scores, and exhibit marginally lower social maladjustment by age 7 (conditional on the other factors controlled for in our model).[3]

In addition, whilst the number of years of formal education of the parents is associated more with cognitive skill development than with social skill development, other aspects of parental education, such as how much the parents (particularly the father) reads, and the interest taken by both parents in the child's education, appear to

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[3] A list of the other factors included in our regression models can be found in the notes to Table 1.

be important for both types of skill development. For example, if the child's mother had undertaken an additional year of education, conditional on other background factors, this would be associated with an increase of 3.3% of a standard deviation in cognitive skills at age 7.

Serious difficulties within the family - such as alcoholism, mental health issues, divorce, and so on - observed by the health visitor at age 7 were also particularly important in explaining social maladjustment (as well as lower cognitive test scores) at ages 7 and 11.

Table 1 also shows that the child's own very early developmental outcomes (including whether or not they could walk alone by age 1.5, whether he/she could speak by age 2 and whether he/she wet himself/herself by day beyond age 3), and poor health at birth and during early childhood, are very important for explaining social maladjustment and cognitive development at age 7, but only cognitive skills at age 11. Of course, these early developmental outcomes are themselves strongly influenced by the family environment from a very early stage.

It is also worth noting that girls from this cohort performed considerably better than boys in terms of social adjustment and cognitive test scores at age 7, whilst at age 11, they still exhibited fewer signs of social maladjustment, but did not perform as well as boys in the cognitive tests. However, much remains unexplained: the R-squared statistic on the social skills equation is fairly low, at 0.14 (for the age 7 regression), indicating that the observable characteristics we have do not explain measured social skills as well as they explain variation in measured cognitive skills (with an R-squared statistic of 0.21).

The results in Table 1 also confirm the notion that 'skills beget skills': both cognition and social maladjustment at age 7 are important factors in explaining social

and cognitive performance at age 11. Such linkages highlight the need for further research to develop a fuller picture of the inter-relationships between different types of skill formation throughout childhood.

Table 1 also 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. The regressions reveal a stronger correlation (conditional on other background factors) between cognitive skills over time than between social skills over time (with the coefficient of 0.64 on the age 7 cognitive test score in the age 11 cognitive test score regression suggesting a higher degree of persistence in cognitive skills than in social skills, where the coefficient on the age 7 social maladjustment score in the age 11 social maladjustment regression is just 0.27).

Table 1: The home environment and skill formation

	Age 7		Age 11	
	Social Maladjustment	Cognitive skills	Social Maladjustment	Cognitive skills
Female	-0.295	0.039	-0.207	-0.037
	[0.017]**	[0.012]**	[0.017]**	[0.010]**
Father's years of education	-0.005	0.022	0.002	0.023
	[0.007]	[0.005]**	[0.007]	[0.004]**
Mother's years of education	-0.001	0.033	-0.011	0.031
	[0.008]	[0.006]**	[0.008]	[0.005]**
Father's Social Class (I/II)	-0.049	0.108	-0.026	0.144
	[0.025]*	[0.018]**	[0.026]	[0.015]**
Any serious difficulties in the family	0.169	-0.151	0.113	-0.032
	[0.025]**	[0.018]**	[0.026]**	[0.015]*
Mother shows little interest in child's education	0.435	-0.274	0.084	-0.042
	[0.032]**	[0.023]**	[0.034]*	[0.020]*
Father shows little interest in child's education	0.312	-0.22	0.04	-0.09
	[0.033]**	[0.024]**	[0.034]	[0.020]**
Mother reads news most days and books most weeks	0.011	0.05	-0.01	0.06
	[0.020]	[0.014]**	[0.020]	[0.012]**
Father reads news most days and books most weeks	-0.077	0.091	0.004	0.038
	[0.019]**	[0.014]**	[0.020]	[0.012]**
Slow early development (bed-wetting, late walking, late speaking)	0.259	-0.279	0.025	-0.077
	[0.026]**	[0.018]**	[0.027]	[0.016]**
Early illness or handicap	0.308	-0.611	-0.158	-0.224
	[0.080]**	[0.055]**	[0.087]	[0.052]**
Social maladjustment at 7			0.272	-0.071
			[0.010]**	[0.006]**
Cognitive ability at 7			-0.231	0.643
			[0.014]**	[0.008]**
Observations	12787	12878	10927	10922
R-squared	0.14	0.21	0.23	0.59

Standard errors in brackets
* significant at 5%; ** significant at 1%

Notes: Social maladjustment is measured using the Bristol Social Adjustment Guide (as rated by the teacher). Cognitive skills are averages of test results sat at school at the relevant ages. Both social and cognitive skills are measured in units of standard deviations from the mean. See Box 1 for more information.

All regressions contain controls for child characteristics: gender, ethnicity, birthweight, illness at birth, handicap, twin status, only child, 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, was walking alone before the age of 1.5 years, speaking by 2 years, wetting by day after 3 years, whether the cohort member attended a welfare clinic as a baby; parental characteristics (at child's birth unless stated otherwise): father's age, mother's age, education of both parents, social class of both the father, marital status of mother, whether mother smoked, and if stopped, during pregnancy, previous complications in pregnancy, interval between marriage and birth, whether mother obese, whether mother worked during pregnancy and number of hours, whether English mother's usual language with the child, whether or not each parent reads books and newspapers regularly (age 7), parent shows interest in child's education (age 7), ever lived in care (age 7), health visitor reports of serious family difficulties (incl. disability, mental illness divorce, alcoholism); local characteristics: broad region, urban vs. rural, % semi- and unskilled males as proportion of economically active males in local authority, % economically active females/ economically active males in local authority (both 1961).

The intuition that there is greater mobility in social scores than cognitive ones is also confirmed in Table 2, which gives transition matrices for social maladjustment and cognitive test scores between the ages of 7 and 11. To produce these, we divide the population into quartiles[4] 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 2, we see that 44% 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 29% had moved into the quartile above, i.e. moved into a relatively less maladjusted group over time. For cognitive test scores, the proportions were 64% and 26% respectively.

The matrices taken as a whole suggest considerably more mobility in social skills than cognitive skills; to summarise the degree of mobility across all quartiles, we can calculate immobility indices for social maladjustment and cognitive test scores.[5] Here, we see that the immobility index for cognitive test scores (3.59) is higher than for measures of social maladjustment (2.99), which may in turn imply that social skills are more malleable than cognitive skills.

It should be noted that the apparent differences in the degree of mobility between cognitive and social skills shown in these transition matrices, and in the regression coefficients in Table 1, could also arise from differences in the amount of measurement error in social and cognitive skills measures: in particular, if there were greater measurement error in the social adjustment scores (which is plausible, given

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[4] Our quartiles do not contain exactly 25% of the population in the case of the social maladjustment scores (see notes to Table 2 for more details).

[5] We calculate the immobility indices by summing proportions on the leading diagonal and all adjacent squares, i.e. for social maladjustment, the immobility index is calculated using the following figures: 0.44+0.30+0.21+0.49+0.29+0.19+0.37+0.24+0.26+0.20 = 2.99.

that these measures are likely to be assessed by different teachers at age 7 and age 11, whilst cognitive tests can be scored more objectively), this could lead to greater measured mobility in socials skills compared to cognitive skills. For this reason our findings should be taken as suggestive. In future work we plan to assess the sensitivity of our results to the possibility of measurement error.

Table 2: Transition matrices for social maladjustment and cognitive test scores, ages 7 and 11

Age 7 ↓	Age 11→ Most maladjusted	2nd	3rd	Least maladjusted
Most socially maladjusted	0.44	0.29	0.13	0.14
2nd	0.24	0.30	0.19	0.27
3rd	0.16	0.26	0.21	0.37
Least socially maladjusted	0.09	0.22	0.20	0.49

Age 7 ↓	Age 11→ Lowest cognitive score	2nd	3rd	Highest cognitive score
Lowest cognitive score	0.64	0.26	0.08	0.02
2nd	0.25	0.37	0.26	0.11
3rd	0.08	0.27	0.38	0.28
Highest cognitive score	0.03	0.10	0.29	0.59

Immobility index for social maladjustment: 2.99
Immobility index for cognitive scores: 3.59

Note: Because of the distribution of social maladjustment test scores, 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 1.
Immobility indices based on column rather than row probabilities show a very similar picture: with an index of 3.01 for social maladjustment, and 3.59 for cognitive scores.

3. What Skills Matter for Schooling and Other Adolescent Outcomes?

Social skills are very important for schooling outcomes and decisions. Although performance in cognitive tests, particularly at age 11, is important for decisions at 16 and beyond, social skills matter too. Children who exhibited social maladjustment at age 11 were less likely to stay on at school post-16, after taking into account cognitive ability and other family background factors (see Table 3, which

shows that every standard deviation increase in maladjustment at 11 is associated with a 3.3 percentage point reduction in the likelihood of staying on at school at 16). Whilst cognitive skills appear to have had an even larger impact (Table 3 shows that an increase of 1 standard deviation in cognitive skills at age 11 is associated with a 20.2 percentage point rise in the likelihood of staying on at school post-16 conditional on other background characteristics), comparisons of the size of the coefficients across different types of skills need to be made with care.[6][7]

Beyond this, social maladjustment – both at 7 and 11 - is also an important determinant of performance in higher education (HE). Although cognitive abilities, particularly at age 11, were even more important in determining whether an individual obtained an HE qualification, the importance of social skills cannot be over-looked.

Social skills developed during childhood also appear to be at least as important as cognitive skills in explaining what can be thought of as negative adolescent outcomes, such as contact with the police and teenage motherhood. Table 3 shows that social maladjustment during childhood is clearly associated with an increased likelihood of getting into trouble with the police (as reported by the parent), or having been to court (as reported by the school) by age 16. Our basic model suggests that every additional standard deviation in the maladjustment score at age 11 is associated with a 2 percentage point increase in the probability of having been in formal trouble by age 16 (conditional on a host of background characteristics).[8] This is clearly at least as important a determinant of early criminal activity as cognitive ability. Table 3 also shows a strong positive association between social maladjustment at 11 and the

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[6] Although both cognitive and social skills measures have been standardised, Appendix Figure A1 shows that their distributions are very different. It is not clear therefore that 1 standard deviation change in our measure of cognitive skills is directly comparable to 1 standard deviation change in our measure of social skills, particularly in the presence of possible measurement error in both..

[7] It may also be the case that given that some children may have been prevented from staying on due to poor academic outcomes, we might expect the coefficient on cognitive skills to be larger.

[8] A list of background characteristics included in our models can be found in the notes to Table 1.

likelihood of teenage motherhood amongst women in the NCDS: every additional standard deviation in the maladjustment score at age 11 is associated with a 2 percentage point increase in the probability of having a child before the age of 20. The impact of cognitive skills at age 11 was even larger: an additional standard deviation of cognitive achievement at age 11 is associated with a 4.3 percentage point reduction in the likelihood of being a teenage mother (conditional on other background characteristics).[6]

In general, cognitive and social skills at age 11 seem to matter more for these outcomes than the same measures at age 7. This is perhaps unsurprising[9], although it is worth pointing out that social maladjustment at age 7 has a significant impact on the likelihood of obtaining an HE qualification (in both specifications) over and above social maladjustment at age 11. This is never true for cognitive skills, though of course this may simply reflect greater correlation between cognitive skills over time.

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[9] Given that we are controlling for social skills at both ages 7 and 11, the coefficient on the age 7 social skills variable represents the effect of that part of social skills at age 7 that is not also reflected in social skills at age 11.

Table 3: Schooling and other 'adolescent' outcomes

	Schooling			Social outcomes	
	Post-compulsory schooling?	HE qualification? (1)	HE qualification? (2)	Trouble with police by 16?	Teenage mother?
Social maladjustment at 7	-0.008	-0.017	-0.016	0.008	-0.002
	[0.006]	[0.007]*	[0.007]*	[0.002]**	[0.005]
Social maladjustment at 11	-0.033	-0.023	-0.015	0.019	0.02
	[0.007]**	[0.007]**	[0.007]*	[0.002]**	[0.005]**
Cognitive ability at 7	0.011	0.023	0.021	0.002	-0.007
	[0.010]	[0.012]	[0.012]	[0.005]	[0.008]
Cognitive ability at 11	0.202	0.205	0.161	-0.015	-0.043
	[0.010]**	[0.011]**	[0.012]**	[0.005]**	[0.009]**
Female	-0.018	-0.068	-0.068	-0.081	
	[0.010]	[0.011]**	[0.012]**	[0.005]**	
Father's years of education	0.013	0.016	0.012	-0.004	-0.007
	[0.004]**	[0.004]**	[0.004]**	[0.002]	[0.005]
Mother's years of education	0.033	0.02	0.012	-0.003	-0.002
	[0.004]**	[0.005]**	[0.005]*	[0.003]	[0.005]
Father high social class	0.091	0.059	0.034	-0.02	-0.04
	[0.013]**	[0.016]**	[0.016]*	[0.009]*	[0.016]*
Stayed on at school post 16			0.272		
			[0.015]**		
Observations	8509	7740	7740	9164	4246

Standard errors in brackets
* significant at 5%; ** significant at 1%
Notes: main specification has same background control variables as in notes to Table 1. HE qualification(2) additionally controls for whether or not the individual stayed on at school post-16. The outcome "trouble with policy by 16?" is coded as 1 if either the teacher reports that the young person has ever been in trouble with the police, or if the parent reports that their child has ever been to court (presumably as a result of some criminal behaviour).

4.   What Skills Matter for Labour Market Outcomes?

Social skills also matter for labour market outcomes (see Table 4). Even conditioning on schooling outcomes (whether or not the individual stayed on at school post-16, and whether or not they received an HE qualification), teacher-rated social maladjustment at age 11 is associated with both lower employment probabilities, and lower wages at age 42 (also at age 33, shown in Appendix Table A1). Our model suggests that an increase of one standard deviation in the maladjustment score at age 11 reduces the probability of employment (conditional on schooling outcomes) by 3 percentage points for individuals at 42, and reduces wages (conditional on schooling

outcomes) by approximately 3 per cent. The magnitude of the impact of cognitive

skills on the probability of being in employment at age 42 is similar to that of social

maladjustment (albeit in opposite directions), but the impact on wages at age 42 is

much larger: an increase of 1 standard deviation in cognitive ability at age 11 is

associated with approximately a 10% increase in hourly wages (conditional on

staying on at school point-16).[6] This suggests that social skills are important both

because they influence achievement at school, but also because they impact on labour

market performance directly:this is consistent with other research, which has shown

that it is often work experience and personal traits such as reliability, motivation and

integrity that employers are looking for (see Atkinson & Williams, 2003 or Hasluck,

2002).

Table 4: Labour market outcomes (at age 42)

	Employment		Wages	
	Employed (1)	Employed (2)	Hourly wage (1)	Hourly wage (2)
Social maladjustment at 7	-0.014	-0.013	-0.003	0.001
	[0.004]**	[0.004]**	[0.008]	[0.008]
Social maladjustment at 11	-0.029	-0.028	-0.029	-0.022
	[0.004]**	[0.004]**	[0.008]**	[0.008]**
Cognitive ability at 7	0.005	0.006	0.042	0.039
	[0.008]	[0.008]	[0.013]**	[0.013]**
Cognitive ability at 11	0.023	0.018	0.168	0.104
	[0.008]**	[0.008]*	[0.012]**	[0.013]**
Female	-0.13	-0.128	-0.413	-0.393
	[0.008]**	[0.008]**	[0.013]**	[0.012]**
Father's years of education	-0.001	-0.002	0.02	0.015
	[0.003]	[0.003]	[0.005]**	[0.005]**
Mother's years of education	0.001	0.001	0.008	0
	[0.004]	[0.004]	[0.006]	[0.006]
Father high social class	-0.01	-0.012	0.038	0.014
	[0.012]	[0.012]	[0.019]*	[0.018]
Stayed on at school post 16		-0.013		0.127
		[0.011]		[0.017]**
Obtained HE qualification		0.035		0.218
		[0.009]**		[0.015]**
Observations	7735	7735	5417	5417
R-squared			0.31	0.35

Standard errors in brackets
* significant at 5%; ** significant at 1%
Notes: specification (1) has same background control variables as in notes to Table 1: specification (2) additionally controls for whether or not the individual stayed on at school post-16. Regression coefficients reported for log wage models.

5. Conclusions

Our work shows that successful education policy cannot neglect the development of non-cognitive skills. We find that social skills are important determinants of schooling and labour market outcomes, and of a variety of behavioural outcomes, including teenage motherhood, and engagement in illegal activity before the age of 16. Our work contributes to a growing body of research that documents the role of non-cognitive skills in an individual's life, all indicating that a uni-dimensional vision of skill is wrong and likely to mislead both research and policy.

Furthermore, recent research suggests that non-cognitive skills may be more malleable than cognitive skills (e.g., Carneiro and Heckman, 2003, Cunha, Heckman, Lochner and Masterov, 2005). Even though our work is quite preliminary, our findings are consistent with this assertion, which suggests that non-cognitive skills may be more effectively influenced by education policy than cognitive skills (the usual focus of analysis). Given that disadvantaged children tend to be more socially maladjusted (shown in Table 1), education interventions targeted at disadvantaged children are also likely to be more effective if they consider explicitly the formation of social skills.

Our work is consistent with a growing body of evidence showing that skills formed relatively early in the life cycle have long lasting and substantial effects on a variety of important outcomes (e.g. see Carneiro and Heckman, 2003). It is quite possible that early human capital interventions, designed to take into account both the multi-dimensional nature of skills, and the dynamic nature of skill formation, can be among the most effective set of policy instruments to combat early school leaving, unemployment, teenage pregnancy, illegal behaviour and many other behaviours and outcomes.

Appendix

Figure A1. Distribution of standardised cognitive and social skills at 7 and 11
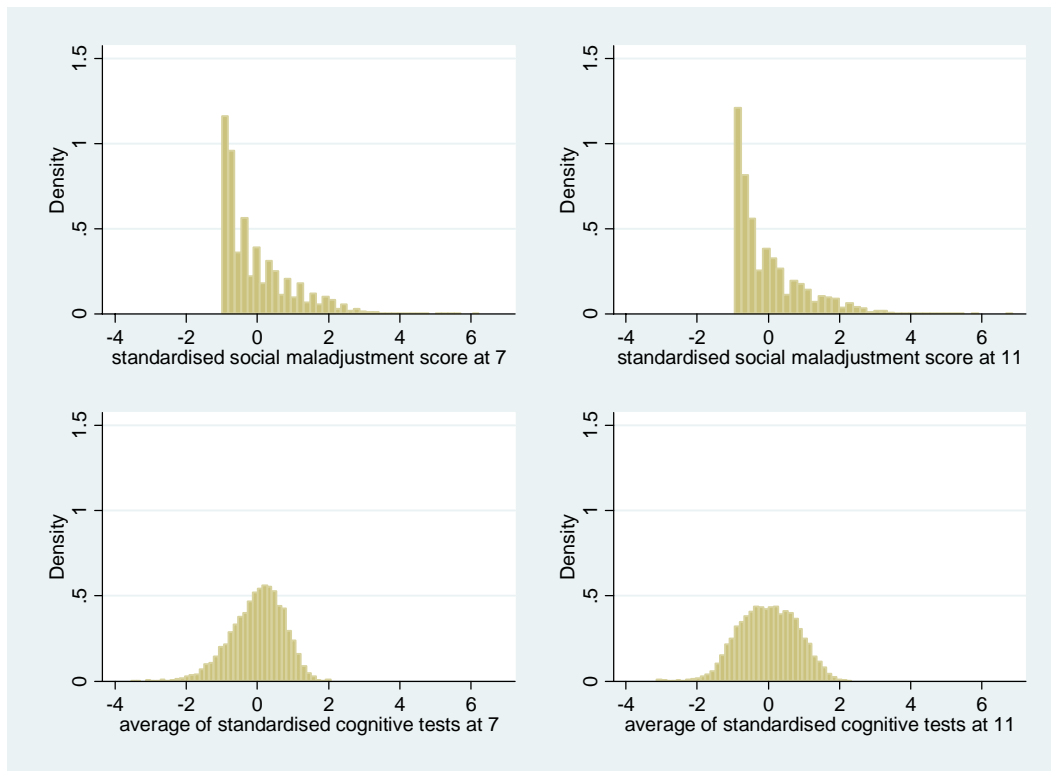
Table A1: Labour market outcomes (at age 33)

	Employment		Wages	
	Employed	Employed	Hourly wage	Hourly wage
	(1)	(2)	(1)	(2)
Social maladjustment at 7	-0.004	-0.002	-0.017	-0.012
	[0.005]	[0.005]	[0.008]*	[0.008]
Social maladjustment at 11	-0.03	-0.029	-0.029	-0.023
	[0.005]**	[0.005]**	[0.008]**	[0.008]**
Cognitive ability at 7	0.016	0.016	0.063	0.062
	[0.009]	[0.009]	[0.013]**	[0.013]**
Cognitive ability at 11	0.036	0.031	0.143	0.084
	[0.009]**	[0.009]**	[0.012]**	[0.012]**
Female	-0.246	-0.247	-0.38	-0.366
	[0.009]**	[0.009]**	[0.013]**	[0.012]**
Father's years of education	0.002	0.002	0.005	0.001
	[0.004]	[0.004]	[0.005]	[0.005]
Mother's years of education	-0.004	-0.004	0.009	-0.001
	[0.004]	[0.004]	[0.006]	[0.006]
Father high social class	0.007	0.006	0.021	-0.001
	[0.014]	[0.014]	[0.019]	[0.018]
Stayed on at school post 16		-0.01		0.134
		[0.013]		[0.017]**
Obtained HE qualification		0.028		0.194
		[0.012]*		[0.015]**
Observations	7777	7777	4641	4641
R-squared			0.32	0.37

Standard errors in brackets
* significant at 5%; ** significant at 1%
Notes: specification (1) has same background control variables as in notes to Table 1: specification (2) additionally controls for whether or not the individual stayed on at school post-16. Regression coefficients reported for log wage models.

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