

# The journey from childhood skills to adult financial capability

**Technical Appendix**

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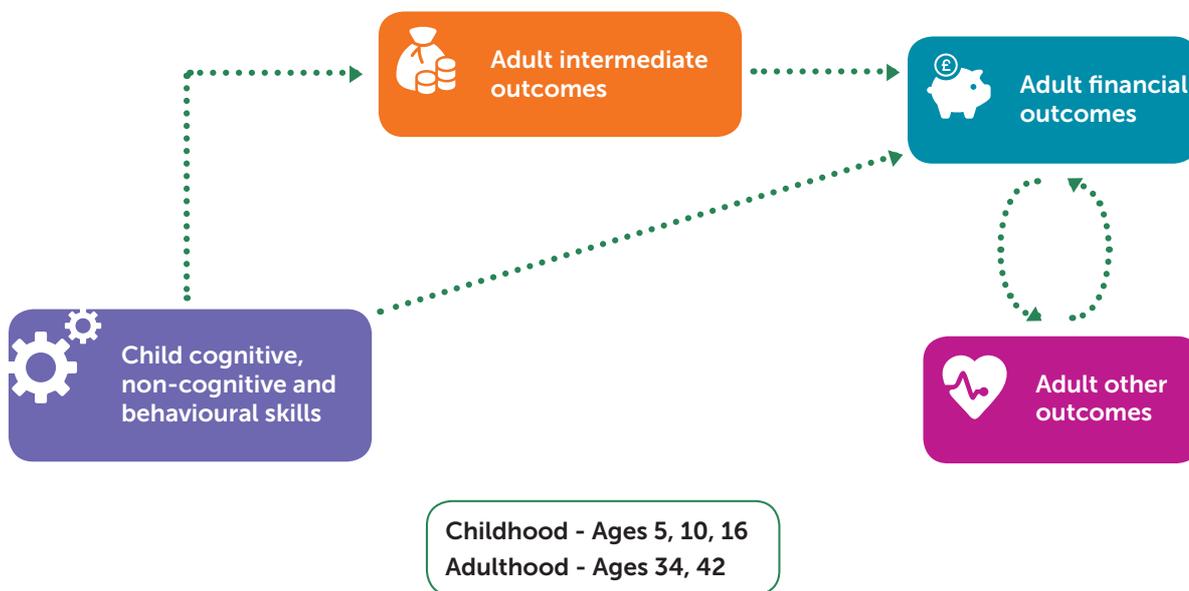
# Introduction

This Technical Appendix accompanies the main report *The journey from childhood skills to adult financial capability* (2017) prepared for the Money Advice Service by London Economics. The analysis has used the 1970 British Cohort Study (BCS70) dataset to test the links between skills (cognitive, non-cognitive, and behaviour), in childhood and adolescence, and long term financial outcomes in adulthood. In so doing, this research uncovers important new understandings about the predictors of adult financial wellbeing, possible indicators of risk and vulnerability, and important links between financial outcomes and wider social policy priorities.

This document supplements the main report by providing additional detail on the methodology and results. It is further supplemented by a workbook containing the full set of wider results obtained over the course of the research<sup>1</sup>.

The study consisted of a number of strands of analysis, each represented in Figure 1 below. This diagram provides a framework for the analysis and how it represents the many connections between different aspects of a person's life, from childhood and adolescence, to adulthood.

Figure 1: Overview of analysis



The structure of the document is as follows:

- Chapter 1 presents the literature review that guided the analysis.
- Chapter 2 provides a detailed description of the selection and measurement of the childhood skills and adult financial outcome variables used in the analysis.
- Chapters 3 expands on the information provided in Chapter 2 of the main report to provide a deeper examination of the relationships between composite and individual childhood skills and adult financial outcomes.
- Chapter 4 provides additional detail on the relationships between childhood skills and intermediate outcomes discussed in Chapter 3 of the main report.
- Chapter 5 of this document presents the results relating to the impact of personal and family background characteristics discussed in Chapter 4 of the main report.
- Chapter 6 presents further information on the relationship between adult financial outcomes and other adult outcomes, beyond what appears in Chapter 5 of the main report.

<sup>1</sup> Please contact the Money Advice Service Insight and Evaluation team if you would like to see these more detailed results. Contact details can be found at the back of this report.

# Chapter 1 Literature review

This study considers whether the roots of adult financial capability can be found in childhood. We have reviewed the existing literature on the childhood roots of adult financial capability for the main purpose of guiding the selection of variables for the analysis described in this report. Relevant papers were identified using an online literature search and by the Money Advice Service.

Literature on the effect of childhood skills on adult financial capability is scarce. A possible reason for this is that financial literacy, knowledge and behaviour tends to be the focus of the economic literature, whereas perhaps the most important childhood influence, financial socialisation, tends to be the focus of the psychology literature (Grohmann et al., 2015). These two strands of literature rarely interact in the set of papers reviewed. There appears to be a greater volume of literature focused on linking childhood skills to other adult outcomes, particularly labour market outcomes such as wages and employment.

## 1.1 Impact of financial socialisation

Across the reviewed literature, the most important childhood predictor of adult financial capability seems to be financial socialisation. Financial socialisation can be defined as “the process in which individuals acquire and develop knowledge, beliefs, and norms that influence their subsequent financial practices” (Cho et al., 2012). Socialisation varies depending on where and from whom the individual receives information. Typically, a distinction is made between parental socialisation and socialisation at school or at work.

The literature generally shows either a positive effect of *parental socialisation* on adult financial outcomes or no effect at all. Bucciol & Veronesi (2014), looking at adult saving behaviour, show a positive effect of parental socialisation in terms of teaching about appropriate saving. Parents’ teaching is both direct, through providing budgeting advice, and indirect, through providing pocket money and allowing the child freedom in their spending decisions. A similar positive effect of parental socialisation is found by Shim et al. (2013) looking at more general financial capability measures such as financial knowledge and attitude towards financial matters. Grohmann et al. (2015) find a positive direct effect of parental socialisation on financial literacy and a positive indirect effect on financial behaviour but find no direct effect of parental socialisation on financial behaviour<sup>2</sup>. Similarly, no effect is observed by Cho et al. (2012), also using a more general definition of financial capability.

Financial socialisation *at school* shows to be a positive force for adult financial capability too, with both Grohmann et al. (2015) and Cho et al. (2012) showing a positive effect. In contrast, financial socialisation through *work experience* has seemingly no impact on financial capability according to the reviewed literature. Grohmann et al. (2015) finds no effect of socialisation through work experience on financial behaviour. Lenton (2014), looking at wages, similarly finds no effect. Interestingly, Grohmann et al. (2015) find a negative effect of work-related financial socialisation on financial literacy.

## 1.2 Impact of environment

Parents may also have another role to play beyond financial socialisation, most importantly providing the environment in which the child grows up. In the reviewed literature, this childhood environment is invariably proxied by parental socio-economic status or social class, and it seems to play no significant role in adult financial capability. Daly et al. (2015) find no significant impact of parental social status on unemployment while Grohmann et al. (2015) and Herd et al. (2012) find no significant impact of parental social status on knowledge of one’s own financial situation.

There is some suggestion in the literature that genetics can also play a role in the financial skill development of children. Cronqvist & Siegel (2013) perform a twin study to disentangle the effect of genetics on savings behaviour. By exploiting the fact that identical twins are genetically identical and fraternal twins are not, they are able to estimate that around 33% of variation in savings propensity is due to genetics.

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<sup>2</sup> The direct effects in Grohmann et al. (2015) are effects that impact either financial literacy or financial behaviour directly. Indirect effects are effects that are mediated through a third variable. For instance, the effect of parental socialisation on financial behaviour is mediated through financial literacy. That is, parental socialisation improves literacy which in turns improves financial behaviour. Combining these two effects, the authors show that therefore parental socialisation has a positive effect on financial behaviour.

## 1.3 Impact of cognitive and non-cognitive skills

Other childhood characteristics potentially influencing adult financial capability are cognitive and non-cognitive skills. The literature on the interaction between adult financial capability and childhood skills is not well developed. Literature on the interaction between childhood skills and labour market outcomes such as wages and unemployment is much more abundant. In this light, this section mainly looks at the impact of childhood cognitive and non-cognitive skills with respect to such labour market outcomes, with the understanding that this is not equal to financial capability but should be related.

### 1.3.1 Cognitive skills

Cognitive skills can be defined as “the ability of an individual to perform the various mental activities most closely associated with learning and problem solving” (NCME, 2015). These tend to be measured by general intelligence, literacy (reading) and numeracy.

There is some evidence in the literature reviewed suggesting a relationship between childhood skills and adult *financial capability*. Grohmann et al. (2015)<sup>3</sup> find a positive effect of numeracy on financial literacy in adulthood<sup>4</sup> but no effect on financial behaviour (as represented by the number of different financial asset types held by the owner). Meanwhile, Herd et al. (2012), using the Wisconsin Longitudinal Study, find some positive effects of general intelligence – measured with the Henmon-Nelson Test of Mental Ability – on financial capability, measured by knowledge of one’s own financial situation. However, they also find no statistically significant effect of numeracy and literacy on the same measure.

Most of the studies reviewed looking at *adult labour market outcomes* (such as wages and employment) find a statistically significant, positive link between cognitive skills (measured sometimes as a composite, numeracy or literacy scores, or as general intelligence) and the outcomes. None finds a statistically significant, negative link.

Goodman et al. (2015) find that cognitive skills as assessed by a combination of numeracy skills, literacy skills and general intelligence, have a positive impact on wage, family income, net wealth – total savings minus total debt – and whether someone is employed later in life. Daly et al. (2015) find a negative effect of childhood general intelligence on adult unemployment (i.e. those with higher intelligence are more likely to be employed). Macmillan (2013) finds that early literacy and general intelligence at age 5 negatively impact the chance of being unemployed (i.e. more likely to be employed), but find no such relationship for general intelligence at age 10.

Crawford & Cribb (2015) show that higher literacy, as measured by the Edinburgh Reading Test, is associated with higher wages<sup>5</sup> later in life. Lenton (2014) finds a positive effect of test scores<sup>6</sup> on adult wages. Feinstein (2000) finds childhood numeracy to positively impact adult employment and wages, and literacy also to positively impact wages. Blanden et al. (2006) find a similar impact on wages for numeracy and general intelligence. Furnham & Cheng (2017), using the National Child Development Study, find that cognitive ability (assessed with a general ability test and measured at age 11) positively impacts net monthly earnings at age 54.

### 1.3.2 Non-cognitive skills

In the literature reviewed, there is some evidence of the impact of childhood non-cognitive skills on adult saving behaviour. Prevoo and Ter Weel (2013) use BCS70 data to examine childhood predictors of whether an adult saves some amount of money per month, which is slightly different to the regular saving outcome included in this study. They find that emotional stability and conscientiousness impact one’s saving probability positively, whereas extraversion does so negatively. Agreeableness is not found to be a statistically significant predictor for wages nor savings, and emotional stability and extraversion are not statistically significant predictors for wages.

As before, there is a greater volume of literature focused on linking childhood non-cognitive skills to adult outcomes such as wages and employment – many of them also employing BCS70 data. Goodman et al. (2015), in a report on behalf of the Early Intervention Foundation, use BCS70 data to examine the links between non-cognitive skills and a broad range of adult outcomes, including labour market outcomes (such as wages) and other outcomes (such as mental health and life satisfaction). They find that income is positively affected by one’s self-perception and awareness, self-control and regulation and social skills.

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<sup>3</sup> Using a survey specifically collected for this study. Measures related to participants’ childhoods were based on their memories.

<sup>4</sup> Based on answers to questions on interest rates, inflation and diversification, and a question asking respondents to name foreign banks operating in the country.

<sup>5</sup> Other cognitive skills have been included in this paper, but their results are not reported.

<sup>6</sup> This is not further defined in the paper.

Furthermore, they also find that self-control and self-regulation positively impact the probability of being employed. These findings are corroborated by an extensive literature review undertaken in the same report, which additionally finds a positive impact of self-perception and awareness on employment.

Daly et al. (2015) find that an increase of self-control is associated with lower unemployment. Macmillan (2013), focusing on boys only, finds that childhood internal locus of control, conscientiousness, extraversion and hyperactivity are important influences on the probability of being unemployed, the last being positive and the rest negative. Agreeableness and self-esteem do not have significant impact on unemployment. Blanden et al. (2006), focusing on wages, find that internal locus of control, extraversion and having high anxiety have an impact, the last being negative. Self-esteem and neuroticism are not statistically significant.

Furnham & Cheng (2017), using the National Child Development Study, find that conscientiousness and openness (measured at age 11) positively impact net monthly earnings at age 54.

Two studies examine whether the specific non-cognitive personality traits driving adult labour market outcomes differ between boys and girls, and found evidence of this. In terms of men's wages, Lenton (2014) finds that childhood extraversion is a positive predictor and affiliation is a negative predictor, but neither of these traits have a link with women's wages. On the other hand, childhood conscientiousness is a positive predictor and agreeableness is a negative predictor of women's wages, but neither of these traits have a link with men's wages. Feinstein (2000) finds that childhood anti-social tendencies, extraversion and self-esteem are more important predictors of men's employment than women's while childhood locus of control is more important for women. Childhood self-esteem and locus of control are bigger predictors of women's wages than men's.

## 1.4 Impact of other factors

Besides childhood factors, other variables may have an impact on financial capability too. The variables which are most commonly used are discussed here. The results of course depend on the definition of financial capability used, which varies throughout the literature, and whether this refers to financial behaviour or financial literacy or a broader definition of financial capability.

Gender is commonly controlled for in the reviewed literature. Bucciol & Veronesi (2014) and Cronqvist & Siegel (2013) find no significant differences between men and women in financial capability and neither do Grohmann et al. (2015) for financial literacy. These authors, however, do find that women display better financial behaviour. Similarly, Daly et al. (2015) find that women have a lower chance of unemployment. In contrast, Herd et al. (2012) find that men display better financial capability. Cho et al. (2012) find mixed results and Crawford & Cribb (2015), looking at wages, and Shim et al. (2013) control for gender in their analysis but do not report the effect. Overall, the results for gender are mixed but to a large extent it seems that gender makes little difference to financial capability.

Age is another commonly controlled for factor. The results are mixed here too. Bucciol & Veronesi (2014) find no impact of age on saving behaviour and Grohmann et al. (2015) find no effect on either financial literacy nor financial behaviour, proxied by different type of financial assets owned. Cronqvist & Siegel (2013) on the other hand find a positive effect on savings. Once again, Cho et al. (2012) find mixed results.

Family income seems to have an overall positive effect on later adult financial capability. Cronqvist & Siegel (2013) find that growth of disposable income positively affects savings behaviour. They, however, find mixed results for the level of disposable income. Bucciol & Veronesi (2014) and Grohmann et al. (2015) find a positive effect of the level of income on financial capability. Cho et al. (2012) similarly find positive effects for some financial capability measures, but find no significant results for others.

Educational attainment shows little importance for financial capability. The majority of the literature finds no significant impact of education on financial capability (Cho et al., 2012; Grohmann, et al., 2015; Herd et al., 2012; Bucciol & Veronesi, 2014 for whether someone saves). Bucciol & Veronesi (2014) find that education positively impacts the amount that someone saves. Lastly, Lenton (2014) finds that education has a positive impact on wages.

A last set of variables that is often controlled for relates to household structure of the individual as an adult, particularly when savings behaviour is analysed. One such statistic is the number of children someone has. In the literature reviewed, this statistic turns out to not be a good predictor of financial behaviour and outcomes. Cronqvist & Siegel (2013) and Bucciol & Veronesi (2014) find no significant impact of having children on saving behaviour. Looking at wages, Lenton (2014) find a negative impact but only for men.

Other household statistics are also used. Cho et al. (2012), looking at general financial capability, find a positive effect of the number of family members, whereas Bucciol & Veronesi (2014), looking at savings, find a negative effect. Cronqvist & Siegel

(2013) find a negative relationship between savings and the number of siblings one has, but no such relationship exists with respect to the number of parents still alive.

## 1.5 Conclusions

From this review, tentative conclusions may be drawn. Firstly, it seems that financial socialisation is the most important contributor to adult financial capability, although this again depends on the definitions of financial capability used, which varies throughout the literature. A particularly large role is reserved for parental socialisation, but socialisation at school is also a positive influence. Financial socialisation through work, on the other hand, does not seem to be important. Beyond socialisation, there are some suggestions that childhood environment does not seem to be an important predictor of financial capability.

There is some evidence in the literature reviewed suggesting a relationship between cognitive and non-cognitive skills in childhood and adult financial capability. However, there is a greater volume of literature focused on linking childhood skills to other adult outcomes, particularly labour market outcomes such as wages and employment.

A number of these studies find a statistically significant, positive link between cognitive skills and adult financial capability and labour market outcomes. Certain childhood non-cognitive skills also appear to be positively linked to adult financial capability and labour market outcomes, such as conscientiousness, self-perception and awareness. There is some evidence that different specific non-cognitive personality traits drive positive adult labour market outcomes for men and women.

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# Chapter 2 Definition of childhood skills and adult financial outcomes

This section provides more detail on the construction of the measures used in the analysis, beyond what appears in the main report. Section 2.1 of this Technical Appendix describes how childhood skills were constructed while Section 2.2 focuses on adult financial outcomes. Further details on which underlying BCS70 variables were used to construct the childhood skills and adult financial outcome variables are provided in Annex 1 of this document.

## 2.1 Childhood skills

As described in the main report, there was a distinction made in the analysis between cognitive, non-cognitive and behavioural skills. For each of these types of skill, the analysis considered both composite measures and individual skill components. Composite measures were used to investigate the relationships between overall skills and adult financial outcomes, whereas skill components were used to investigate whether any specific underlying skills components were driving these relationships.

The main report provides an overview of how childhood skill measures were defined for the analysis and lists all of the composite and individual skill measures used in the analysis. This section of the Technical Appendix provides more detail on the construction of the childhood skills measures, particularly on the associations between the composite measures and individual skill components.

### 2.1.1 Cognitive skills

#### Measures at age 5 (1975 wave)

##### Composite measure of cognitive skills at age 5

The composite measure of cognitive skills at age 5 is generated using Principal Component Analysis (PCA)<sup>7</sup> on the copying designs test, the human figure drawing test, the profile drawing test and the mother's assessment of whether the child can read, each of which have also been used as individual measures. The composite measure assigns a higher weight to the copy designs test and the human figure drawing test than the other measures.

PCA is a statistical technique that produces a number of combinations of variables, called components, which represent variation in the underlying data. It is used in this study with the purpose of combining skills to create an index which represents overall cognitive or non-cognitive skills. This index is derived from the first component of a PCA, which is the component which explains the largest amount of variation in the data. In this case, where the PCA is run on a set of cognitive skill variables which are likely to be positively correlated with one another, we would expect the first component to represent overall cognitive ability.

#### Measures at age 10 (1980 wave)

##### Composite measure of cognitive skills at age 10

This is a PCA-generated composite score of Friendly Maths test score, the Edinburgh Reading Test score and the British Ability Scales score (testing general intelligence), each of which has also been used as a separate measure of cognitive skill at age 10. The composite index constructed using PCA ends up being essentially an average of the three underlying test scores.

#### Measures at age 16 (1986 wave)

##### Composite measure of cognitive skills at age 16

The composite measure of cognitive ability at age 16 has been derived from O-level results reported in the age 26 wave of the BCS70. All cohort members are grouped into one of three categories based on the National Qualification Framework (NQF) as follows:

- Level 0: No O-level, CSE, GCSE, Scottish Standard Grade or Scottish Ordinary Grade with grade A to G or equivalent achieved.

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<sup>7</sup> Using polychoric variances for ordinal variables like mother's assessment of the child's reading ability and the copying designs test.

- Level 1: 1 to 4 O-levels, CSEs, GCSEs, Scottish Standard Grade or Scottish Ordinary Grade with grade A to C or equivalent achieved, and any number O-levels, CSEs, GCSEs, Scottish Standard Grade or Scottish Ordinary Grade with grade D to G achieved, or any combination of these.
- Level 2: 5 or more O-levels, CSEs, GCSEs, Scottish Standard Grade or Scottish Ordinary Grade with grade A to C or equivalent achieved.

The decision was made to use a different approach to the approach used at other ages, as the measures of cognitive ability at age 16 have a higher proportion of missing observations, which would result in very small sample sizes for the analysis. This is in part due to the fact that individual cognitive skills are derived from the teacher self-completion module, which in the 1986 wave had a relatively low response rate due to a teacher strike taking place at the time of the survey<sup>8</sup>.

## 2.1.2 Non-cognitive skills

### Measures at age 5 (1975 wave)

Measures of non-cognitive skills at age 5 are not available in the BCS70.

### Measures at age 10 (1980 wave)

#### Academic self-concept

Academic self-concept is a non-cognitive skill component derived from self-assessed ability in particular subjects, with a higher score indicating a better self-concept. The survey question used is: “Do you do well or not so well in the following school subject?” with responses being either “well” or “not so well”. The question is answered for each of the following subjects<sup>9</sup>:

- Mathematics
- Reading
- Spelling
- Creative writing
- Art and craft
- Topic or project work

#### Locus of control

A higher score indicates greater internal locus of control, meaning the belief that an individual controls their own life (rather than events occurring due to external factors outside of their control). Sixteen questions are used to construct this composite measure, such as:

- Do you feel that most of the time it's not worth trying hard because things never turn out right anyway?
- Are tests just a lot of guess work for you anyway?
- When nice things happen to you is it only good luck?

#### Self-esteem

A higher score indicates higher self-esteem. The underlying questions used in the scoring include:

- Do you think that your parents usually like to hear about your ideas?
- Do you often feel lonely at school?
- Do other people often think that you tell lies?

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<sup>8</sup> Centre for Longitudinal Studies. ‘BCS70 - The 1970 British Cohort Study: The Sixteen-year Follow-up’. Available at: <http://www.cls.ioe.ac.uk/shared/get-file.ashx?id=784&itemtype=document>

<sup>9</sup> Following the approach of Goodman et al (2015).

### Self-control

Self-control measure the ability to control one's inhibitions. A higher score indicates a higher degree of self-control. The questions used include<sup>10</sup>, for instance:

- Child is daydreaming
- Cannot concentrate on particular task
- Pays attention in class

### Social skills

The social skills variable is derived from the teacher-completed questionnaire with questions about<sup>11</sup>:

- Child's popularity with peers
- Number of friends child has
- Boldness of the child
- Cooperativeness of the child

### Composite measure of non-cognitive skills at age 10

The composite measure of non-cognitive skills at age 10 is generated using Principal Component Analysis. This composite was constructed using the individual non-cognitive skills components at age 10, namely academic self-concept, locus of control, self-control, self-esteem and social skills. The composite index constructed using PCA ends up being essentially an average of the five underlying test scores.

## Measures at age 16 (1986 wave)

### Locus of control

19 questions are used, similar to those used in the construction of the age 10 measure.

### Challenge

The challenge variable is derived from the cohort member's answers to questions related to jobs and job environment. In particular, challenge is derived from three variables asking whether it matters to have an interesting job, whether getting a promotion matters and whether having a job with real challenge matters.

### Self-esteem

A higher score indicating a higher self-esteem. It is based on the same list of variables as the age 10 variable.

### Social skill

The social skills variable is constructed in the same way as the measure at age 10.

### Composite measure of non-cognitive skills at age 16

This is a PCA-generated composite score of the challenge measure, the locus of control measure, the self-esteem measure and the social skills measure all defined above. The index gives slightly higher weight to challenge and locus of control, and less to social skills.

## 2.1.3 Behavioural skills

### Composite measure

The composite measure used for behavioural skills is the Rutter Behavioural Score, which gives an indication of behavioural problems in children, with a higher score indicating **worse** behaviour. It is derived from a number of questions in the maternal completion module. Examples of underlying behaviours include:

- Very restless, often running about or jumping up and down;

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<sup>10</sup> Following Daly et al (2015).

<sup>11</sup> Following the approach of Goodman et al (2015).

- Frequently fights with other children;
- Often worried, worries about many things;
- Bullies other children, etc.

The underlying questions are the same in the 1975, 1980 and 1986 waves. For ease of reporting, the scale has been reversed so that a higher score indicates better behaviour.

## Individual measures

The individual questions of the Rutter Behavioural Score have been used to construct individual behavioural skill components. Following Prevoo & Ter Weel (2013), the variables have been used to construct a measure for:

- **Agreeableness**, measuring the tendency for a child to be cooperative, unselfish, etc.;
- **Conscientiousness**, measuring the tendency to be organised, responsible, hardworking etc.;
- **Extraversion**, measuring the tendency to be outgoing, fondness of large groups etc.; and
- **Neuroticism**, measuring the tendency to be emotionally unstable and prone to psychological distress.

Following Goodman et al. (2015), the variables have been used to construct a measure for:

- **Good conduct**, measuring the extent of a child to not be antisocial or uncooperative; and
- **Emotional health**, measuring the extent to which a child rarely worried, miserable, fearful, fussy, sullen or sulky.

These individual measures have been constructed at ages 10 and 16, following the combination of questions and their weights suggested in the literature reviewed as part of this analysis. The literature, however, only suggests how to construct non-cognitive skill measures for age 16. Non-cognitive skill measures at age 10 were constructed using the same combination of questions and weights provided in the literature for age 16, assuming that non-cognitive skills at age 10 can be measured in the same way as non-cognitive skills at age 16.

Applying the same assumption to individuals aged 5 – namely that the components of childhood non-cognitive skills at age 5 can be measured in the same way as those at age 16 - would be difficult to justify, since a child significantly changes and develops in terms of behaviour between the ages of 5 and 16. Therefore, the literature does not provide a reliable model of how to construct individual measures of non-cognitive skills at age 5 based on the Rutter questionnaire. For this methodological reason, individual non-cognitive skill measures have not been constructed at age 5.

## 2.2 Adult financial outcomes

### Regular saving (age 34)

The regular saving variable captures whether a person saves regularly. This outcome was constructed as a binary variable which has a value of 1 if the survey participant claims to save regularly, and 0 if they claim to save only from time to time or not to save at all.

### Pension saving (age 34)

The pension saving variable captures whether a person saves for retirement. This outcome was constructed as a binary variable which has a value of 1 if the survey respondent claims to either save for retirement, or to contribute to at least one type of pension scheme, or both; and a value of 0 if the survey respondent does not save for retirement nor contributes to a pension scheme.

### Low debt-to-income ratio (age 42)

The low debt-to-income ratio variable captures whether a person's household debt is less than 25% of the annual household income (value of 1), or above 25% of the annual household income (value of 0) and serves as a proxy for indebtedness. Household debt excludes mortgages, and household income includes all sources of income including one's own pay, pay from a partner, and benefits or tax credits.

The definition of debt being less than or equal to 25% of annual household income was selected from a range of different options. A description of the process of selecting this definition follows.

As proxies for indebtedness, a number of binary variables were created based on the debt-to-income ratio at age 42. Each such variable was constructed using an arbitrarily chosen cut-off point of the debt-to-income ratio at age 42. The cut-off ratios that were tested were:

- Debt-to-income ratio > 0 (i.e. individuals with some debt)
- Debt-to-income ratio > 0.15 (i.e. individuals with debt greater than 15% of annual income)
- Debt-to-income ratio > 0.2 (i.e. individuals with debt greater than 20% of annual income)
- Debt-to-income ratio > 0.25 (i.e. individuals with debt greater than 25% of annual income)
- Debt-to-income ratio > 0.3 (i.e. individuals with debt greater than 30% of annual income)
- Debt-to-income ratio > 0.43 (i.e. individuals with debt greater than 43% of annual income)
- Debt-to-income ratio > 0.7 (i.e. individuals with debt greater than 70% of annual income)
- Debt-to-income ratio > 1 (i.e. debt more than a year’s income)
- Debt-to-income ratio > 2 (i.e. debt more than two years’ income)

For each variable, individuals with a debt-to-income ratio below the respective cut-off level were classified as “not indebted”, and individuals with a debt-to-income ratio equal to or above the cut-off were classified as “indebted”.

In order to choose the most appropriate indicator of indebtedness, we explored the extent to which each of the constructed measures were correlated with the financial self-assessment variable. The results of this analysis are presented in the table below. As expected, the correlation coefficients are negative. This result implies that the better someone’s financial self-assessment, the less likely they are to have a high debt-to-income ratio (and therefore to be above the tested thresholds).

Table 1: Correlation coefficients of debt-to-income binary variables and financial self-assessment at age 42

Debt variable	Correlation coefficient
Debt-to-income > 0	-0.1767
Debt-to-income > 0.15	-0.2099
Debt-to-income > 0.2	-0.2122
Debt-to-income > 0.25	-0.2024
Debt-to-income > 0.3	-0.2108
Debt-to-income > 0.43	-0.2092
Debt-to-income > 0.7	-0.1864
Debt-to-income > 1	-0.1458
Debt-to-income > 2	-0.0659

The 25% definition was selected for a number of reasons: it had one of the strongest correlation coefficients with financial self-assessment amongst the options tested; it is a meaningful value (equivalent to 3 months’ income) and data from the Money Advice Service’s Financial Capability Survey (2015)<sup>12</sup> suggests this is a useful threshold beyond which over-indebtedness becomes more prevalent, as illustrated in Table 2 below.

Table 2: Prevalence of over-indebtedness according to alternative debt-to-income ratios

Debt-to-income ratio	Over-indebted (%)	Not Over-indebted (%)
Less than 1 month	51	74
>= 1 but less than 3 months	15	11
>=3 but less than 6 months	12	06
6 months or more	22	08
Total	100	100

<sup>12</sup> Financial Capability in the UK 2015 (Money Advice Service, 2015)

### **Net wealth (age 42)**

Net wealth is defined as household savings minus household debt. Savings include self-reported amounts of household savings in terms of bank or building society savings, bonds and certificates, ISAs, stocks and shares, investment trusts, bonds and gilts. Household debt includes self-reported amounts of student loans, credit card, store card, hire purchase agreements, personal loans (e.g. bank, building society or other financial institution, as well as loans from a private individual), but excludes mortgage debt.

### **Financial self-assessment (ages 34 and 42)**

For both ages 34 and 42, the financial self-assessment variable has been derived from a question recording the self-assessment of the cohort member's financial position. The question was framed identically in both the 2004 and the 2012 wave.

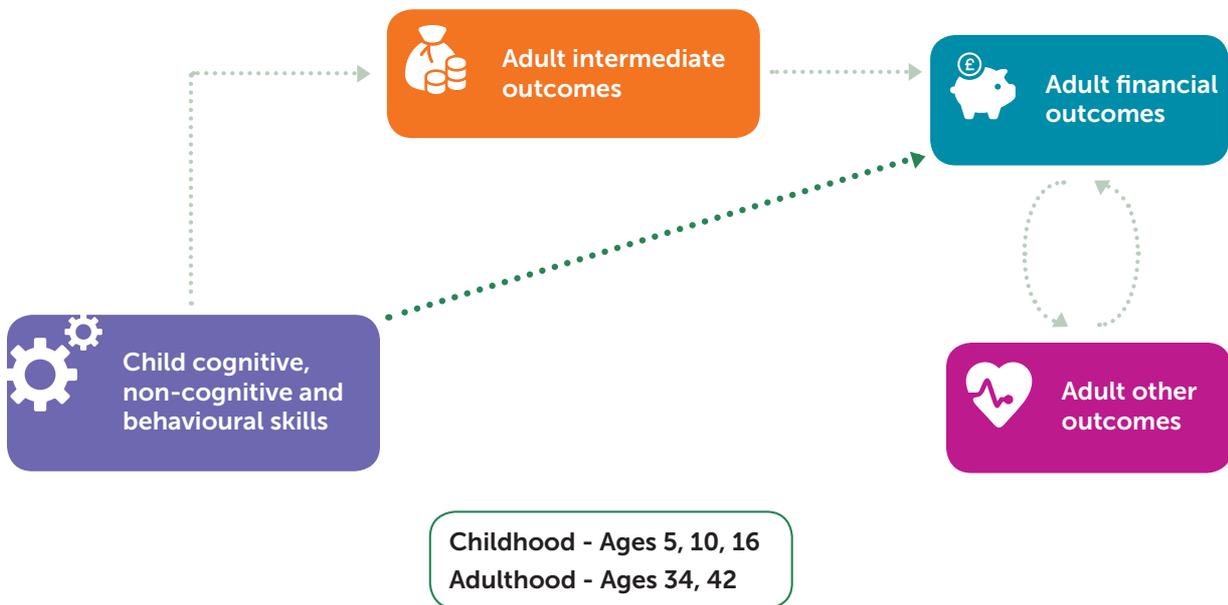
The question asked is: "How well would you say you personally are managing financially these days?" The possible answers are:

- "Finding it very difficult"
- "Finding it quite difficult"
- "Just about getting by"
- "Doing all right"
- "Living comfortably".

# Chapter 3 Testing the relationship between childhood skills and adult financial outcomes

## 3.1 The relationship between skills and adult financial outcomes

Table 3 in Section 2.1 of the main report shows that cognitive skills, non-cognitive skills and behaviour at ages 5, 10 and 16 are shown to be predictors of a range of adult financial outcomes.



It should be noted that the analytical approach, described in the box below, does not aim to build a predictive model of the levels of adult financial outcomes that a child might achieve. Instead, the purpose of this type of analysis – and the analysis in further sections – is to test hypotheses about links between certain childhood characteristics and adult outcomes.

### Regression analysis to estimate the relationships between skills and financial outcomes

The relationships between childhood skills and financial outcomes were investigated through regression analysis using a technique appropriate for the outcome of interest, i.e. Ordinary Least Squares for continuous financial outcomes and logit regression for binary financial outcomes. In both cases, robust standard errors have been used where necessary. The basic form of the equation is:

$$\text{Adult financial outcome} = \alpha + \beta \times \text{Skills at childhood age} + \gamma \times \text{Controls at childhood age}$$

This type of equation was estimated separately for each financial outcome and at each childhood age (5, 10 and 16), using the composite measures of cognitive, non-cognitive and behavioural skills measured at that age. A full set of control variables measured at childhood were also included, which were also included in all subsequent analyses. The control variables consisted of:

- Gender, ethnicity, gestational time, age of parents
- Number of people in the household, family income, home ownership status, neighbourhood social rating
- Parents' highest educational attainment, employment status, social class
- Mother's attitude to maternal employment, TV viewing, child independence and child rearing

The procedure for selection of the control variables is discussed in Section 3.3 of this Technical Annex.

Table 3 in this chapter provides further information on these relationships. Similarly to the presentation in the main report, the results in Table 3 are organised by childhood age and type of skill. For each skill and at each childhood age, the table presents the size of the estimated improvements<sup>13</sup> of financial outcomes associated with improvements of the respective skill at the given age. It should be noted that the results presented in this table and discussed in the main report use **standardised**<sup>14</sup> skills variables. Such transformation allows us to:

- compare a child who scores in the top 15th percentile (i.e. 15% of all children score at that level or above) of a particular measure to a child in the bottom 15th percentile (i.e. 15% of all children score at that level or below) of the measure; and
- compare the relationships between different skills and financial outcomes, which are otherwise measured on a number of different scales (e.g. depending on the scales used in the BCS70 questionnaire and on how many underlying questions were used for their construction).

**Note on interpreting the results:** The table presents the estimated relationships between skills and financial outcomes in terms of the percentage **change in the odds** of having a certain financial outcome in adulthood (e.g. being a regular saver, saving for a pension, etc.). Odds and probabilities are two ways of representing the likelihood of an event. In particular, the two measures are related with the odds of being a regular saver equalling the probability of being a saver divided by the probability of not being a saver.

The results on the relationships between skills and **net wealth** are slightly different – rather than showing changes in the odds, they show the monetary uplift in net wealth (in £) associated with an improvement in skills.

The table shows the point estimate (effect size) and the associated 95% confidence interval. The 95% confidence interval represents the amount of uncertainty around the point estimate. If the interval does not include the value 0, then we can say that the result is statistically significantly different to 0. The statistical significance is also marked with \* if the result is significant at the 95% confidence interval.

As an example, we focus on the results for skills at age 16 and pension saving at age 34. The table suggests that the link between pension saving and **cognitive skills** (represented by 'O' Level qualification attainment at age 16) and that between pension saving and **behaviour** are statistically significant at the 95% confidence level. Therefore, a young person aged 16 who achieves a score in the top 15% in terms of cognitive ability or behaviour is associated with odds of pension saving that are 117% and 61% higher than for a young person scoring in the bottom 15% of these measures, respectively. Non-cognitive skills at age 16 do not appear to be a significant predictor of pension saving in adulthood.

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<sup>13</sup> For regular saving (age 34), pension saving (age 34) and low debt-to-income ratio (age 42), the effect sizes are presented in terms of odds ratios; an odds ratio above 1 implies a positive link between the skill and the financial outcome, whereas an odds ratio below 0 means a negative link. For net wealth (age 42), the effect size is in terms of additional £. For financial self-assessment (age 34 & age 42), the effect sizes are in terms of improvement of the odds; a positive effect size implies a positive relationship, whereas a negative sign implies a negative relationship.

<sup>14</sup> Centred at 0 and rescaled by dividing by two standard deviations.

Table 3: Statistical results for the link between childhood skills and adult financial outcomes

Skill measure	Regular saving (age 34)			Pension saving (age 34)			Low debt-to-income ratio (age 42)			Net wealth (age 42)			Financial self-assessment (age 34)			Financial self-assessment (age 42)									
	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]							
Age 5	Cognitive ability composite	1.134	*	1.011	1.272	1.241	***	1.103	1.398	0.928		0.781	1.104	5350	*	403	10338	1.115	*	1.004	1.238	1.154	**	1.039	1.281
	Non-cognitive ability composite	----- Not captured at age 5 -----																							
Age 10	Reversed Rutter behavioural score	1.073		0.947	1.216	1.146	*	1.010	1.302	0.828	*	0.689	0.988	-3600		-8823	1624	1.113		0.994	1.246	1.054		0.941	1.180
	Cognitive ability composite	1.438	***	1.184	1.746	1.580	***	1.298	1.924	1.160		0.876	1.536	5912		-3128	14952	1.284	**	1.077	1.531	1.405	***	1.180	1.672
	Non-cognitive ability composite	1.746	*	1.007	1.438	1.262	*	1.298	1.924	0.934		0.719	1.212	12548	**	4557	20540	1.607	***	1.337	1.889	1.554	***	1.322	1.827
	Reversed Rutter behavioural score	1.153		0.970	1.372	1.301	**	1.298	1.924	0.900		0.697	1.161	2109		-4123	8341	1.077		0.921	1.260	0.939		0.801	1.100
Age 16	Cognitive ability composite	1.392		0.968	2.003	2.171	***	1.467	3.215	1.258		0.700	2.261	8658		-4713	22028	1.094		0.781	1.531	0.963		0.694	1.338
	Non-cognitive ability composite	1.357		0.993	1.852	0.825		0.584	1.167	0.872		0.540	1.409	-6248		-19385	6888	1.631	***	1.219	2.183	1.536	**	1.152	2.046
	Reversed Rutter behavioural score	1.215		0.861	1.714	1.609	*	1.114	2.323	0.578	*	0.356	0.939	3937		-8685	16558	1.368		0.993	1.884	1.530	**	1.115	2.099

Note: \* = “Statistical significance at 95% confidence interval”; \*\* = “Statistical significance at 99% confidence interval”; \*\*\* = “Statistical significance at 99.9% confidence interval”. Regular saving (age 34), pension saving (age 34) and low debt-to-income (age 42) present odds ratios from logit. Net wealth (age 42) presents coefficients from linear regression. Financial self-assessment (ages 34 and 42) presents odds ratios from ordered logit.

## 3.2 The relationship between individual skill components and adult financial outcomes

Section 2.2 of the main report presents the main findings of the analysis examining which individual skill components drive the relationships between childhood skills and adult financial outcomes:

- Both **numeracy and literacy** appear to drive the link between the cognitive skill measure at age 10 and adult financial outcomes to a comparable extent.
- **Self-control and locus of control** at age 10 drive the links between non-cognitive skills and many adult financial outcomes.
- At age 16, **extraversion and agreeableness** are personality traits that appear to drive the relationship between behaviour and adult financial outcomes.

Table 4 overleaf presents further detail about the relationships between individual skill components and financial outcomes. The results for individual skill components can be interpreted in the same way as the results for the composite measures of skills presented in Section 3.1 of this Technical Appendix.

The links between individual skill components and financial outcomes were examined only where a statistically significant relationship was established between at least one composite skill at a certain age and the financial outcome (as indicated in Table 3 of Section 3.1 this Technical Appendix). Where no such relationships were identified, no results have been presented in the respective cell in Table 4.

The results within Table 4 relating individual skill components at age 10 to regular saving at age 34 indicates that there are two skill components which are linked to regular saving: **self-control**<sup>15</sup> and **locus of control**<sup>16</sup>. Specifically, a child with a score in the top 15% in terms of self-control or locus of control at age 10 is associated with odds of regular saving at age 34 which are approximately 28% higher than for a child who scores in the bottom 15% of self-control or locus of control. Thus, these two components of non-cognitive skills **drive the relationship** presented in Table 3 between non-cognitive skills at age 10 and regular saving.

As noted in the main report, in some cases, the link between an individual skill component and a financial outcome has a negative sign, opposite to the sign on the relationship identified between the composite skill and financial outcome. Such 'counterintuitive' results are not uncommon in analysis of this type when many skill components are included in one model. The negative relationship between a skill component and a financial outcome is likely to reflect the fact that the skill component is interlinked with another skill component in such a way that it is difficult to isolate each component's individual effect.

### Regression analysis to estimate the relationships between individual skill components and financial outcomes

The relationships between individual skill components and financial outcomes were investigated through regression analysis using a technique appropriate for the outcome of interest, i.e. Ordinary Least Squares for continuous financial outcomes and logit regression for binary financial outcomes. The basic form of the equation is:

$$\text{Financial outcome} = \alpha + \beta x \text{ Individual skill components at childhood age} + \gamma x \text{ Controls at childhood age}$$

This type of equation was estimated separately for each financial outcome and at each childhood age, using the individual cognitive, non-cognitive and behavioural skill components of measured at that age. The analysis controlled for the same set of variables as listed in Chapter 3 of this Technical Appendix.

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<sup>15</sup> The ability to control one's environment.

<sup>16</sup> The belief that one controls their own life rather than that events occur due to external factors.

Table 4: Coefficients representing the link between individual skill components and adult financial outcomes

Skill measure	Regular saving (age 34)			Pension saving (age 34)			Low debt-to-income ratio (age 42)			Net wealth (age 42)			Financial self-assessment (age 34)			Financial self-assessment (age 42)									
	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]	Effect size	Stat. sign.	[95% C.I.]							
Age 5	Can read letters	1.056		0.901	1.239	1.015		0.864	1.193	0.800		0.635	1.007	37		-7176	7250	1.130		0.978	1.305	1.053		0.911	1.217
	Can read some words	1.131		0.982	1.303	1.146		0.992	1.324	1.003		0.811	1.239	2141		-4918	9200	1.145 *		1.008	1.302	1.034		0.910	1.174
	Can read simple sentences	1.141		0.958	1.359	1.178		0.982	1.413	1.007		0.774	1.311	-5017		-12530	2496	1.054		0.898	1.236	1.130		0.964	1.323
	Initial Teaching Alphabet (I.T.A.)	1.352		0.987	1.853	1.489 *		1.063	2.085	0.799		0.508	1.255	-7901 *		-15290	-513	1.111		0.833	1.482	1.014		0.767	1.340
	Copy designs test score	1.209 **		1.064	1.373	1.167 *		1.024	1.331	0.928		0.769	1.120	9474 **		3289	15659	1.157 *		1.029	1.299	1.186 **		1.056	1.331
	Human figure drawing test	0.998		0.883	1.128	1.104		0.973	1.252	1.118		0.931	1.342	756		-5683	7196	1.054		0.943	1.178	1.029		0.922	1.149
	Profile drawing test score	0.893 *		0.799	0.999	0.928		0.827	1.041	1.059		0.897	1.249	-2337		-7547	2872	0.890 *		0.804	0.984	0.959		0.868	1.060
	Reversed Rutter behavioural score	1.064		0.938	1.206	1.141 *		1.004	1.295	1.214 *		1.013	1.455	-4042		-9231	1146	1.110		0.991	1.243	1.045		0.933	1.171
	Reading score	1.251		0.966	1.621	1.383 *		1.066	1.796	0.846		0.582	1.230	-14232 *		-27610	-854	1.019		0.807	1.286	1.021		0.811	1.285
	British Ability Scales score	0.960		0.755	1.220	0.927		0.726	1.186	1.069		0.751	1.522	1714		-6739	10167	1.089		0.875	1.354	1.054		0.847	1.313
Age 10	Maths score	1.141		0.888	1.466	1.177		0.912	1.520	1.001		0.690	1.452	16901 **		7241	26560	1.136		0.907	1.423	1.244		0.994	1.556
	Academic self-concept	0.996		0.849	1.168	1.167		0.992	1.372	0.941		0.748	1.185	-4092		-10323	2139	1.138		0.985	1.315	1.059		0.917	1.223
	Locus of control	1.293 *		1.009	1.656	1.152		0.894	1.485	1.261		0.880	1.806	16192 **		4759	27625	1.111		0.888	1.390	1.332 *		1.067	1.663
	Self-control	1.266 *		1.036	1.547	1.445 ***		1.179	1.772	0.808		0.602	1.084	6822		-795	14439	1.323 **		1.106	1.583	1.323 **		1.106	1.581
	Self-esteem	0.954		0.815	1.118	0.906		0.771	1.064	1.249		0.992	1.572	7847 **		2045	13650	1.144		0.993	1.319	1.007		0.875	1.160
	Social skills	0.956		0.806	1.135	0.882		0.740	1.050	0.961		0.753	1.228	-2540		-11049	5968	1.106		0.947	1.291	1.159		0.995	1.350
Conscientiousness	0.990		0.793	1.237	0.938		0.750	1.173	0.918		0.665	1.267	692		-9601	10985	1.150		0.943	1.404	1.043		0.856	1.270	

Age 16	Extraversion	0.842	0.629	1.126	1.041	0.777	1.395	1.278	0.842	1.939	-3895	-14605	6814	0.881	0.678	1.144	0.829	0.638	1.077
	Agreeableness	1.180	0.848	1.641	1.220	0.876	1.700	0.811	0.509	1.293	-4605	-19946	10736	1.053	0.784	1.414	1.043	0.780	1.395
	Neuroticism	1.062	0.834	1.353	1.152	0.904	1.469	1.455 *	1.032	2.050	2382	-8034	12797	1.219	0.981	1.515	1.208	0.972	1.501
	Good conduct scale	0.971	0.670	1.409	1.094	0.750	1.595	1.235	0.734	2.080	5426	-11033	21885	0.882	0.631	1.233	0.962	0.694	1.333
	Emotional health	1.261	0.887	1.792	0.989 *	0.696	1.404	0.661	0.400	1.092	2094 *	-11420	15608	1.039	0.757	1.427	1.004	0.735	1.373
	Cognitive ability composite	1.314	0.889	1.943	2.088 **	1.370	3.183	0.758	0.405	1.418	5171	-7672	18014	1.062	0.742	1.522	1.008	0.709	1.432
	Locus of control	1.215	0.859	1.719	1.031	0.701	1.516	1.083	0.634	1.850	5344	-8310	18998	1.547 **	1.122	2.132	1.246	0.912	1.701
	Self-esteem	1.048	0.767	1.433	0.743	0.516	1.069	1.168	0.721	1.894	-1479	-18930	15972	1.175	0.879	1.572	1.274	0.958	1.692
	Challenge	1.272	0.936	1.727	0.973	0.695	1.363	1.184	0.737	1.904	-408	-12413	11598	1.021	0.764	1.362	1.099	0.829	1.456
	Social skills	1.015	0.759	1.358	0.843	0.606	1.171	0.887	0.564	1.395	-13362	-27538	813	1.239	0.943	1.627	1.172	0.896	1.532
	Conscientiousness	0.591 *	0.361	0.966	1.015	0.599	1.720	0.554	0.232	1.325	-4312	-26232	17609	1.174	0.751	1.835	1.031	0.661	1.609
	Extraversion	1.607	0.892	2.896	1.920 *	1.011	3.646	1.357	0.546	3.373	-5446	-50599	39707	1.241	0.729	2.112	1.934 *	1.131	3.307
	Agreeableness	0.979	0.424	2.261	0.674	0.280	1.619	2.970	0.850	10.37	-2961	-33016	27093	0.768	0.361	1.634	1.128	0.541	2.350
	Neuroticism	1.250	0.777	2.010	1.223	0.733	2.041	1.198	0.612	2.346	-569	-20405	19267	1.233	0.793	1.918	1.280	0.832	1.968
	Good conduct scale	1.629	0.709	3.742	1.532	0.620	3.785	0.759	0.192	3.008	5770	-22918	34457	1.069	0.493	2.315	0.759	0.346	1.663
Emotional health	0.624	0.370	1.051	0.661 **	0.377	1.157	0.826	0.376	1.818	11519	-25129	48166	0.918	0.569	1.481	0.625 *	0.394	0.991	

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Results based on non-standardised variables.

### 3.3 Selection of control variables

The regression analysis box in Section 3.1 summarised the control variables included in the analysis when examining the relationships between childhood skills and adult financial outcomes. This section discusses the procedure which was followed for the selection of these control variables.

The BCS70 provides a wide set of demographic, personal and family characteristics which could potentially be used as control variables in the modelling process. However, controlling for all available demographics and family characteristics is not necessary, as they are not all expected to impact the financial outcome of interest; and would not be practical, as:

- 1) including all possible control variables would further restrict the sample size for the analysis of each outcome, since not all demographic and family characteristics questions are answered by all respondents;
- 2) including a large set of variables in each model would lead to “over-fitting” of the model, i.e. the econometric model might pick out spurious correlation and falsely identify relationships where they don’t exist, or under-estimate the impact of skills and behaviour variables.

Therefore, including too many control variables would obstruct the identification of the true impact of skills on financial outcomes.

As a result, the selection of the “optimal set” of control variables is a balancing act. In order to select a sensible list of control variables so that the estimated impact of skills is reliable and robust, whilst the sample sizes are large enough and the results are comparable between the different financial outcomes, the following procedure was implemented, **for the set of variables at age 5, age 10 and age 16 separately:**

- **Pre-selection of control variables:** The full list of information available in the BCS70 was restricted, using existing knowledge of what types of variables might impact later life outcomes. The initial list of controls considered included variables that capture information on:
  - general demographics (including child’s gender, ethnicity);
  - social class of the family;
  - family income;
  - parental education;
  - parental employment status;
  - household composition;
  - description of the house and neighbourhood;
  - maternal attitudes;
  - young age financial socialisation;
  - weekly spending money;
  - teenage employment;
  - money received last week; and
  - financial knowledge.
- **Initial model testing:** All financial outcomes<sup>17</sup> were modelled using **multivariate** regression analysis, where the independent variables used included:
  - the composite measure of cognitive skill at the respective childhood age;
  - the list of individual non-cognitive skills at the respective childhood age (except for age 5, where non-cognitive skills are not available in the BCS70);
  - the reversed Rutter behavioural score at the respective childhood age; and
  - the full list of pre-selected control variables at the respective childhood age.

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<sup>17</sup> Where financial outcomes are available both at ages 34 and 42, only the financial outcome at age 34 was used for the control variables selection process.

Unlike for cognitive skills and behavioural variables, the non-cognitive skills were included individually rather than as one composite measure. This approach was chosen as composite measures of non-cognitive skills generally perform worse than those of cognitive skills and so the individual non-cognitive skills were used for the control variable selection in order to appropriately differentiate between variation explained by skills and variation explained by potential controls.

The modelling technique used in each model was chosen to correspond to the financial outcome.

- **First elimination:** For each given age, separately, all control variables that demonstrated no statistically significant impact at the 90% confidence level in any of the adult financial outcomes were removed altogether. If a control variable explained even one financial outcome (i.e. was statistically significant in any of the models considered), it was kept in the list of control variables.
- **Repeat eliminations:** The process of variable elimination was repeated a number of times, until each control variable finally selected was identified as being of interest in at least one of the financial outcome models. The control variables for age 5 were selected after the second round of elimination; those at age 10 – after the first round of elimination; and those at age 16 – after the third round of elimination.

This is a fairly conservative approach which minimises the risk of omitting important personal and demographic characteristics, and at the same time utilises a sufficiently large sample. The end list of variables selected is provided in the table below, and details on the underlying variables from BCS70 are provided in Annex 1 of this document.

Table 5: Detailed list of selected personal and family background characteristics, by childhood age

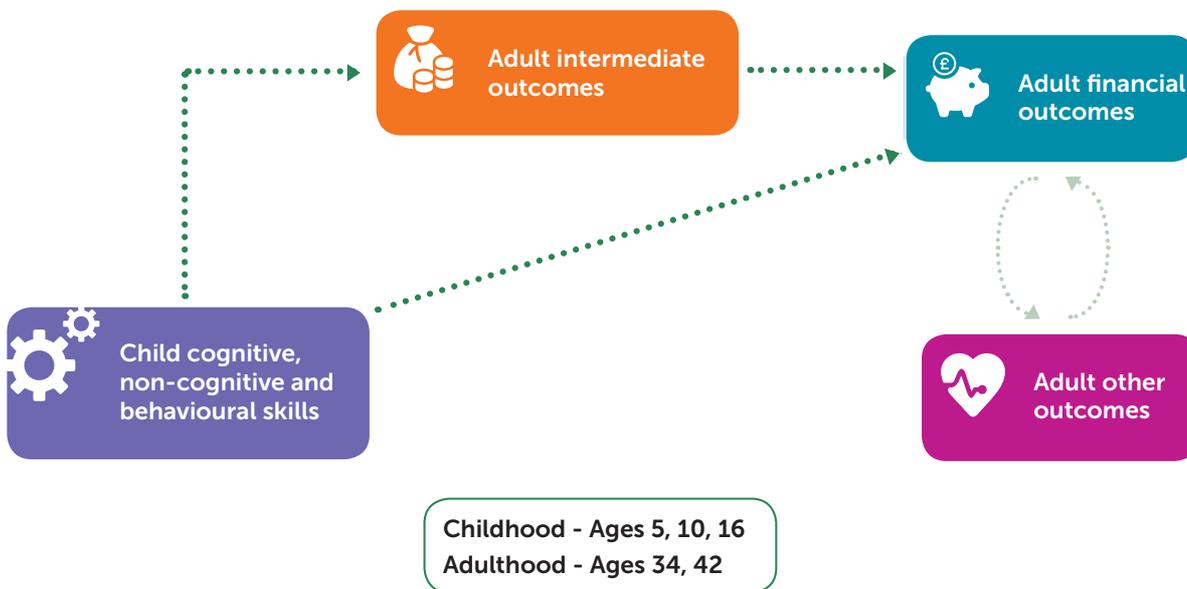
Demographic/family variable or variable group	Age 5	Age 10	Age 16
<b>Child's gender</b>	✓	✓	✓
<b>Child's ethnicity:</b>	✓	✓	
Indian, Pakistani or Bangladeshi	✓	✓	
Irish or other European	✓	✓	
British		✓	
<b>Gestational age at birth</b>		✓	✓
<b>Age of parents at the time</b>	✓		
Age of father	✓		
Age of mother	✓		
<b>Number of persons/children in household</b>	✓	✓	
No other children in household	✓		
Number of children in household		✓	
Number of persons in household		✓	
<b>Parents' highest level of education achieved</b>	✓	✓	✓
Father's highest qualification: vocational	✓		
Father's highest qualification: O-levels	✓	✓	✓
Father's highest qualification: A-levels or higher	✓	✓	✓
Mother's highest qualification: vocational		✓	✓
Mother's highest qualification: O-levels	✓		✓
Mother's highest qualification: A-levels or higher		✓	
<b>Parents' employment status</b>		✓	
Father is in regular employment		✓	
Mother is looking after the home		✓	
<b>Parents' social class:</b>	✓	✓	✓
Category I or II	✓		✓
Category V or voluntary work	✓	✓	
<b>Family income</b>		✓	✓
Family income is between £35-£99 per week		✓	

Family income is between £50-£99 per week			✓
Family income is above £100 per week		✓	
Family income is between £100-£149 per week			✓
Family income is between £300-£349 per week			✓
Family income is above £500 per week			✓
Family receives benefits			✓
<b>Parents' home ownership</b>			✓
<b>Neighbourhood social rating</b>	✓		
Neighbourhood is 'well to do'	✓		
Neighbourhood is 'rural'	✓		
<b>Attitude to maternal employment</b>	✓		
<b>Attitude to TV viewing</b>	✓		
<b>Attitude to child independence</b>	✓		
<b>Authoritarian child rearing</b>	✓		
<b>Mother's malaise score</b>	✓	✓	
<b>Small jobs and small purchase skills</b>		✓	
Child uses money for small purchases		✓	
Child does small jobs for a reward		✓	
<b>Child does not receive money regularly but borrows</b>			✓

# Chapter 4 Exploring the pathways from childhood skills to adult financial outcomes

Chapter 4 of the main report examines the role of intermediate outcomes – things that occur between childhood and the ages when adult financial outcomes are observed – such as educational attainment, employment status, marital status, income and home ownership. Intermediate outcomes are found to often channel the link between childhood skills and adult financial outcomes. An example of this is a child with higher cognitive skills being more likely to attend university, which itself is linked to a higher likelihood of pension saving. We also find that the same intermediate outcomes can operate as pathways which protect children from adverse financial outcomes in adulthood, in that achievement in these areas raises the likelihood of positive outcomes for children of all cognitive skill levels.

This chapter provides more detail than is presented in Chapter 3 of the main report on the relationship between childhood skills and a wide range of intermediate outcomes.



Intermediate outcomes have been categorised into two groups, life events and other intermediate outcomes. The variables used in the subsequent analysis were:

■ Life events:

- Owning a home
- Marital status – being married vs. not; being divorced vs. not
- Whether there are any dependent children in the household; as well as the number of children

■ Other intermediate outcomes:

- Economically active vs. inactive
- In employment or self-employment vs. unemployed
- Part-time vs. full-time employment
- Public vs. private employment
- Educational level: highest level of NVQ (National Vocational Qualification) achieved
- Individual income

Further details on which underlying BCS70 variables were used for these intermediate outcome variables are provided in Annex 1 of this document.

## 4.1 The relationship between skills and intermediate outcomes

The first step in the investigation of the role of intermediate outcomes was to analyse the relationship between childhood skills and intermediate outcomes.

### Regression analysis to estimate the relationships between skills and intermediate outcomes

The relationships between childhood skills and intermediate outcomes were investigated through regression analysis using a technique appropriate for the outcome of interest, i.e. Ordinary Least Squares for continuous intermediate outcomes and logit regression for binary intermediate outcomes. The basic form of the equation is:

$$\text{Intermediate outcome} = \alpha + \beta \times \text{Skills at childhood age} + \gamma \times \text{Controls at childhood age}$$

This type of equation was estimated separately for each long-term intermediate outcome, using the composite measures of cognitive, non-cognitive and behavioural skills measured at childhood. A full set of control variables measured at childhood were also included, which were also included in all subsequent analyses. The controls were:

- Gender, ethnicity, gestational time, age of parents
- Number of people in the household, family income, home ownership status, neighbourhood social rating
- Parents' highest educational attainment, employment status, social class
- Mother's attitude to maternal employment, TV viewing, child independence and child rearing

The analysis was performed at age of the childhood ages separately.

This stage of the analysis served as an intermediate step towards the exploration of the pathways from childhood skills to financial outcomes. Its purpose was not to establish an impact of life events and other intermediate life outcomes on adult financial outcomes, but rather to identify those intermediate outcomes which are most likely to act as channels of the relationship between skills and financial outcomes.

The results are shown in Table 6 and Table 7. Most of the life events, especially owning a home and being married, appear to be related to skills. Similarly, we observe systematic positive relationships between skills and the other intermediate outcomes. This is particularly the case for education ('highest level of NVQ achieved'). Those life events and intermediate outcomes which have a statistically significant<sup>18</sup> link with most skills and at most ages were selected to be explored further as channels of the impact of skills on adult financial outcomes in Chapter 3 of the main report (methodology discussed in Section 4.2 of this document).

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<sup>18</sup> At the 95% confidence interval

Table 6: Identification of statistically significant relationships between skills in childhood and adult life events

		Owning your home (age 34)	Owning your home (age 42)	Being married (age 34)	Being married (age 42)	Being divorced (age 34)	Being divorced (age 42)	Number of children in the household (age 34)	Number of children in the household (age 42)	Whether any children in the household (age 34)	Whether any children in the household (age 42)
Age 5	Cognitive ability										
	Reversed Rutter Behavioural Score										
Age 10	Cognitive ability										
	Non-cognitive ability										
	Reversed Rutter Behavioural Score										
Age 16	Cognitive behaviour										
	Non-cognitive ability										
	Reversed Rutter Behavioural Score										

Legend: Positive statistically significant link  No statistically significant link  Negative statistically significant link 

Table 7: Identification of statistically significant relationships between skills in childhood and other intermediate outcomes

		Economic-ally active (age 34)*	Economic-ally active (age 42)*	Employed (age 34)	Employed (age 42)	Working full-time (age 34)**	Working full-time (age 42)**	Working in the public sector (age 34)***	Working in the public sector (age 42)***	Highest level of NVQ achieved (age 34)^	Highest level of NVQ achieved (age 42)^	Individual income (age 34)	Individual income (age 42)
Age 5	Cognitive ability	Dark Green	Dark Green	Dark Green	Dark Green	Dark Green	White	White	White	Dark Green	Dark Green	Dark Green	White
	Reversed Rutter Behavioural Score	Dark Green	White	Dark Green	White	White	White	White	White	Dark Green	White	White	White
Age 10	Cognitive ability	Dark Green	Dark Green	Dark Green	Dark Green	Dark Green	White	Dark Green	Dark Green	Dark Green	Dark Green	White	Dark Green
	Non-cognitive ability	Dark Green	White	White	Dark Green	White	White	Dark Green	White	Dark Green	Dark Green	White	Dark Green
Age 16	Reversed Rutter Behavioural Score	Dark Green	Dark Green	Dark Green	Dark Green	White	White	White	White	Dark Green	White	White	White
	Cognitive ability	White	White	White	Dark Green	Dark Green	White	Dark Green	Dark Green	Dark Green	Dark Green	White	Dark Green
	Non-cognitive ability	White	White	White	White	White	White	White	White	Dark Green	Dark Green	White	Dark Green
	Rutter Behavioural Score	White	White	White	White	White	White	White	Dark Green	White	White	White	White

\* Economically active is defined as being available for labour, i.e. being in the labour force. Therefore, this variable is 1 if someone is either (self-)employed or seeking work. In the 2004 and 2012 waves of the BCS70, there are very few people who are classified under economically active but not employed. \*\* As opposed to working part-time. \*\*\* As opposed to working in the private sector. ^ The highest level of NVQ achieved can be of vocational as well as academic type

Legend: Positive statistically significant link  No statistically significant link  Negative statistically significant link

## 4.2 The role of intermediate outcomes in channelling the link between childhood skills and adult financial outcomes

The next stage of the analysis was to evaluate whether some of the links between childhood skills financial outcomes in adult life are channelled through intermediate outcomes. Educational attainment and employment status were found to often *channel* the link between childhood skills and adult financial outcomes. The methodology is presented in the box below and Table 6 – Table 8 provide the results for those intermediate outcomes discussed in Section 3.2 of the main report. Results for the full set of intermediate outcomes tested can be found in the Excel document supplementing this technical report.

The results in Table 6 – Table 8 demonstrate the link between childhood skills and adult financial outcomes, once the respective intermediate outcome is considered. The presentation of results is organised according to type of skill, and then by age of skill. An intermediate outcome is identified as a channel if there is no statistically significant link between childhood skills and adult financial outcomes once the intermediate outcome has been accounted for.

### Regression analysis to identify which intermediate outcomes channel the links between skills and financial outcomes

To investigate the extent to which intermediate outcomes channel the effect of childhood skills on adult financial outcomes, the adult life events and other intermediate outcomes were added to the model estimated in the previous section. Each intermediate outcome was tested one at a time. The basic form of the equation is:

$$\begin{aligned} \text{Financial outcomes} &= \alpha + \beta \times \text{Skills at childhood age} + \gamma \times \text{Controls at childhood age} \\ &+ \delta \times \text{Intermediate outcome} \end{aligned}$$

For instance, previous analysis discussed in Section 3.1 identified that there is a statistically significant relationship between cognitive skills at age 5 and regular saving at age 34. However, when educational attainment is accounted for, the link between cognitive skills at age 5 and regular saving at age 34 is no longer statistically significant. Therefore, we say that educational attainment channels the link between cognitive skills at age 5 and regular saving at age 34. In cases where the results suggest channelling of the link between a childhood skill and an adult financial outcome, the effect is marked in bold in the tables overleaf.

In contrast, the link between cognitive skills at age 16 and pension saving at age 34 is statistically significant and remains such even after accounting for any one of the aforementioned intermediate outcomes. Therefore, we conclude that the relationship between cognitive skills and pension saving at age 34 has begun to cement by the age of 16.

Table 8: Which intermediate outcomes channel the link between cognitive skills in childhood and adult financial outcomes?

	Intermediate outcome	Regular saving (age 34)	Pension saving (age 34)	Low debt-to- income ratio (age 42)	Net wealth (age 42)	Financial self- assessment (age 34)	Financial self- assessment (age 42)
Age 5	No intermediate outcome added	1.134*	1.241***	1.076	5370*	1.115*	1.153**
	Educational attainment: Highest attained NVQ level	<b>1.025</b>	<b>1.103</b>	-	<b>3403</b>	<b>1.031</b>	<b>1.045</b>
	Employed or self-employed (vs. not in employment)	<b>1.111</b>	1.209**	-	5774*	<b>1.091</b>	<b>1.093</b>
	Income	-	-	-	5508*	<b>1.045</b>	-
	Home owner	<b>1.081</b>	1.167**	-		<b>1.060</b>	<b>1.045</b>
	Married	1.123*	1.239***	-	4948*	<b>1.104</b>	1.799***
Age 10	No intermediate outcome added	1.438***	1.580***	0.861	5912	1.284**	1.404***
	Educational attainment: Highest attained NVQ level	<b>1.214</b>	1.298*	-	-	<b>1.154</b>	1.210*
	Employed or self-employed (vs. not in employment)	1.395***	1.508***	-	-	1.228*	1.357**
	Income	-	-	-	-	<b>1.146</b>	-
	Home owner	1.361**	1.489***	-	-	1.194*	1.302**
	Married	1.450***	1.583***	-	-	1.289**	1.355**
Age 16	No intermediate outcome added	1.392	2.171***	0.794	8657	1.093	0.963
	Educational attainment: Highest attained NVQ level	-	1.790**	-	-	-	-
	Employed or self-employed (vs. not in employment)	-	2.524***	-	-	-	-
	Income	-	-	-	-	-	-
	Home owner	-	2.161***	-	-	-	-
	Married	-	2.167***	-	-	-	-

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval". Results are only presented where a statistically significant relationship between the skill and the financial outcome was identified prior to controlling for any intermediate outcomes.

Table 9: Which intermediate outcomes channel the link between non-cognitive skills in childhood and adult financial outcomes?

Intermediate outcome		Regular saving (age 34)	Pension saving (age 34)	Low debt-to- income ratio (age 42)	Net wealth (age 42)	Financial self- assessment (age 34)	Financial self- assessment (age 42)
Age 5	----- Not captured at age 5 -----						
	No intermediate outcome added	1.204*	1.261**	1.071	12548***	1.606***	1.553***
	Educational attainment: Highest attained NVQ level	<b>1.169</b>	1.231*	-	12081**	1.581***	1.501***
Age 10	Employed or self-employed (vs. not in employment)	<b>1.181</b>	<b>1.218</b>	-	12743**	1.585***	1.523***
	Income	-	-	-	11566**	1.580***	-
	Home owner	<b>1.143</b>	<b>1.193</b>	-	11790**	1.528***	1.462***
	Married	<b>1.171</b>	1.250*	-	12424**	1.573***	1.534***
	No intermediate outcome added	1.357	0.825	1.146	-6,248	1.631**	1.535**
	Educational attainment: Highest attained NVQ level	-	-	-	-	1.590*	1.511**
Age 16	Employed or self-employed (vs. not in employment)	-	-	-	-	1.653**	1.553**
	Income	-	-	-	-	1.555**	1.408*
	Home owner	-	-	-	-	1.591**	1.507**
	Married	-	-	-	-	1.633**	1.502**

Note: \* = “Statistical significance at 95% confidence interval”; \*\* = “Statistical significance at 99% confidence interval”; \*\*\* = “Statistical significance at 99.9% confidence interval”. Results are only presented where a statistically significant relationship between the skill and the financial outcome was identified prior to controlling for any intermediate outcomes.

Table 10: Which intermediate outcomes channel the link between behaviour in childhood and adult financial outcomes?

	Intermediate outcome	Regular saving (age 34)	Pension saving (age 34)	Low debt-to- income ratio (age 42)	Net wealth (age 42)	Financial self- assessment (age 34)	Financial self- assessment (age 42)
Age 5	No intermediate outcome added	1.073	1.146**	1.212*	-3599	1.113	1.053
	Educational attainment: Highest attained NVQ level	-	<b>1.122</b>	1.209*	-	-	-
	Employed or self-employed (vs. not in employment)	-	<b>1.064</b>	1.215*	-	-	-
	Income	-	-	<b>1.192</b>	-	-	-
	Home owner	-	<b>1.125</b>	1.206*	-	-	-
	Married	-	1.142*	1.233*	-	-	-
Age 10	No intermediate outcome added	1.153	1.301**	1.111	2108	1.077	0.938
	Educational attainment: Highest attained NVQ level	-	1.270**	-	-	-	-
	Employed or self-employed (vs. not in employment)	-	<b>1.220</b>	-	-	-	-
	Income	-	-	-	-	-	-
	Home owner	-	1.261*	-	-	-	-
	Married	-	1.299**	-	-	-	-
Age 16	No intermediate outcome added	1.215	1.608**	1.728*	3936	1.368	1.530**
	Educational attainment: Highest attained NVQ level	-	1.580*	1.715*	-	-	
	Employed or self-employed (vs. not in employment)	-	1.765*	1.745*	-	-	
	Income	-	-	1.713*	-	-	
	Home owner	-	1.532*	1.732*	-	-	
	Married	-	1.658**	1.729*	-	-	

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval". Results are only presented where a statistically significant relationship between the skill and the financial outcome was identified prior to controlling for any intermediate outcomes.

## 4.3 Protective pathways effective for low-skilled individuals

Section 3.3.2 of the main report finds a number of protective pathways which are effective for individuals with low levels of skills at age 10 – the age at which the link with skills begins to embed:

- A high level in one skill can in many cases compensate for a low level in another skill.
- Vocational education and employment (particularly paid employment) can both moderate the effect of low cognitive skills.
- High levels of qualifications and academic education, employment and having a skilled occupation can compensate for low non-cognitive skills.

To investigate which protective pathways are effective for low-skilled individuals, the same regression specification described in the previous section was tested on the sub-sample of individuals at the bottom of the skills distribution. Where the link between a protective pathway and financial outcomes is statistically significant, the protective pathway is said to be effective among the lower-skilled group.

Similarly to the approach in Section 4.2, the analysis for this strand was performed only where a link between childhood skills and financial outcomes was found (as demonstrated in Section 3.1). The approach to defining low skills is explained in the box below, and the statistical results of this strand of analysis are presented in Table 11 - Table 13 overleaf.

### Defining low skills

In order to split the sample in two groups according to the level of skill, we had to select a cut-off point at the skill distribution, so that all individuals below this cut-off would be considered low-skilled.

To do so, we used a data driven approach: we plotted the average financial outcome levels at each quintile of the skills distribution. If there was a notable jump in the outcome averages from one quintile to the next, then this quintile was a candidate cut-off point. The most common candidate cut-off point across financial outcomes and skill types was at 20% of the skills distribution.

Since the results can be sensitive to the selection of a cut-off point, we performed robustness checks using the other two most common candidates – at 15% and 25% of the skills distribution. Overall, the results were not very sensitive to the selection of a cut-off point.

For this strand of analysis, we considered a wider range of potential protective pathways to that in Section 4.2, namely:

- level of education;
- educational path (whether the highest level of qualification achieved is of vocational or academic type);
- employment mode, i.e. paid or self-employment;
- type of employment; and
- higher levels of other skills.

Further details on the underlying BCS70 variables to construct these additional protective pathways are provided in Annex 1 of this document.

Table 11: Which protective pathways are effective for individuals with low cognitive ability at age 10?

	Protective pathway	Regular saving (age 34)	Pension saving (age 34)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Educational attainment: Highest attained NVQ level	NVQ Level 1 (vs. no education)	3.826***	1.898	-	1.701	1.158
	NVQ Level 2 (vs. no education)	3.206***	1.348	-	1.178	1.434
	NVQ Level 3 (vs. no education)	2.852*	1.585	-	1.493	2.941**
	NVQ Level 4 (vs. no education)	3.919***	2.710**	-	1.118	1.847
	NVQ Level 5 (vs. no education)	7.789	-	-	0.479	3.268
Educational path	Academic education (vs. no education)	3.669**	1.288	-	1.151	1.148
	Vocational education (vs. no education)	3.711***	1.769*	-	1.385	1.744*
Employment	Employed or self-employed (vs. not employed)	2.699**	-	-	2.502***	2.231**
Employment mode	Paid employee (vs. not employed)	2.769**	150.24***	-	2.432***	2.229**
	Self-employed (vs. not employed)	1.885	-	-	4.012***	2.242*
Employment type	I-Professional (vs. V-Unskilled)	-	-	-	0.135	0.955
	II-Managerial-technical (vs. V-Unskilled)	2.091	2.304	-	2.253	1.761
	III-Skilled non-manual (vs. V-Unskilled)	1.05	5.727**	-	0.639	0.944
	III-Skilled manual (vs. V-Unskilled)	1.129	1.436	-	1.164	1.164
Other skills	IV-Partly skilled (vs. V-Unskilled)	0.698	1.302	-	0.679	1.101
	High childhood non-cognitive skills	1.484	1.224	-	1.820**	1.148
	High childhood behavioural skills	1.799**	1.935**	-	1.233	1.088

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval". No statistically significant link was found between cognitive skills (age 10) and net wealth.

Table 12: Which protective pathways are effective for individuals with low non-cognitive ability at age 10?

	Protective pathway	Regular saving (age 34)	Pension saving (age 34)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Educational attainment: Highest attained NVQ level	NVQ Level 1 (vs. no education)	1.233	2.320*	4962	0.62	1.322
	NVQ Level 2 (vs. no education)	2.091*	1.889*	4933	0.959	1.589
	NVQ Level 3 (vs. no education)	2.091	1.626	10052	1.024	2.355**
	NVQ Level 4 (vs. no education)	1.82	2.684**	12697**	1.094	1.889*
	NVQ Level 5 (vs. no education)	2.37	2.684**	20836*	1.128	3.180*
Educational path	Academic education (vs. no education)	2.098*	2.356**	11542**	0.956	1.866*
	Vocational education (vs. no education)	1.877	1.917**	11542*	0.912	1.638*
Employment	Employed or self-employed (vs. not employed)	2.303**	100.633**	1192	2.193***	2.449***
	Paid employee (vs. not employed)	2.348**	133.79**	2137	2.125**	2.601***

	Protective pathway	Regular saving (age 34)	Pension saving (age 34)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Employment mode	Self-employed (vs. not employed)	1.8	2.328	-5254	3.303**	1.772
	I-Professional (vs. V-Unskilled)	10.723	12.347*	27648	3.762	2.423
Employment type	II-Managerial-technical (vs. V-Unskilled)	0.91	3.793*	7996	3.446**	2.444
	III-Skilled non-manual (vs. V-Unskilled)	0.878	4.643*	10205	1.955	2.195
	III-Skilled manual (vs. V-Unskilled)	0.919	3.296*	3972	2.039	1.663
	IV-Partly skilled (vs. V-Unskilled)	0.919	2.253	1084	1.213	1.443
Other skills	High childhood cognitive skills	2.172**	2.655***	-103.2	1.983**	1.209
	High childhood behavioural skills	1.324	1.688**	3527.6	0.822	1.182

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Table 13: Which protective pathways are effective for individuals with low behavioural score at age 10?

	Protective pathway	Regular saving (age 34)	Pension saving (age 34)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Educational attainment: Highest attained NVQ level	NVQ Level 1 (vs. no education)	-	2.888*	-	-	-
	NVQ Level 2 (vs. no education)	-	2.286*	-	-	-
	NVQ Level 3 (vs. no education)	-	3.312**	-	-	-
	NVQ Level 4 (vs. no education)	-	3.445**	-	-	-
	NVQ Level 5 (vs. no education)	-	7.034**	-	-	-
Educational path	Academic education (vs. no education)	-	2.277	-	-	-
	Vocational education (vs. no education)	-	3.065	-	-	-
Employment	Employed or self-employed (vs. not employed)	-	-	-	-	-
Employment mode	Paid employee (vs. not employed)	-	52.864** *	-	-	-
	Self-employed (vs. not employed)	-	-	-	-	-
Employment type	I-Professional (vs. V-Unskilled)	-	16.249**	-	-	-
	II-Managerial-technical (vs. V-Unskilled)	-	11.284**	-	-	-
	III-Skilled non-manual (vs. V-Unskilled)	-	15.124**	-	-	-
	III-Skilled manual (vs. V-Unskilled)	-	4.58	-	-	-
Other skills	IV-Partly skilled (vs. V-Unskilled)	-	3.818	-	-	-
	High childhood cognitive skills	-	1.666*	-	-	-
	High childhood non-cognitive skills	-	1.705*	-	-	-

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval". Behaviour at age 10 has a statistically significant link only with pension saving (age 34)

# Chapter 5 Testing the impact of personal and family background characteristics

## 5.1 Demographic subgroups at higher risk of having adverse financial outcomes

Section 4.1 of the main report discusses which demographic subgroups, in terms of personal and family background characteristics in childhood, were found to be more at risk of adverse financial outcomes in adulthood: such as female participants; those who grew up in a household with more than three children; and those with less educated parents.

When we test which demographic subgroups are more at risk of adverse financial outcomes, the results are based on the same regression models used to identify links between childhood skills and adult financial outcomes, but the focus is on the coefficients associated with the control variables in the models. The methodology of this analysis is described in Section 3.1 of this document, and details on the control variables used for this analysis and the underlying BCS70 variables are presented in Annex 1 of this document.

Table 13 of the main report presents the differences between demographic subgroups in terms of the risk of adverse financial outcomes, where these differences are statistically significant. The full set of statistical results for the control variables in each of the age 10 models is presented in Table 14 in this document.

A negative effect size, or an odds ratio below 1, implies that the given demographic subgroup has experienced on average lower level of a given adult financial outcome, after controlling for the influence of skills on the adult financial outcome. Green shading indicates a positive and statistically significant relationship between the personal or family background characteristic in childhood and the adult financial outcome (i.e. the relationship appears strong enough that it is unlikely be the result of random chance). Pink shading indicates a negative and statistically significant relationship.

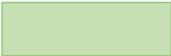
Table 14: Link between personal and family background characteristics and adult financial outcomes

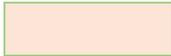
Personal or family background characteristic at age 10	Regular saving (age 34)	Pension saving (age 34)	Low debt-to-income ratio (age 42)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Female (vs. male)	1.081	0.604***	0.877	-7616*	0.040	0.150*
Ethnicity: British	2.405	0.954	0.408	8651.	0.298	0.630
Ethnicity: Other (European)	1.012	0.395	0.531	10745	0.431	0.578
Ethnicity: Indian, Pakistani or Bangladeshi	7.096**	1.221	0.133*	68888*	0.738	0.894
Social class of the family: III (non-manual or manual)	0.973	1.067	1.043	-2734	-0.07	-0.07
Social class of the family: IV-V (partly-skilled or unskilled)	0.839	0.987	0.940	-6377	-0.16	-0.12
Family income: between £35-£99 per week	0.769	1.109	0.286	20769	-0.44	1.139*
Family income: between £100-£149 per week	0.865	1.156	0.348	24155	-0.39	1.131*
Family income: £150 per week or more	0.836	1.206	0.270	27132	-0.25	1.240*
Parental education: Father's highest qualification is O-levels	1.233*	1.151	1.080	382.3	0.165	0.086
Parental education: Father's highest qualification is A-levels or higher	1.246*	1.295*	0.844	1244.	0.222*	0.234*
Parental education: Mother's highest qualification is vocational	1.116	1.159	1.032	8069.	-0.08	0.010

Personal or family background characteristic at age 10	Regular saving (age 34)	Pension saving (age 34)	Low debt-to-income ratio (age 42)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Parental education: Mother's highest qualification is A-levels or higher	1.027	0.950	1.013	8895.	0.130	0.271*
Parental employment: One parent in regular employment	0.970	0.859*	0.944	2733.	0.012	0.033
Parental employment: Neither parent in regular employment	1.002	0.619	0.969	483.9	-0.33	-0.11
Parental figures in household: one parental figure only (biological, adoptive or step)	0.661	0.629	1.083	4382.	-0.27	-0.01
Parental figures in household: in foster care/older siblings/grandparents/other	-	0.278	-	-1035	-0.26	-1.11
Number of children in household: three or more children	0.807**	0.993	1.146	-2140	-0.17*	-0.03
Child uses money for small purchases	1.005	0.996	0.996	243.1*	0.002	-0.00
Child does small jobs for a reward	0.994**	0.998	0.997	-49.4	0.000	0.001
Mother's malaise score	0.999	1.000	1.000	-1.50	-0.00	-0.00
Gestational time	1.001	1.001	0.998	-3.58	-0.00	0.003

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Legend:

 Demographic group has statistically significantly higher levels of financial outcome

 Demographic group has statistically significantly lower levels of financial outcome

 No statistically significant difference found in financial outcome between groups

## 5.2 Subgroups affected disproportionately by having different levels of skills

Section 4.2 of the main report examines whether skills and personal and family background characteristics interact with each other in the way that impacts a child's future financial outcomes, i.e. the link with childhood skills and adult financial outcomes would be greater for one demographic subgroup than for another. Section 4.2 of the main report shows that across most subgroups, this is not the case. However, there are some differences: cognitive skills are found to have a stronger link with female participants' regular saving (at age 34) than for male participants', and behaviour has a stronger link with the financial outcomes of individuals who have grown up in households with three or more children.

This strand of analysis was performed on a smaller set of personal and family background characteristics than the set of variables presented above, where the wider academic literature and the Money Advice Service suggested hypotheses about potential differences. The childhood personal and family background characteristics investigated in this part of the analysis were:

- gender;
- home country of residence;
- number of parental figures and number of children in the household;

- social class, family income and parental employment.

### Regression analysis to explore the influence of personal and family background characteristics on the link between skills and adult financial outcomes

The results presented below were obtained using a regression analysis approach similar to that generating the results discussed earlier in this section. The key difference in this strand of the analysis is that the skills were *interacted* with a few personal and family characteristics of interest to explore interactions between skills and financial outcomes. The interaction between each demographic category and skills was done one demographic characteristic at a time, controlling for the full set of demographic characteristics as in previous strands of the analysis. The basic specification of the regression model is:

$$\begin{aligned}
 &\textit{Adult financial outcome} \\
 &= \alpha + \beta \times \textit{Skills at childhood age} + \gamma \times \textit{Controls at childhood age} \\
 &+ \delta \times \textit{Skill} \times \textit{Demographic subgroup at childhood age}
 \end{aligned}$$

Table 15 below presents the statistical results for the interaction variables, which represent whether the respective demographic subgroup is affected disproportionately by having different levels of skills in terms of their adult financial outcomes. A negative effect size in the case of net wealth and financial self-assessment, or an odds ratio below 1 in the case of regular saving, pension saving and low debt-to-income ratio (marked in pink where statistically significant) imply that the given demographic subgroup has experienced on average a weaker relationship between the respective childhood skill and the adult financial outcome.

For instance, Table 14 demonstrated that the likelihood of regular saving at age 34 is not statistically significantly different between male and female participants with otherwise similar levels of skills and personal and family background characteristics. However, Table 15 shows that on average, female survey participants with *high levels of cognitive skills*<sup>19</sup> are more likely to save regularly compared to male survey participants with high levels of cognitive skills – their odds are higher by 0.58. In other words, cognitive skills are more strongly related to regular saving behaviour for female participants than for male participants.

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<sup>19</sup> Measured by a two standard deviation change

Table 15: Are certain subgroups affected disproportionately by having different levels of skills?

		Differential relationship with skill (age 10)	Regular saving (age 34)	Pension saving (age 34)	Low debt-to-income ratio (age 42)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)
Gender	Female (vs. male)	Cognitive ability	1.578**	1.267	2.180**	1518	0.376*	0.487**
		Non-cognitive ability	0.665**	1.049	0.742	-10363	0.376	-0.378**
		Behavioural score	0.934	0.901	1.629*	-4849	0.051	-0.037
Home country	Wales (vs. England)	Cognitive ability	0.594	0.914	1.944	2914	0.397	0.322
		Non-cognitive ability	1.773	1.338	0.498	-7669	-0.304	-0.218
		Behavioural score	0.968	0.86	1.058	-624	-0.498	0.087
Home country	Scotland (vs. England)	Cognitive ability	0.664	0.804	1.586	-28418	-0.595*	-0.153
		Non-cognitive ability	2.388**	1.47	0.566	11166	0.732**	0.33
		Behavioural score	0.682	0.866	0.613	-5597	-0.063	0.176
Number of parental figures in household	One biological, adoptive or step parental figure only (vs. two)	Cognitive ability	0.855	0.504	0.733	-38792	0.387	0.269
		Non-cognitive ability	3.423	2.945	1.024	23341	0.165	0.067
		Behavioural score	0.754	1.259	2.373	13923	-1.689**	-0.147
Number of parental figures in household	Foster care/older siblings/grandparents/other (vs. two)	Cognitive ability	-	-	-	-610	2.059	0.081
		Non-cognitive ability	-	-	-	-15275	-0.059	-3.276
		Behavioural score	-	-	-	-4909	-1.463	1.037
Number of children in household	Three or more children (vs. one or two)	Cognitive ability	1.048	1.099	0.933	-8846	0.018	-0.103
		Non-cognitive ability	1.04	1.182	1.086	9322	-0.205	0.048
		Behavioural score	1.467*	1.430*	0.751	-860	0.437**	0.146
Social class of the family	III (non-manual or manual) (vs. I-II professional, managerial or technical)	Cognitive ability	1.403	1.002	1.133	-1609	0.347	-0.276
		Non-cognitive ability	1.343	1.184	0.945	-2231	-0.242	-0.225
		Behavioural score	0.908	1.061	0.95	-6909	-0.139	0.022
		Cognitive ability	0.768	0.713	0.902	3355	-0.39	-0.087

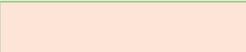
	Differential relationship with skill (age 10)	Regular saving (age 34)	Pension saving (age 34)	Low debt-to-income ratio (age 42)	Net wealth (age 42)	Financial self-assessment (age 34)	Financial self-assessment (age 42)	
Family income	IV-V (partly-skilled or unskilled) (vs. I-II professional, managerial or technical)	Non-cognitive ability	1.139	1.353	1.465	5471	-0.056	-0.183
		Behavioural score	1.346	1.257	0.756	-6909	-0.139	0.026
	Family income: between £35-£99 per week (vs. under £35 per week)	Cognitive ability	-	-	0.098	-4571	-1.696	1.748
		Non-cognitive ability	-	-	60.95	23375	1.37	-1.472
		Behavioural score	-	-	0.3	7704	1.662	0.014
	Family income: between £100-£149 per week (vs. under £35 per week)	Cognitive ability	-	-	0.096	9998	-1.73	1.711
		Non-cognitive ability	-	-	66.6	26282	1.208	-1.52
		Behavioural score	-	-	0.268	9385	1.89	0.112
	Family income: £150 per week or more (vs. under £35 per week)	Cognitive ability	-	-	0.108	2984	-1.701	1.931
		Non-cognitive ability	-	-	39.84	19074	1.436	-1.52
		Behavioural score	-	-	0.363	4866	1.615	-0.257
	Parental employment	One parent in regular employment (vs. both parents in regular employment)	Cognitive ability	0.799	0.95	0.969	-2527	-0.147
Non-cognitive ability			1.213	1.186	0.852	1436	0.243	-0.02
Behavioural score			0.945	0.947	1.02	8518	0.136	0.036
Neither parent in regular employment (vs. both parents in regular employment)		Cognitive ability	0.948	1.123	0.125*	5914	-0.153	0.247
		Non-cognitive ability	1.797	1.806	3.031	-17515	-0.486	-0.093
		Behavioural score	0.762	0.579	1.531	2948	0.398	0.194

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Where no results are presented, this is due to lack of sample size or to the models not converging. Net wealth measured in additional £

Legend:

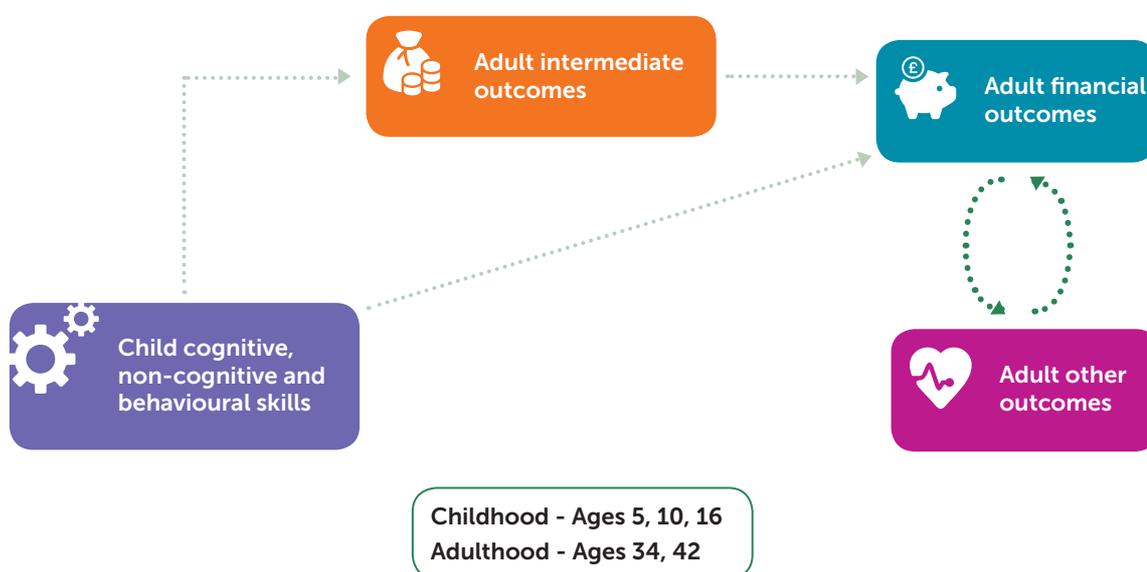
 Demographic group has statistically significantly higher link between skill and financial outcome

 Demographic group has statistically significantly lower link between skill and financial outcome

 No statistically significant difference found in link between skill and financial outcome across groups

# Chapter 6 Testing the relationship between adult financial outcomes and other adult outcomes

Chapter 5 of the main report investigates the relationship between adult financial outcomes and other important aspects of adult life, such as mental and physical health and life satisfaction.



These other adult outcomes considered include:

- Health self-assessment (an assessment of health in the previous year on a scale from 'poor' to 'excellent')
- Absence of long-standing illness
- Life satisfaction (self-reported satisfaction with life so far)
- Mental health (measured by the total Malaise score indicating psychological distress or depression)
- Mental well-being scale (Warwick Edinburgh Mental Well-Being Scale indicating feeling and functioning aspects of mental wellbeing)
- Keeping away from crime (whether the individual has no contact with the police, including police cautioning, warning or arrest, and has not received a conviction in criminal court)

Chapter 5 of the main report describes how adult financial outcomes are positively linked to many of the other outcomes considered. The strongest links are found with health self-assessment and life satisfaction, although links with mental health are also identified. For example, those with a low debt-to-income ratio at age 42 are more likely to rate their health higher, less likely to have a long standing illness, and on average, have better life satisfaction. Equally, individuals with high amounts of debt-to-income levels are more likely to have health issues and will have on average lower life satisfaction.

This chapter of the Technical Appendix provides further detail on the **methodology** of identifying the relationships between adult financial outcomes and other adult outcomes; some of the methodological **challenges** in estimating these relationships; and the **steps** undertaken to overcome these challenges.

## 6.1 Which financial outcomes are linked to other adult outcomes?

The box overleaf explains the methodology which was used to identify the relationships between financial outcomes and other adult outcomes. The results of this analysis are presented in the main report.

### Regression analysis to estimate the relationship between financial outcomes and other adult outcomes

In order to isolate the relationship between financial outcomes and other adult life outcomes, it is important to control for the influence of other personal characteristics such as demographics, life events and other intermediate outcomes, and individuals' 'subjectivity' when answering well-being survey questions.. The full set of adult controls used in this strand of analysis is listed at the end of this box.

Similar to the analysis presented in previous sections, the choice of regression technique (OLS or logit model) depended on the character of the adult outcome (continuous or binary variable). The basic form of the equations used to estimate the relationships between each financial outcome and each other adult outcome was:

$$\text{Adult outcomes} = \alpha + \beta \times \text{Financial outcomes} + \gamma \times \text{Controls at adulthood}$$

The investigation of the link between financial and other life outcomes was undertaken separately for the two adulthood BCS70 waves, age 34 and age 42:

- Adult outcomes observed at age 34 (health self-assessment; long-standing illness; mental health; life satisfaction; and keeping away from crime) were linked to financial outcomes and control variables measured at age 34 (regular saving; pension saving and financial self-assessment).
- Adult outcomes observed at age 42 (health self-assessment; long-standing illness; mental health; mental well-being; and life satisfaction) were linked to financial outcomes and control variables measured at age 42 (debt-to-income ratio > 0.25; net wealth; and financial self-assessment).

The adulthood controls, each measured at age 34 or age 42 respectively, included:

- Gender, ethnicity and region of residence;
- Number of children, cohabitation status and if cohort member does not live with a partner, why not (including bereavement, divorce or separation);
- Highest educational attainment, employment status (including part-time vs. full-time employment and public vs. private sector employment), individual income and home ownership;
- Subjectivity measures: locus of control, optimism and confidence levels.

The statistical results of the analysis using the non-standardised variables and the most appropriate econometric technique are presented in Table 16 below.

Table 16: Link between adult financial outcomes and other adult outcomes

	Health self-assessment	Absence of long-standing illness	Mental health	Life satisfaction	Distance from crime	Mental well-being scale
Regular saving (age 34)	1.188**	0.990	0.105**	0.199**	1.246**	-
Pension saving (age 34)	1.242**	1.015	0.126*	0.117*	1.324**	-
Financial self-assessment (age 34)	1.230**	1.077*	0.201**	0.332**	1.146**	-
Low debt/income ratio (age 42)	1.320**	1.292**	0.010	0.190**	-	-0.139
Net wealth (age 42)	1** <sup>a</sup>	1 <sup>a</sup>	+0	+0**	-	-0*
Financial self-assessment (age 42)	1.284**	1.179**	0.092**	0.360**	-	0.172*

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval". Where no results are presented, this is due to the unavailability of outcomes at the respective BCS70 wave. Health self-assessment reports odds ratios from ordered logit, absence of long-standing illness and distance from crime report odds ratios from logit, mental health, life satisfaction and mental well-being

report coefficients of linear regression. The effects of net wealth is denoted in pounds, causing its effect sizes to be too small to be observed when rounding to three decimals. To clarify the relationships with net wealth: <sup>a</sup> = positive impact; <sup>b</sup> = negative impact.

The results presented in Section 5.1 of the main report showed that amongst all financial outcomes included in the analysis, financial self-assessment was the main driver of other adult outcomes. To allow for comparison between the strength of drivers, the results in the main report are based on regression analysis with standardised outcomes. The statistical results of the analysis on standardised outcomes can be found in the supplementary Excel document.

## 6.2 Do financial outcomes drive adult outcomes or vice versa?

Section 5.2 of the main report provides a discussion on whether financial outcomes drive other adult outcomes or vice versa. This section of the Technical Appendix provides the **motivation** and a detailed explanation of the **methodology** used to test the direction of this relationship. The results of these tests were used to inform the discussion in Section 5.2 of the main report.

### 6.2.1 Motivation for testing for reverse causality

The research outlined in Section 6.1 of this Technical Appendix and discussed in Section 2.2.1 of the main report has identified a number of statistically significant relationships between financial outcomes and other adult outcomes. For instance, the research finds that:

- Pension saving at age 34 is linked to a number of adult outcomes at age 34, namely health self-assessment mental health, life satisfaction and staying away from crime;
- Low debt-to-income ratio at age is linked to a number of adult outcomes at age 42: health self-assessment, long-standing illness and life satisfaction; and,
- Financial self-assessment has a statistically significant relationship with all adult outcomes, both at age 34 and 42.

However, financial outcomes and adult outcomes in this analysis are observed simultaneously since they are measured at the same waves of the BCS70. Therefore, there are questions concerning direction in which the identified relationships between the financial outcomes and adult outcomes manifest themselves. For instance:

- Is it possible that the same factors which make a person more likely to save for a pension have an impact on their health at the same age? Or is it rather that one's health might impact their ability to save for a pension?
- Does indebtedness at age 42 lead to a long-lasting illness and poor health self-assessment at age 42, or vice versa?
- Can we claim that lower financial self-assessment causes lower health self-assessment, or is it that poor health might lead to higher expenses and therefore poorer financial self-assessment?

### 6.2.2 Methodology for testing the direction of relationships between financial and other adult outcomes

The testing was performed for the relationships between pension saving, debt-to-income ratio and financial self-assessment, and those adult outcomes which are available at both age 34 and 42 and where statistically significant relationships were found (see Section 2.2.1 of the main report). We exploited the presence of some outcomes (health self-assessment, absence of long-lasting illness, mental health and life satisfaction) across subsequent waves of the BCS70 dataset to probe the direction of these relationships.

For example, in order to probe the established relationship between pension saving and health self-assessment at age 34, the fact that the BCS70 also contains data for health self-assessment at age 42 was used to test both possible directions of the relationship:

- We tested whether pension saving at age 34 is a driver of health self-assessment at age 42 whilst controlling for the impact of the pre-existing health self-assessment at age 34 (i.e. allowing for auto-correlation in the outcome variable). The result tells us whether pension saving has an impact on future health self-assessment **in isolation from** pre-existing health self-assessment and other controls.
- At the same time, the reverse hypothesis was tested – that health self-assessment drives pension saving at age 34. However, it should be noted that the conclusions from this test are weaker than the conclusions on the hypothesis that pension saving drives health self-assessment, because pension saving data is not available at age 42 to use as an outcome.

These hypotheses were tested using a technique called ‘simultaneous equations modelling’, illustrated in the technical box below.<sup>20,21</sup> The results from such testing allow us to draw a more complex picture to better understand how financial outcomes and adult outcomes interact with each other.

### Regression analysis to test the direction of relationships between financial outcomes and other adult outcomes

The hypothesis testing was conducted using ‘simultaneous equations modelling’. This framework allows us to test the assumption that a financial outcome might drive an adult outcome, but that adult outcome might also drive the financial outcome. This assumption is tested by estimating a system of equations, i.e. two equations at the same time, of the form:

$$\begin{cases} \text{adult outcome}_t = \alpha \times \text{financial outcome} + \beta \times \text{adult outcome}_{t-5} + \mu \times \text{Controls}_t & (1) \\ \text{financial outcome}_t = \gamma \times \text{adult outcome} + \delta \times \text{financial outcome}_{t-5} + \rho \times \text{Controls}_t & (2) \end{cases}$$

Note that the direction of relationships testing is limited by the data availability. If either the adult outcome or the financial outcome is not available at both ages 34 and 42, it is not possible to fully estimate equations (1) and (2). Either the coefficients labelled  $\delta$  or  $\beta$  cannot be estimated in this case.

Section 2.2.2 of the main report provides a discussion of the results from these tests. The main coefficients of interest from the generalised structural equation models are summarised in a matrix form in Table 17 – Table 21 below. The rows contain the potential drivers of the relationship, and the columns – the potential outcomes.

For example, Table 17 shows that health self-assessment at age 34 has a statistically significant relationship with regular saving at age 34. Moreover, regular saving at age 34 has a statistically significant relationship with health self-assessment at age 42 as well, even after controlling for past levels of health self-assessment (at age 34). This evidence, limited as it may be, indicates that the relationship between regular saving and health self-assessment exists in both directions.

On the other hand, regular saving has a statistically significant relationship with mental health at age 34, but it does not appear to have a strong link with mental health at age 42 once past levels of mental health are accounted for. Therefore, it is more likely that mental health drives regular saving rather than the opposite.

Table 17: Direction of the relationship between regular saving and other adult outcomes

Driver	Regular saving (age 34)	Health self-assessment (age 42)	Life satisfaction (age 42)	Mental health (age 42)
Regular saving (age 34)	-	0.145**	0.228***	0.001
Health self-assessment (age 34)	0.114***	0.996***	-	
Life satisfaction (age 34)	0.102***	-	0.103*	
Mental health (age 34)	-0.041**			0.402***

Note: \* = “Statistical significance at 95% confidence interval”; \*\* = “Statistical significance at 99% confidence interval”; \*\*\* = “Statistical significance at 99.9% confidence interval”

Table 18: Direction of the relationship between pension saving and other adult outcomes

Driver	Pension saving (age 34)	Health self-assessment (age 42)	Life satisfaction (age 42)	Mental health (age 42)	Absence of long-standing illness (age 42)
Pension saving (age 34)	-	0.259***	0.057	0.039	-0.085
Health self-assessment (age 34)	0.136***	0.995***	-		
Life satisfaction (age 34)	0.054**	-	0.230***		

<sup>20</sup> See e.g. Wooldridge, J.M. (2002) ‘Econometric analysis of cross section and panel data’, The MIT Press.

<sup>21</sup> The execution of this analysis was performed using the ‘sem’ and ‘gsem’ commands in Stata.

Mental health (age 34)	-0.048**			0.402***	
Absence of long-standing illness (age 34)	-0.011				1.558***

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Table 19: Direction of the relationship between net wealth and other adult outcomes

Driver	Net wealth (age 42)	Health self-assessment (age 42)	Life satisfaction (age 42)
Net wealth (age 42)	-	0.000***	0.000**
Health self-assessment (age 34)	0.058	0.997***	
Life satisfaction (age 34)	-0.041		0.237***

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Table 20: Direction of the relationship between low debt-to-income and other adult outcomes

Driver	Low debt/income ratio (age 42)	Health self-assessment (age 42)	Life satisfaction (age 42)	Absence of long-standing illness (age 42)
Low debt/income ratio (age 42)	-	-0.232**	-0.184**	0.223*
Health self-assessment (age 34)	-0.151**	1.005***		
Life satisfaction (age 34)	-0.048		0.249***	
Absence of long-standing illness (age 34)	0.186*			1.572***

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

Table 21: Direction of the relationship between financial self-assessment and other adult outcomes

Driver	Financial self-assessment (age 42)	Health self-assessment (age 42)	Life satisfaction (age 42)	Mental health (age 42)	Absence of long-standing illness (age 42)
Financial self-assessment (age 34)	range between 0.744-0.760*** across all models	0.155***	0.091***	0.050*	-0.095*
Health self-assessment (age 34)	0.093**	0.984***			
Life satisfaction (age 34)	0.022		0.217***		
Mental health (age 34)	0.014			0.407***	
Absence of long-standing illness (age 34)	-0.114				1.552

Note: \* = "Statistical significance at 95% confidence interval"; \*\* = "Statistical significance at 99% confidence interval"; \*\*\* = "Statistical significance at 99.9% confidence interval".

# Annex 1 Details on BCS70 variables used in the analysis

Table 22: List of BCS70 variables used in the analysis

	Variable as presented	BCS70 codes of underlying variables	Variable description
Skills	Reading ability	BD2RDAGE	Mother's assessment of child's reading skill (i.e. whether the child can read letters, some words, simple sentences)
	Copy designs test score	F199	Score on how well the child can copy a simple design (e.g. a circle)
	Human figure drawing test	F121	Score on how well the child represents different features in drawings of human figures
	Profile drawing test score	F118	Score on how well the child can complete the profile of a human face, scored on e.g. presence and shape of eyes, ears and nose
	British Ability Scales score	i3504 - i3644	Test of general intelligence consisting of tests on word definitions, memory, similarity of words and pattern recognition
	Maths score	BD3MATHS	Maths test score developed specifically for the BCS, known as the Friendly Maths Test.
	Reading score	BD3READ	Test Score in Edinburgh Reading
	Academic self-concept	k036-k041	Self-assessed ability in mathematics, reading, spelling, creative writing, art and craft and topic/project work.
	Challenge	c5d6-c5d13	A measure capturing a 'strong desire to get ahead', e.g. whether it matters to have an interesting job, to get a promotion, and to have a job with real challenge
	Locus of control	K075 - K094	Greater internal locus of control means that the individual believes <i>they</i> control their own life (rather than events occurring due to external factors outside of their control)
	Self-esteem	K010 - K025	Self-esteem measures a child's sense of self-worth
	Self-control	j127, j129, j138, j139, j152, j155, j158, j174, j177	Self-control measures the ability to inhibit impulses and control emotional expression
	Social skills	j122, j123, j124, j125; c5h27, c5h11, c5g16, c5h41	Teacher's assessment of how the child interacts with peers; the number of friends; 'boldness' and cooperativeness
Reversed Rutter behavioural score <sup>22</sup>	BD2RUTT, BD3MRUTT, BD4RUTT	A score which is calculated based on parents' responses to a series of questions <sup>23</sup> on the child's overall behaviour, a higher score indicating a better behaviour	

<sup>22</sup> For ease of reporting and consistency with other skills, the scale has been reversed so that a higher score indicates better behaviour

<sup>23</sup> For ages 10 and 16, these underlying questions can also be used to construct personality traits, such as extraversion and emotional health. Measures have not been generated at age 5 because it was deemed that the way in which the variables are constructed would not be representative for behaviour of a 5 year old.

	Variable as presented	BCS70 codes of underlying variables	Variable description
Financial outcomes	Agreeableness	m61, m46, m60, m56, m52, m45, m74; pa5_19, pa5_4, pa5_18, pa5_14, pa5_10, pa5_3, pa6_11	The tendency to act in a cooperative, unselfish manner
	Good conduct scale	m45, m46, m52, m56, m60, m61; pa5_3, pa5_4, pa5_10, pa5_14, pa5_18, pa5_19	Whether the child does not exhibit antisocial and uncooperative behaviour
	Conscientiousness	m57, m65, m76, m82; pa6_3, pa6_13, pa5_15, pa6_19	The tendency to be organised, responsible, and hardworking
	Emotional health	m48, m51, m58, m59, m75, m78; pa5_6, pa5_9, pa6_12, pa6_15, pa5_16, pa5_17	The extent to which the child is rarely worried, miserable, fearful, fussy, sullen or tearful.
	Extraversion	m47, m48, m49, m58, m59; pa5_17, pa5_7, pa5_16, pa5_6, pa5_5	Based on indicators including fondness for large groups, popularity with other children, and leadership
	Neuroticism	m80, m79, m50, m71, m75, m51; pa6_17, pa6_16, pa5_8, pa6_8, pa6_12, pa5_9	Emotional instability and proneness to psychological distress
	Regular saving	B7SAVERG	Whether saving regularly
	Pension saving	bd7sav01-bd7sav15	Whether saving for retirement or contributing to a pension
	Low debt-to-income ratio	B9DEBT, B9NETA, B9NETP, B9SJUA, B9SJUP, B9PNETPY, B9PNETPD, B9EASE, B9INC	Whether the person's household debt (excluding mortgage) is less than a quarter of their annual household income <sup>24</sup>
	Net wealth	B9SAVT, B9DEBT	Total savings minus total debt (excluding mortgage)
Intermediate life outcomes	Financial self-assessment	b7finnow, B9FINNOW	Self-assessment of an individual's financial situation (i.e. 'finding it very difficult', 'finding it quite difficult', 'just about getting by', 'doing all right' and 'living comfortably')
	Educational attainment	BD7HNVQ, BD9HNVQ	Highest attained NVQ level
	Educational path	BD9HANVQ, BD9HNVQ	Whether highest achieved qualification is academic or vocational
	Employment	bd7ecact, BD9EACT	Either in paid employment or self-employed, vs not employed
	Income	b7cnetpy	Individual annual pay
	Home owner	b7ten2, B9TEN	If accommodation is owned outright or on mortgage
	Marital status	bd7ms; BD9MS, BD9COHAB	Married, in partnership or cohabiting

<sup>24</sup> A cut-off at less than a quarter of annual household income was chosen because this cut-off provides the strongest relation with other variables related to indebtedness, and provides the strongest correlation with childhood skills.

	Variable as presented	BCS70 codes of underlying variables	Variable description
Other adult outcomes	Children	bd7nchhh, bd7ochhh; BD9NUMCH	If any children, including adopted children, in the household; and how many
	Bereavement of a parent in childhood	bd7maliv, bd7paliv; B9MADIED, B9PADIED	Whether the participant had lost a parent up till the age of 16
	Health self-assessment	b7khlstt, B9HLTHGN	Self-assessment of health
	Absence of long-standing illness	b7lsiany, B9LOIL	Reverse of long-standing illness or condition
	Total Malaise score	BD7MAL, BD9MAL	Higher Malaise score indicates symptoms associated with depression
	Mental well-being	BD9WEMWB	Warwick Edinburgh Mental Well-Being Scale
	Self-assessed life satisfaction	b7lifet1, B9LIFST1	How well the individual appraises their life so far
	Distance from crime	b7polic3, b7polic4, b7polic5, b7court	Has not been officially warned, cautioned or arrested by the police, nor has been found guilty on court
	Feeling confident	B9SCQ31J	Self-reported level of confidence
	Optimism	B9SCQ31A	Self-reported level of feeling optimistic about the futures

Note: Further details on the BCS70 variables can be found from the BCS70 documentation produced by the Centre for Longitudinal Studies, available here:

<http://www.cls.ioe.ac.uk/page.aspx?&sitesectionid=795&sitesectiontitle=Welcome+to+the+1970+British+Cohort+Study>



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