

**The socio-economic gradient in child
outcomes: the role of attitudes,
behaviours and beliefs
The primary school years**

Report for the JRF

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Table of Contents

<i>Figures and tables</i>	4
<i>Acknowledgements</i>	6
<i>Summary</i>	7
1. <i>Background</i>	9
2. <i>Modeling approach</i>	12
3. <i>Data</i>	16
4. <i>Socio-economic differences in child and family characteristics</i>	21
5. <i>Explaining between-group differences in educational outcomes at 11</i>	26
5.1. <i>Socio-economic differences in educational achievement at 11</i>	26
5.2. <i>Other between-group differences in educational achievement at 11</i>	32
6. <i>The role of specific attitudes, behaviours and beliefs</i>	39
6.1. <i>The conditional association of different attitudes, behaviours and beliefs with Key Stage 2 scores</i>	39
6.2. <i>Individual variable contributions to the socio-economic gradient in educational achievement at 11</i>	45
7. <i>Antecedents of key attitudes, behaviours and beliefs</i>	51
8. <i>Focus on preschool environments and educational attainment at 11</i>	61
9. <i>Conclusions</i>	64
10. <i>References</i>	66
<i>Appendix 1: Representative nature of the sample</i>	A1
A1.1. <i>Comparison of Avon with England as a whole</i>	A1
A1.2. <i>Sample selection</i>	A2
<i>Appendix 2: Variable definitions and summary statistics</i>	A9
A2.1. <i>Key Stage outcomes</i>	A9
A2.2. <i>Measures of socio-economic position</i>	A10
A2.3. <i>Measures of demographic and school characteristics</i>	A13
A2.4. <i>Measures of attitudes, behaviours and beliefs</i>	A15
A2.5. <i>Variables used in supplementary analyses</i>	A20
A2.6. <i>Summary statistics of all variables</i>	A22

Appendix 3: Sub-group contributions to the socio-economic gradient in educational achievement at 11..... A27

Appendix 4: Sensitivity of results to alternative definitions of key variables A32

A4.1. Key Stage 2 outcomes A32

A4.2. Socio-economic position A33

A4.3. School composition and quality A36

A4.4. Prior ability A38

Figures and tables

Figures

1.1. Test scores at 11 by parental socio-economic position (SEP)	11
2.1. A distal-proximal model of educational achievement	13
5.1. Socio-economic gaps in Key Stage 2 scores, conditional on successive groups of controls	30
5.2. Socio-economic gaps in Key Stage 2 scores, conditional on Key Stage 1 and successive groups of controls.....	32
7.1. Socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9	55
A4.1. Socio-economic gaps in Key Stage 2 scores, using alternative metrics for Key Stage 2	A33

Tables

1.1. Educational performance at 7 and 11, by parental SEP	11
3.1. Explanatory variables used in the analysis	19
4.1. Means of variables, by quintile of socio-economic position	24
5.1. Socio-economic gaps in Key Stage 2 scores, conditional on successive groups of controls	29
5.2. Socio-economic gaps in Key Stage 2 scores, conditional on Key Stage 1 and successive groups of controls.....	31
5.3. Other group differences in Key Stage 2 scores, conditional on successive groups of controls	35
5.4. Other group differences in Key Stage 2 scores, conditional on Key Stage 1 and successive groups of controls.....	37
6.1. Estimated effects of attitudes, behaviours and beliefs on Key Stage 2 scores.....	43
6.2. Breakdown of the bottom-middle and bottom-top SEP gaps in average Key Stage 2 scores	49
7.1. Socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9	56
7.2a. Socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9, detailed predictors.....	57
7.2b. Further socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9, detailed predictors	59
8.1. Regressions of Key Stage 2 on preschool environments, with alternative groups of controls	633

A1.1. Means of key variables, by sample selection criteria.....	A5
A1.2. Free school meals eligibility and household income at 11, by SEP quintile and sample selection criteria	A6
A1.3. Regressions of Key Stage 2 scores on selected characteristics using alternative sample selection criteria	A7
A2.1. Transformation of Key Stage 1 levels to point scores.....	A10
A2.2. Components of the SEP index	A12
A2.3. Demographic and school characteristics variables.....	A14
A2.4. Attitudes, behaviours and beliefs variables.....	A15
A2.5. Summary statistics of all variables in the working sample	A23
A3.1. Socio-economic gaps in Key Stage 2 scores, conditional on sub-groups of controls	A30
A3.2. Socio-economic gaps in Key Stage 2 scores, conditional on Key Stage 1 and sub-groups of controls	A31
A4.1. Socio-economic gaps in Key Stage 2 scores, using alternative definitions of SEP	A35
A4.2. Socio-economic gaps in Key Stage 2 scores, using school fixed effects models	A37
A4.3. Breakdown of the socio-economic gaps in Key Stage 2 scores, conditional on alternative measures of prior ability	A40

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Summary

Key Findings

- The poorest fifth of children score, on average, 14 percentile points lower than the middle fifth of children in Key Stage 2 tests at age 11, and 31 percentile points lower than the richest fifth.
- Children from low socio-economic backgrounds perform less well on tests at age 7. Poor children who perform well at 7 are more likely than rich children to have slipped back by age 11, and poor children who perform badly at 7 are less likely to catch up over the period. Our estimates imply that over a third of the gap between the richest and poorest children at age 11 emerges after the age of 7.
- Parental aspirations and attitudes to education vary particularly strongly with socio-economic position. 81% of the richest mothers say they hope their 9-year-old will go to university, compared with only 37% of the poorest mothers. There are also large differences according to whether the mother found school valuable for themselves.
- Children's attitudes and behaviours in primary school vary in the degree to which they are socially graded. Poor children tend to view themselves as scholastically less able, are less likely to believe school results are important in life, and exhibit higher levels of hyperactivity, conduct problems and peer problems. However, their levels of school enjoyment and cooperative behaviour differ little from those of more affluent children.
- Measures of parents' attitudes and behaviours are related to those of their children, but both have independent predictive power in explaining socio-economic achievement gaps.
- Lack of economic resources is not the only thing that matters for disadvantaged children. Together the levels of parental education, demographic characteristics like family size and structure, and the characteristics of the schools attended by the poorest fifth can explain 60 to 70% of their educational deficits at Key Stage 2.
- The attitudes, beliefs, and behaviours of parents and children have a major role to play in accounting for the gaps that remain unexplained. Together they increase the proportion of the deficits accounted for to 75 to 80%. This calculation understates their true importance because part of the baseline influence of family and school characteristics operates via their association with attitudes, behaviours and beliefs.
- The adverse attitudes to education of disadvantaged mothers are one of the single most important factors associated with the children's deficits at age 11. In particular, 9-year-olds whose mothers hope they will go to university will score 5.7 percentile points higher at age 11 than the child of the parent with the lowest aspirations given the same prior attainment and parental education etc. This factor alone explains 19% of the test score

gap between the richest and poorest children at 11, and 16% of the widening gap between the ages of 7 and 11.

- The greater behavioural problems of disadvantaged children are the second key factor in accounting for their poorer educational outcomes. We find evidence children with high levels of anti-social behaviours, hyperactivity and conduct problems at the ages of 8 to 9 scored lower at Key Stage 1, but even taking this into account, such behaviours appear to interfere with the learning process between 7 and 11. Other types of behaviour problems do not appear to play the same role.
- Although parental aspirations and behaviour problems are of key importance, a whole range of adverse attitudes, behaviours and beliefs contribute to the educational deficits of low income children. Other factors we identify as important are the lack of a sense of personal efficacy (both of mothers and their children), and the view that school results are not important in life.

1. Background

- The poorest 20% of children score, on average, 14 percentile points lower than the middle 20% in Key Stage 2 tests at age 11, and 31 percentile points lower than the richest 20%.
- Children from low socio-economic backgrounds perform less well on tests at age 7. Poor children who perform well at 7 are more likely than rich children to have slipped back by age 11, and poor children who perform badly at 7 are less likely to catch up over the period. Around one third of the attainment gaps by socio-economic background at age 11 emerge after age 7.

Children growing up in less affluent families emerge from our schools with substantially lower levels of educational attainment. These educational deficits emerge early in children's lives, even before entry into school, and widen throughout childhood. This paper focuses on the differences between socio-economic groups in academic performance at the time of entry into secondary education at age 11. We use data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a cohort of around 14000 children born in Avon in the early 1990s, to examine some of the routes through which family socio-economic position (SEP) affects educational attainment. Our focus is on a range of early parenting behaviours and on parent and child attitudes, behaviours and beliefs in the primary school years that have seldom been studied in work on the causes and consequences of poverty. We aim to explore which attitudes and beliefs are important in influencing attainment at age 11 and patterns of educational development between the ages of 7 and 11, and how strong these influences are. The paper is designed as a companion to two other research projects, which explore the same kinds of relationship at earlier ages (the pre-school period, using data from the Millennium Cohort Study) and at later ages (the secondary school years, using data from the Longitudinal Study of Young People in England).

The motivation for this study is the well-established fact that educational inequalities appear early in life, and tend to widen with age (see Feinstein, 2003 and 2004). Descriptive statistics from ALSPAC on the relationship between performance of national Key Stage (KS) tests in English, maths and science and a broad measure of socio-economic background confirm this. The left hand panel of Figure 1.1 shows the average test scores of children in our working sample at age 11 (KS2), by quintile of SEP. The scores reflect the child's percentile in the Avon distribution and range from 1 for the lowest performing children to 100 for the highest performing. If there were no systematic differences in attainment by SEP, each group would

have an average score of 50.5. Deviations from this number show how far children from different socio-economic backgrounds tend to over- or under-perform relative to the average. It is clear that there are substantial differences in educational performance that run throughout the socio-economic scale. The mean score of the most advantaged children is 31 percentile points higher than that of the most disadvantaged. Although there are some differences around the middle of the SEP distribution, it is noticeable that the largest gaps occur at the tails, with the poorest children falling far behind and the richest children pulling strongly ahead.

The right hand panel of Figure 1.1 explores how these patterns are affected by controlling for prior attainment at Key Stage 1 (KS1; age 7). These figures adjust for the fact that lower SEP children have lower ability at age 7 by estimating how the gaps would look if all children scored the average at Key Stage 1. The gradients here are noticeably smaller than in the left panel, and show that a large fraction of the educational inequality observed at age 11 in fact reflects differences that are already apparent by age 7. However substantial differences remain, and suggest that the poorest children fall a further 11 percentile points (almost one-third of the raw 31 point gap) behind the richest children between 7 and 11, even if they started the period with the same levels of attainment.

Table 1.1 explores the trajectories of children from different socio-economic groups in more detail. The first two rows focus on low-achieving children at age 7. The lower SEP children in our sample are much more likely to fall into this group – 54% of the bottom quintile scored at the 40th percentile or below, compared with only 16% of the top quintile. They are also much less likely to escape from the low-achieving group by age 11. Less than a quarter of the poorest children who scored in the bottom 40% at age 7 are able to escape by age 11, whereas more than half of those in the top SEP quintile are no longer there four years later. The next two rows show a parallel pattern for the high-achieving children at 7. Low SEP children are much less likely to be scoring above the 60th percentile at this age (25% of the poorest compared with 64% of the richest), and those who do are more likely to have dropped out of this high-achieving group by age 11 (28% of the poorest fall back compared with only 8% of the richest high-achievers). It is the combination of these two factors – that low SEP children start behind at age 7 and that high achieving children from poorer families do not progress as well as higher SEP children and are often overtaken by less able more affluent children during the primary school years – that results in the patterns shown in the final two rows of the table. At 11, children in the bottom SEP quintile are nearly five times as likely to be low-achievers, and two-and-a-half times less likely to be high-achievers, as children in the top SEP quintile.

Figure 1.1. Test scores at 11 by parental socio-economic position (SEP)

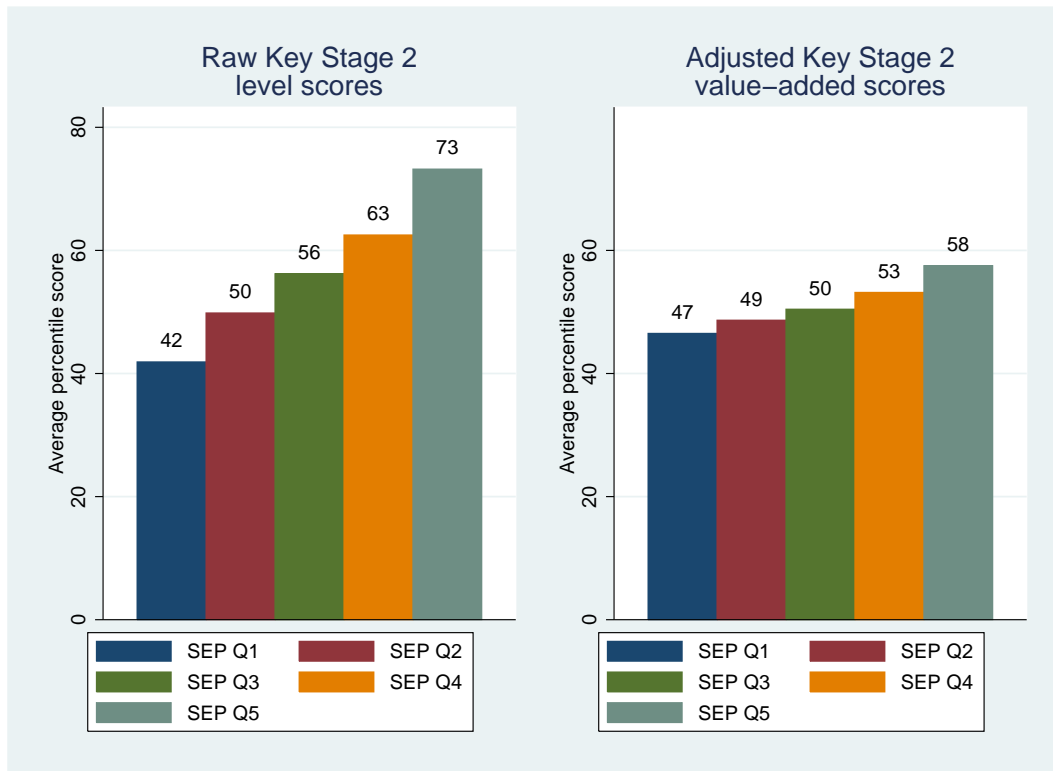


Table 1.1. Educational performance at 7 and 11, by parental SEP

Category	Proportions					
	Total working sample	SEP Q1	SEP Q2	SEP Q3	SEP Q4	SEP Q5
Bottom 40% at KS1	0.33	0.54	0.41	0.33	0.27	0.16
Escape from bottom 40% by KS2 ^a	0.32	0.23	0.29	0.32	0.37	0.54
Top 40% at KS1	0.44	0.25	0.34	0.42	0.50	0.64
Drop out of top 40% by KS2 ^a	0.16	0.28	0.26	0.18	0.14	0.08
Bottom 40% at KS2	0.30	0.51	0.38	0.31	0.24	0.11
Top 40% at KS2	0.50	0.28	0.37	0.47	0.57	0.73

^a Proportion exiting group, conditional on being in group at KS1.

Top and bottom 40% refer to the proportions in the population of all children in the Avon area. Proportions in the working sample do not equal exactly 0.40 because the working sample is positively selected. See Appendix 1 for details.

Observations in total working sample = 7972.

2. Modelling approach

- Our analysis focuses on explaining the difference in mean test scores between the poorest 20% of children and those in the middle 20% of the SEP distribution (the *middle-bottom gap*), and the difference between the poorest and the richest 20% (the *top-middle gap*).
- We seek to account for the socio-economic gaps in Key Stage 2 using data on a number of different types of factor. We include *parental education*, *demographic family characteristics*, and *school composition and quality*, as potentially confounding background, or ‘distal’ characteristics. Our focus, however, is on the role of more ‘proximal’ or direct influences, namely the *attitudes, behaviours and beliefs* of parents (distinguishing preschool factors from later ones), and of the children themselves at the ages of 8 to 9.
- Outcomes at 11 reflect the joint influence of the child’s prior ability at 7 and the environment in which they develop over the intervening four years. We explore the role of both of these factors by estimating two types of model. The *levels model* focuses on the extent of inequality observed in the population at age 11. The *value-added model* holds performance at Key Stage 1 (age 7) constant, and focuses on the relative progress of advantaged and disadvantaged children between the ages of 7 and 11. The levels model thus makes no distinction as to the timing at which deficits emerge, while the value-added model focuses on influences operating specifically during the last 4 years of primary school.
- The distal-proximal approach – commonly used in developmental psychology – estimates transmission mechanisms between family socio-economic position and educational achievement at 11. The ‘effects’ estimated by this approach are not necessarily causal, but the sequential timing of outcomes and proximal factors can provide some clues as to the likely direction of causation.

The aim of our analysis is to better understand the observed relationship between a child’s socio-economic background and his or her educational performance at 11. In particular the aim is to assess the importance of attitudes and aspirations, both parental and child, on attainment. We explore the role of a diverse range of factors that potentially mediate this relationship, in the sense that they are shaped by family background, and then in turn directly influence children’s educational development. The ALSPAC data is extremely rich, so we organise our data according to distinct concepts that have been identified in the literature.

Figure 2.1. A distal-proximal model of educational achievement

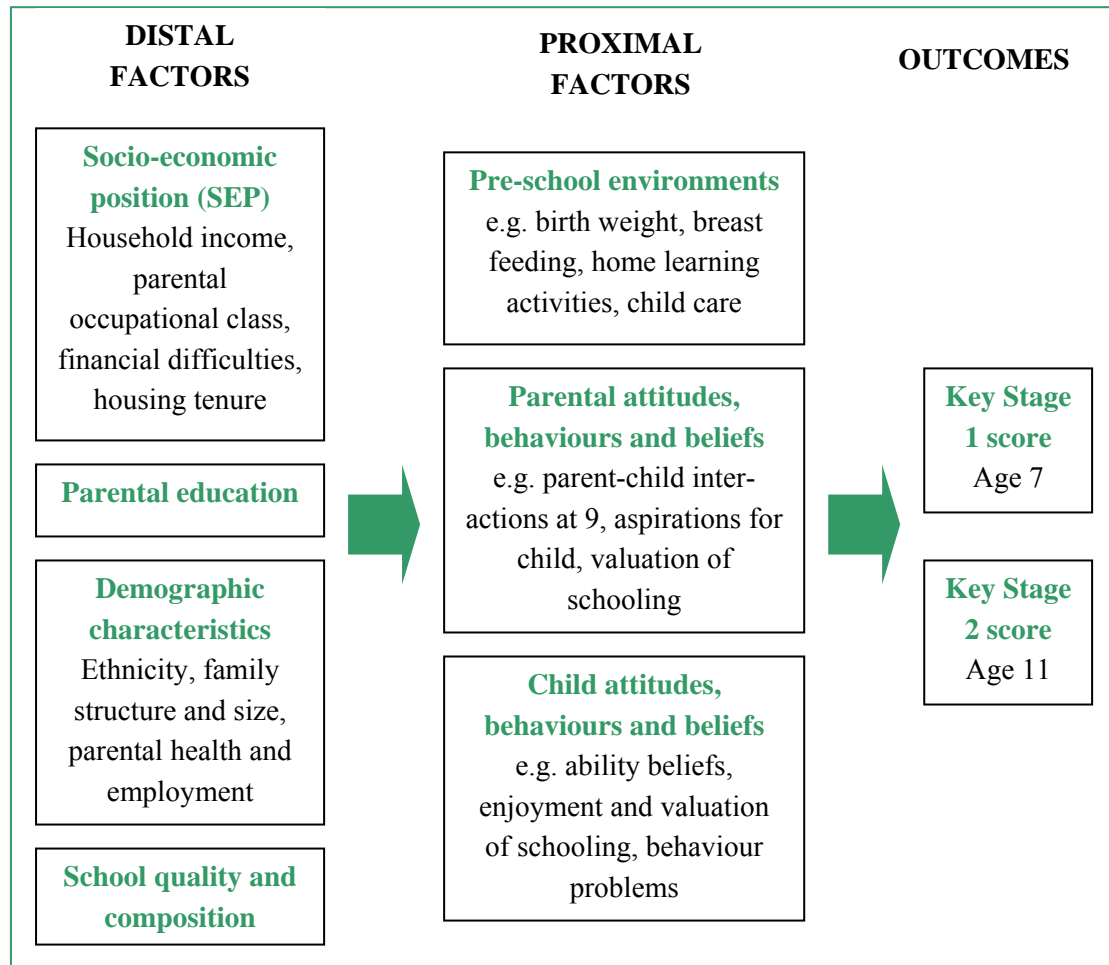


Figure 2.1 summarises our approach. Socio-economic position (SEP) is the principal family background indicator of interest. However, conceptually it is only one of a set of ‘distal’ factors, or aspects of family background that together characterise the social and cultural resources available to the child. SEP, along with parental education, family structure and size, school quality and other distal variables are assumed to shape the ‘proximal’ attitudes, behaviours and beliefs that are the focus of this study. We hypothesise that the values and behaviours of parents (both in the pre-school period and during the primary school years) and of the children themselves are relatively more immediate or direct influences on educational achievement, and help to explain why we observe differences in average Key Stage scores between different distal groups.

Our choice of potential mediating processes is informed by data availability and by a diverse social science literature on the determinants of educational success. Many of the concepts used in this study are informed by the expectancy-value theory of achievement motivation, proposed by Eccles, Wigfield and colleagues (e.g. Wigfield and Eccles, 2000). Underlying

this theory is the idea that individuals' achievement-related choices, persistence and performance in an activity can be explained by their beliefs about how well they will do the activity and the extent to which they value the activity.

However, we do not restrict our attention solely to motivational constructs, but also consider the role of factors such as children's behavioural problems, or self-regulation, which have been linked to educational performance in a largely unrelated literature (see for example, Heckman and Rubinstein, 2001, Heckman et al., 2006, Blanden et al., 2007). A child's degree of self regulation influences the ability to see intentions through, and thus interacts with achievement motivation in influencing the expected outcome. The relationship between the parents' and child's motivations and expectations is also likely to be complex. The parent will be aware, though potentially imperfectly, of the child's capabilities and will adjust expectations accordingly. However, the parents' own experiences, and those of others they are aware of, may also shape their own expectations of the child and their efforts to influence the child's motivation and decision making.

We focus our results on two key statistics. The difference in mean test scores between the poorest 20% of children and those in the middle 20% of the SEP distribution (the middle-bottom gap) is a summary measure of differences between those in poverty and average children. In contrast, the difference between the poorest and the richest 20% (the top-middle gap) is an indicator of the full extent of educational inequality at 11.

The modelling approach we adopt is a two step procedure. The first step is to take the raw educational achievement–SEP gaps and condition on the other major distal variables that may differ across families. These social and cultural aspects of family background potentially overlap with the family's material or economic status, and in their absence the importance of the material/economic element would be substantially overstated.

The second step is then to explore the transmission of economic disadvantage via a rich and diverse set of parental and child proximal variables. We explore these in three groupings, early (pre-school) parent-child interactions; parent-child interactions and parent aspirations for the child in the primary school years; and the child's behaviours and attitudes to learning around age 9. The role in transmission of other markers of disadvantage such as low parental education or large family size will also be explored.

In addition we explore how parent and child beliefs and attitudes to education map on to early parenting styles, the home learning environment and maternal bonding. This is to explore whether the families which invest heavily in early learning support for children tend to be the same families with positive attitudes and behaviours at age 9.

The relationship between family background in general and educational performance at 11 reflects two distinct influences. Family background is related to parents' investments in children, and also children's wider inheritance, which together shape educational performance at age 7 (Key Stage 1). Outcomes at 11 then reflect the joint influence of the child's prior ability at 7 and the environment in which they develop over the intervening four years. The total observed association between family background and Key Stage 2 scores is the combined influence of these two processes. In our analysis, we present results on the relative importance of mediating factors with and without conditioning on Key Stage 1. The first set of results (the levels model) reveals how far each factor is associated with Key Stage 2 outcomes, without distinguishing how far its influence is manifested pre- or post-age 7. The second set of results (the value-added model) holds child attainment at 7 constant, and hence reveals how far each factor is associated with improvement or deterioration of the child's performance during the primary school years.

The distal-proximal approach, commonly used in development psychology, is not strictly causal. There are potential unobserved differences in family functioning which, if correlated with the measures of attitudes and beliefs we observe, could lead to a misleading sense of importance of these attitudes/beliefs in children's educational progress. Likewise, the degree to which interventions to change attitudes and beliefs can alter attainment could be overstated. Our main argument here relies on timing, in that the value added models we develop focus on what is actually happening in the primary school years. Parental attitudes, investments and influences that are permanent or pre-date this period will be substantially captured by prior attainment. However, the level of prior attainment may not be enough to fully capture these potential effects if children are on different trajectories rather than just at different levels of prior attainment. So we also explore the extent to which progress during the primary school years is related to early parental investments. This allows us to capture the continuing impact of these earlier investments on the child along with longer-term family differences in educational investments that are not specific to the primary years period of a child's life.

3. Data

- Our analysis is conducted on a sample of 7972 children born in the Avon area of England in the early 1990s (from the Avon Longitudinal Study of Parents and Children, or ALSPAC).
- We use official data on children's Key Stage test scores at 7 and 11, linked to questionnaire and clinic data collected over the entire period from birth to the end of primary schooling.
- Our measures of attitudes, behaviours and beliefs are taken from mother-reported postal questionnaires and direct assessments when the child was aged 8 to 9. The timing of these measures is advantageous because they occur between the Key Stage 1 and Key Stage 2 tests. This enables us to explore how different family environments affect the trajectory of a child's development, given their prior attainment.

ALSPAC is a cohort study that recruited around 14,000 pregnant women who were resident in the Avon area of England whose expected date of delivery fell between 1st April 1991 and 31st December 1992. Study families were surveyed via high frequency postal questionnaires from the time of pregnancy onwards, and via a number of hands-on clinics in which ALSPAC staff administered a range of detailed physical, psychometric and psychological tests to the children. ALSPAC has been linked to the National Pupil Database (NPD), which contains school identifiers and results on national Key Stage school tests for all children in the public school system, and information of local deprivation at the small area level (the government-produced Indices of Multiple Deprivation, IMD). For information on ALSPAC, see <http://www.bris.ac.uk/alspac>.

The key outcome variable in our analysis is derived from the results of Key Stage 2 assessments in English, maths and science taken by all pupils in state schools in Year 6 (age 11). We construct an average measure of performance on the three tests, and express this total as a percentile score. We explore two specifications of the Key Stage 2 outcome in all the main results in the paper: one without, and one with, a control for Key Stage 1 performance at age 7. Again, the Key Stage 1 measure is constructed as an average score, here over reading, writing and maths tests. We normalise Key Stage 1 to have a mean of zero and a standard deviation of 1, so that the performance of the average child is used the reference case (see Appendix 2 for details of variable construction). We refer to the first specification as the levels model and to the second as the value-added model. In effect the value-added model measures the influence of covariates on relative progress between the ages of 7 and 11. It

addresses the question of whether and where gaps would open up during the period even if all children started with the same level of academic ability.

Our measure of socio-economic position is derived from data on a number of indicators: household income, parental social class, housing tenure and reported experience of financial difficulties. The measure is constructed using principal components analysis, and individuals are then placed into quintiles (fifths) of the population ranked by this measure. The aim is to construct a long term measure of the material resources of the household, one that incorporates the fact that deprivation is multi-dimensional and that socio-economic risk factors are likely to be cumulative (again, see Appendix 2 for details).

The ALSPAC data contain information on a wide range of factors that may help to explain the poorer educational performance of socially-disadvantaged children. We distinguish two types of mediating factors. Parental education, demographic characteristics and school characteristics can be thought of as ‘distal’ factors. They describe the resources available to parents and children in a broad sense, and capture the structural features of the environments in which children are raised. The attitudes, behaviours and beliefs of parents and children are ‘proximal’ factors that we expect to be shaped by the distal features of the family’s circumstances, and that in turn directly affect the learning process. Table 3.1 sets out the variables used in the analysis. (Full details are available in Appendix 2.)

Many of our measures of attitudes, behaviours and beliefs are taken from a mother-reported postal questionnaire when the child was 9 years old, and from a hands-on clinic when the child was 8. The timing on these measures is advantageous because they occur between the Key Stage 1 and Key Stage 2 tests. This enables us to explore how different family environments affect the trajectory of a child’s development, given their prior attainment. However, the data requirements are such that families must have remained in the study from birth to 9 years. This is quite a stringent requirement and there is substantial attrition, leaving us with a working sample of only 7972, about half of original cohort remaining in English state schools. We have used a number of techniques to ensure that our definitions of SEP groupings, and the scaling of the Key Stage outcome variables, are as representative as possible of the national population, rather than only those who remain in the sample (see Appendix 1). Missing values on the explanatory variables are dealt with by mean replacement and the inclusion of a missing dummy. Table A2.5 in Appendix 2 gives summary statistics and sample sizes of all the variables used in the report.

As a sub-set of parental factors, we include some measures of the pre-school environment relating to health, cognitive stimulation and child care experiences. Our analysis allows us to explore whether these early influences have lasting effects on performance, and also whether they are associated with faster progress between 7 and 11. We then look at the importance of two potential ways in which parents may influence the educational development of children during the primary school years. The first concerns the value that parents place on education, both in terms of their own experiences and in terms of hopes for their children, and in their motivational attitudes more generally (locus of control). The second concerns the amount and quality of parent-child interactions. We distinguish educational interactions, which contain some component of cognitive stimulation, and other interactions that may nevertheless be important in fostering family bonds and socio-emotional well-being in children.

We capture the child's perspective in three broad groupings of variables. Children's attitudes and beliefs are captured by their perceptions of their own ability, their feelings about school, and their beliefs about how education and personal effort more generally will impact on their lives. Behavioural difficulties, which may interfere with academic progress, are measured in terms of engagement in anti-social behaviours, hyperactivity, conduct problems and emotional symptoms. Other contexts besides the home may also impact on ability and motivation. Here we examine experience of bullying and peer problems, teacher relations, and participation in out-of-school activities, such as sports, singing or drama groups.

In some cases our measures come from recognized scales, such as the Harter Self Perception Profile for Children, Scholastic Competence sub-scale (ability beliefs)¹, and the Strengths and Difficulties Questionnaire (hyperactivity, conduct problems, emotional symptoms, peer problems, pro-social behaviour)². In other cases we generate our own scales by standardising the responses to a number of related questions and taking the average. Full details of the construction of all measures are given in Appendix 2.

¹ Harter (1985).

² Goodman (1997).

Table 3.1. Explanatory variables used in the analysis

Family (distal) characteristics	
Parental education	Mother's highest qualification, father's highest qualification
Demographic characteristics	Gender, ethnicity, month of birth, mother's age, stepfather and lone parent indicator, number of older and younger siblings, twin, English as an additional language (EAL) at 11, mother and father employed at age 4, mother's and father's general health at age 4.
School characteristics	School's KS1 average point score, KS2 value-added measure, school % pupils FSM
Attitudes, behaviours and beliefs (proximal factors)	
<i>Pre-school environments</i>	
Health factors	Birth weight, gestation, breastfeeding, smoking during pregnancy, post-natal depression
Home learning environment	Child read to daily at 3, Home Learning Index at 3 (reading, singing, library visits, colours, alphabet, shapes & sizes, nursery rhymes, numbers, songs)
Child care	Centre-based care by 3, nursery at 3 to 4
<i>Parental attitudes beliefs, behaviours</i>	
Educational values (scale)	Extent to which parent feels school was valuable experience
Maternal locus of control (scale)	Mother's beliefs about whether outcomes are determined by oneself or external forces
Aspirations for child's education (%)	Qualification mother hopes child will achieve (good GCSEs, A-level, degree, other)
Mother child education interactions (scale)	Frequency of mother: Making things, singing, reading, drawing & painting, playing with toys, helping with homework, helping prepare for school, having conversations with child (age 9)
Mother child non-education interactions (scale)	Frequency of mother: Cuddles, active play, takes to park, takes to activities, puts to bed, takes shopping, prepares food with child (age 9)
<i>Child attitudes beliefs, behaviours</i>	
Ability beliefs (scale)	Child's beliefs about how clever, and how good at school work, they are
Locus of control (scale)	Beliefs about whether outcomes are determined by oneself or external forces
Intrinsic value (scale)	Enjoyment/ non-enjoyment of school and lessons

Report for JRF: The primary school years

Extrinsic value	Whether child considers school results or other factors important in life.
Anti-social behaviour (scale)	E.g. smoking, alcohol, stealing, carrying weapon, setting fire, cruelty to animals
Hyperactivity (scale)	E.g. inability to concentrate or stay still
Conduct problems (scale)	E.g. disobedience, fighting, temper tantrums
Emotional symptoms (scale)	E.g. worried, unhappy, fearful
Experience of bullying (scale)	Frequency of experiencing bullying (e.g. called names, excluded from group, threatened, hit)
Peer problems (scale)	E.g. lacking friends, playing alone, being unpopular
Pro-social behaviours (scale)	E.g. being helpful, kind and considerate to others
Teacher child relations (scale)	E.g. child's perception of teacher, whether teacher helps child to improve
Leisure/out of school activities (scale)	Swimming, sports, special clubs/classes (e.g. Scouts, judo, sport), foreign languages, singing group, musical instrument, Sunday School

4. Socio-economic differences in child and family characteristics

- The mothers of disadvantaged children are much more likely to lack qualifications, to be single parents, to be under 25 when they give birth, and to have already borne at least two children, than more advantaged mothers.
- Disadvantaged children attend primary schools with poorer average test results, poorer value-added and a greater proportion of low income pupils, than more affluent children.
- Parental attitudes and behaviours vary in the degree to which they are socially graded. We find large differences in breast feeding, smoking, post-natal depression, and a sense of control over life; moderate differences in the preschool home learning environment; and negligible differences in parent-child interactions at age 9.
- Parental aspirations and attitudes to education vary particularly strongly with socio-economic position. 81% of the richest mothers say they hope their 9-year-old will go to university, compared with only 37% of the poorest mothers. There are also large differences according to whether the mother found school valuable for themselves.
- Children's attitudes and behaviours in primary school also vary in the degree to which they are socially graded. Poor children tend to view themselves as scholastically less able, are less likely to believe school results are important in life, and exhibit higher levels of hyperactivity, conduct problems and peer problems. However, their levels of school enjoyment and cooperative behaviour differ little from those of more affluent children, as do reports of teacher-child relations.

The characteristics of low income families differ from those of their more affluent counterparts along many dimensions. In the first place, material disadvantage tends to be concentrated among certain demographic groups. Key demographic factors, such as low parental education, single parenthood and teenage motherhood, are likely to influence children's attitudes, behaviours and attainment independently of the level of family financial resources.

The first two panels of Table 4.1 highlight a number of the systematic differences between deprived and affluent families³. The table shows the average characteristics of those in the

³ See Appendix 2 for full variable definitions.

bottom, middle and top quintiles of SEP, omitting details of those in the second and fourth quintiles for brevity. Unsurprisingly parental educational attainment varies dramatically between socio-economic groups. Disadvantaged families are more likely to be from ethnic minorities and much less likely to contain two co-resident biological parents at age 7. Mothers in these families were much more likely to have given birth before the age of 25, but were nevertheless also more likely to have already borne two or more children before the birth of the cohort member.

In addition to family circumstances, the characteristics of the schools attended by children will be key influences of their attitudes, motivation and educational performance. The third panel of Table 4.1 shows that disadvantaged children tend to attend schools with composed of lower ability pupils (as measured by the average Key Stage 1 score in the school), and those with a higher concentration of disadvantage (as measured by proportion eligible for free school meals or FSM). We use the average value added for the school between Key Stages 1 and 2 as a measure of school quality that is independent of the composition of the intake, and see that the schools attended by higher SEP children tend to see more improvement, on average, than the schools attended by low SEP children.

Moving from the distal influences of family background to the more proximal focus of this study, the fourth panel of Table 4.1 shows a number of dimensions of the early home environment (prior to the start of school) that plausibly affect children's health and development. Breast feeding, maternal smoking and post-natal depression are all very strongly graded by SEP, and there are also some differences in average birth weight and the likelihood of being born pre-term. Less advantaged parents tend to engage in fewer reading and teaching behaviours with their three-year-olds, although this is not universally true: 13% of the poorest families are in the highest home learning environment quintile, while 14% of the most affluent families are in the bottom quintile. Finally, we see that exposure to centre-based child care before the age of 3 was relatively rare in this cohort, but much more common among the better off, while attendance at nursery at ages 3 to 4 was most common among the best and worst off, with middle SEP children showing the lowest participation rates. We might imagine that the quality of child care settings would differ with family income, for example because the most advantaged can afford expensive private nurseries⁴. Research suggests that quality is the key factor that determines the influence of child care on children's

⁴ The children in the ALSPAC cohort were age 3 to 4 between 1994 and 1996, before the introduction of guaranteed free half-day places.

development (NICHD ECCRN and Duncan, 2003), but unfortunately we are not able to measure it here, and can only explore differences in exposure to particular types.

The fifth panel of Table 4.1 highlights differences in parental attitudes and behaviours that are not specific to the preschool period. Low SEP mothers tend to have a much more external locus of control (a sense that luck or fate, rather than their own actions, are what matters in life), and tend to view their own schooling experiences as having been less valuable than more advantaged mothers. Most strikingly there are very large differences in their educational aspirations for their children when they are age 9. 81% of mothers in the richest quintile hope their child will go to university, compared with only 37% of mothers in the lowest quintile. Interestingly, these differences do not appear to be mirrored in differences in the frequency and variety of mother-child interactions at 9. We find only very small differences in mothers' reports of how often they make things or read with the child, help with homework, etc. (educational interactions), and in how often they take the child to the park or shopping, prepare food with the child, etc. (non-educational interactions). Hence the marked socio-economic differences we see in preschool parenting behaviours seem to have narrowed by the mid-primary school years.

The final panel in Table 4.1 shows how children's own attitudes, behaviours and beliefs differ with socio-economic position. There are notable differences in the degree to which low-income children express negative views at the ages of 8 to 9. They tend to regard themselves as scholastically less able, they are less likely to view school results as important in life (as reported by the mother) and tend to have a more external locus of control. This sense that luck or chance determines outcomes, rather than one's own efforts, is also found among low income mothers but the gradient is much less marked in the children than in their mothers. In contrast, we find little differences in the extent to which children enjoy school or value it for its own sake, and in the likelihood of believing material possessions to be important in life. Low income children are much more likely to exhibit behavioural problems in terms of hyperactivity, conduct problems and peer relations, including being a victim of bullying, whereas pro-social (cooperative) behaviours and teacher-child relations differ less with family background. Finally there is evidence of marked differences in participation in out-of-school leisure activities such as sports, clubs and classes. Differences in the degree of social grading already provide us with the some indication of the factors that can potentially account for the attainment gaps at 11 shown in Figure 1.1.

Table 4.1. Means of variables, by quintile of socio-economic position

Variable	SEP Q1 (Low)	SEP Q3 (Middle)	SEP Q5 (High)	Gap (High – low)
I. Parental education				
Mother: CSE/none	42.6%	14.4%	2.9%	-39.7 ppt
Mother: Vocational/O-level	47.0%	57.1%	23.7%	-23.3 ppt
Mother: A-level	9.0%	23.8%	34.7%	25.7 ppt
Mother: Degree	1.3%	4.8%	38.7%	37.4 ppt
Father: CSE/none	51.4%	21.7%	3.4%	-48.0 ppt
Father: Vocational/O-level	32.6%	37.9%	18.2%	-14.4 ppt
Father: A-level	14.6%	33.1%	27.4%	12.8 ppt
Father: Degree	1.4%	7.3%	51.0%	49.6 ppt
II. Demographic characteristics				
Female	50.8%	49.8%	48.0%	-2.8 ppt
Non-white	6.4%	2.0%	2.0%	-4.3 ppt
Resident bio father at 7	53.8%	89.5%	96.1%	42.3 ppt
Resident step-father at 7	13.2%	4.3%	2.1%	-11.1 ppt
Single parent at 7	33.0%	6.2%	1.8%	-31.2 ppt
Month of birth (Sept = 0)	5.41	5.60	5.46	0.06 mths
Mother's age at birth: <20	12.2%	2.2%	0.2%	-11.9 ppt
Mother's age at birth: 20-24	33.7%	16.8%	4.8%	-28.8 ppt
Mother's age at birth: 25-29	32.4%	44.7%	33.4%	1.0 ppt
Mother's age at birth: 30-34	15.8%	27.8%	44.5%	28.7 ppt
Mother's age at birth: 35+	5.9%	8.6%	17.0%	11.1 ppt
Firstborn child	37.7%	43.9%	49.6%	11.9 ppt
One older sibling	31.3%	36.0%	36.3%	5.1 ppt
Two older siblings	18.2%	15.1%	11.6%	-6.6 ppt
Three or more older siblings	12.8%	5.0%	2.5%	-10.3 ppt
No younger siblings by age 9	51.4%	48.5%	45.8%	-5.5 ppt
One younger sibling by age 9	36.3%	41.2%	41.7%	5.4 ppt
Two or more younger siblings by age 9	12.3%	10.3%	12.5%	0.2 ppt
Child is twin	2.9%	2.9%	2.4%	-0.5 ppt
English second language at 11	1.0%	0.7%	0.8%	-0.2 ppt
Mother employed at age 4	30.2%	61.6%	62.3%	32.2 ppt
Father employed at age 4	63.7%	95.6%	97.2%	33.5 ppt
Mother's general health at age 4 (scale 1-4)	3.33	3.49	3.54	0.21
Father's general health at age 4 (scale 1-4)	3.33	3.44	3.43	0.10
III. School composition and quality				
Mean pupil Key Stage 1 (std score)	-0.22	0.03	0.23	0.46 sd
Mean pupil value added KS1- KS2 (std score)	-0.01	0.04	0.13	0.14 sd
Proportion pupils FSM	21.0%	10.4%	5.8%	-15.1 ppt
IV. Preschool environments				
Birth weight (kg)	3.34	3.44	3.46	0.11 kg
Gestation < 37 weeks	6.4%	5.4%	4.4%	-1.9 ppt
Breast fed: Never	46.3%	27.3%	10.6%	-35.7 ppt
Breast fed: < 3 mths	24.9%	26.4%	18.0%	-6.9 ppt
Breast fed: 3-6 mths	11.3%	18.0%	18.7%	7.4 ppt
Breast fed: 6 mths +	17.5%	28.3%	52.7%	35.2 ppt
Mother smoked in pregnancy	56.5%	23.2%	10.7%	-45.9 ppt
Mother had post-natal depression	27.3%	12.0%	8.1%	-19.2 ppt
HLE at 3: Lowest quintile	30.6%	19.6%	13.8%	-16.9 ppt

Variable	SEP Q1 (Low)	SEP Q3 (Middle)	SEP Q5 (High)	Gap (High – low)
HLE at 3: Second quintile	23.3%	22.0%	17.3%	-6.0 ppt
HLE at 3: Middle quintile	18.6%	19.6%	19.6%	1.0 ppt
HLE at 3: Fourth quintile	14.0%	19.0%	23.4%	9.4 ppt
HLE at 3: Highest quintile	13.4%	19.8%	25.9%	12.5 ppt
Child read to daily at 3	52.3%	63.7%	71.4%	19.1 ppt
Child has regular sleeping routine at 3	85.2%	91.9%	96.5%	11.3 ppt
Centre-based child care pre-age 3	7.2%	9.8%	24.2%	16.9 ppt
Nursery age 3 to 4	40.4%	35.7%	53.6%	13.2 ppt
V. Parental attitudes, behaviours and beliefs				
Mother's locus of control (scale)	-0.64	0.01	0.61	1.26 sd
Mother found school valuable (scale)	-0.39	-0.01	0.35	0.74 sd
Mother hopes child will get good GCSEs	21.9%	11.3%	1.4%	-20.5 ppt
Mother hopes child will get at least 1 A-level	19.0%	19.0%	6.6%	-12.4 ppt
Mother hopes child will go to university	36.5%	50.2%	80.5%	44.0 ppt
Mother hopes other for child	22.7%	19.5%	11.5%	-11.2 ppt
Mother-child interactions: Education (scale)	0.03	0.02	-0.03	-0.06 sd
Mother-child interactions: Non-educational (scale)	-0.03	0.02	-0.01	0.02 sd
VI. Child's attitudes, behaviour and beliefs				
Ability beliefs (scale)	-0.12	-0.06	0.11	0.24 sd
Locus of control (scale)	-0.31	-0.10	0.28	0.59 sd
Enjoyment of school (intrinsic values, scale)	-0.03	0.00	0.02	0.06 sd
School results important in life (extrinsic values)	50.6%	61.3%	66.6%	16.0 ppt
Hobbies important in life (extrinsic values)	66.6%	75.2%	83.5%	16.9 ppt
Possessions important in life (extrinsic values)	75.0%	76.7%	78.5%	3.6 ppt
Anti-social behaviours (scale)	0.10	-0.01	-0.03	-0.13 sd
Hyperactivity (scale)	0.27	-0.02	-0.16	-0.42 sd
Emotional symptoms (scale)	0.17	-0.02	-0.10	-0.27 sd
Conduct problems (scale)	0.33	-0.04	-0.14	-0.47 sd
Experience of bullying (scale)	0.08	-0.00	-0.06	-0.14 sd
Pro-social behaviours (scale)	-0.04	0.04	-0.05	-0.01 sd
Peer problems (scale)	0.32	-0.04	-0.12	-0.44 sd
Leisure/out-of-school activities (scale)	-0.23	-0.07	0.22	0.45 sd
Teacher-child relations (scale)	-0.04	0.02	0.01	0.05 sd

Full sample contains 7972 observations. Means defined over non-missing responses only. See Table A2.5 for item response rates.

Q1 denotes the lowest SEP quintile, Q2 the second lowest SEP quintile, and so on; HLE denotes the home learning environment index; ppt denotes percentile points; scale denotes the average of a number of standardized item scores; std score denotes a variable standardized to mean 0, standard deviation 1 on the maximum available sample; sd denotes standard deviations. See Appendix 2 for further details.

5. Explaining between-group differences in educational outcomes at 11

- Lack of economic resources is not the only thing that matters for disadvantaged children. Together the levels of parental education, demographic characteristics like family size and structure, and the characteristics of the schools attended by the poorest fifth can explain 60 to 70% of their educational deficits at Key Stage 2.
- The attitudes and behaviours of parents and children still have a role to play in accounting for the gaps that remain unexplained. Together they increase the proportion of the deficits accounted for to 75 to 80%. This calculation understates their true importance because part of the baseline influence of family and school characteristics operates via their association with attitudes, behaviours and beliefs.
- Measures of parents' attitudes and behaviours are related to those of their children, but both have independent predictive power in explaining the socio-economic achievement gap.
- Much of the educational under-performance of disadvantaged children is already manifest in Key Stage 1 scores at the age of 7. Nevertheless, our estimates imply that over a third of the gap between the richest and poorest children at age 11 emerges after the age of 7.
- Socio-economic differences in most of the factors we consider are related both age 7 achievement and progress between the ages of 7 and 11. Parental and child attitudes and beliefs are more important in explaining attainment gaps between the poorest and most affluent families than between the poorest and middle income children.
- Other inequalities besides those associated with socio-economic position are apparent in Key Stage 2 outcomes. Differences in achievement associated with parental education are as large or larger than those associated with SEP, and also widen over the period. However, some gaps narrow between 7 and 11 (such as those associated with gender and month of birth).

5.1 Socio-economic differences in educational achievement at 11

Section 4 explored the raw differences in factors that potentially explain, or mediate, the observed relationship between SEP and Key Stage 2 outcomes. In order for any of these factors to play a substantial explanatory role, it is necessary not only that they are socially graded, but also that they are associated with real differences in academic attainment. Conceptually, there are two ways that we can explore this. On one hand, we can include every

variable in the model simultaneously, and allow each to ‘compete’ for explanatory power. The coefficient on an individual variable is then the ‘direct’ effect of that factor, controlling for as many confounding biases as possible. This approach, which we take in Section 6, provides a stringent test of which of the many related factors shown in Table 4.1 are significant predictors of educational performance.

A drawback to this approach is that it obscures the fact that some factors may have ‘indirect’ effects on the outcome, i.e. effects that operate via their influence on other intermediate variables that are also included in the model. For example, parental aspirations may affect educational outcomes because they shape the child’s own attitudes and aspirations. When these child-level factors are included as regressors, the coefficient on parental aspirations may become insignificant. It would be wrong to conclude, however, that parental aspirations do not significantly influence academic performance. Furthermore, many of our variables are highly correlated with one another. This means that a focus on the significance of a single variable, holding all else constant, may not be a good representation of the patterns of variation observed in the real world.

In this section, we focus on broad groupings of potential influences, rather than individual variables. We add groups of controls to the model sequentially, and explore how far the SEP gradient can be accounted for by the joint contribution of the factors in each group. The values of the SEP coefficients when a given set of controls are included have the interpretation of the remaining gap in outcomes after SEP differences in those factors are adjusted for. Under the assumption that the estimated effects are causal (which is unlikely to be the case in reality) we would say that they are the gaps that would remain if socio-economic differences in the included factors were eliminated. If we can drive the residual gaps down to zero then we have fully explained the observed socio-economic differences in the outcome.

Table 5.1 (and Figures 5.1) focus on the SEP gradients in the levels model (without holding constant Key Stage 1 scores) as groups of controls are added. We again highlight the middle-bottom and top-bottom quintile gaps as summary measures of educational inequality at 11. Column 1 of Table 5.1 shows the differences we observe with no additional controls in the model – the estimates correspond to the gradients shown in the left panel of Figure 1.1. Children in the bottom quintile score on average about 14 percentile points lower than middle quintile children and 31 points lower than the best off quintile.

Column 2 introduces controls for parental education. This is clearly a factor that is strongly independently associated with outcomes at 11 as the ‘partial’ gaps fall to roughly three-fifths of the baseline in the case of the middle-bottom comparison, and to around half the baseline in the case of the top-bottom comparison. The inclusion of demographic characteristics such as family size and structure (column 3) and school characteristics (column 4) reduce the remaining socio-economic gaps by around 10 percentage points each, such that we have now eliminated 60 percent or more of the raw socio-economic gaps.

The specifications shown in column 4 control for a rich set of ‘distal’ characteristics – variables that capture structural features of the homes and schools in which children are raised. Socio-economic differences in these types of factors can account for a large proportion of the attainment gap at 11. Conceptually, however, we hypothesise that these characteristics impact on children via their influence on more ‘proximal’ factors, or the attitudes, behaviours and beliefs that causally affect children’s cognitive development and test performance. Column 5 adds in controls for parental influences, both in the preschool period and during the primary school years. If our hypothesis is correct that these influences are shaped in part by distal characteristics, then to some extent their mediating role will already have been picked up in column 4. The test in column 5 is whether variation in parenting behaviour and style has any additional explanatory power, beyond that which would be predicted by the included distal characteristics. The results show that this is indeed the case – these variables together can account for an additional 12 to 13 percentage points of the raw SEP gaps.

Column 6 drops the parental variables and replaces them with the set of controls for children’s attitudes, behaviours and beliefs. This allows us to contrast which of the two groups – parental or child variables – are relatively most powerful in accounting for attainment and the social gradients. Since we hypothesise that parents’ views and actions will influence their children’s perceptions, the simple addition of the child variables to column 5 may understate their impact, as they could effectively displace the parental factors that are already held constant. The results show that the child variables are slightly less powerful than the parental variables in that they reduce the remaining the SEP gaps by a smaller amount. Note however, that the child variables increase the adjusted R-squared of the regression by a greater amount than the parental variables (by 0.13 rather than 0.06). This suggests that our measures of child attitudes and behaviours at age 8 to 9 are relatively better at predicting educational success than the parental measures, but they are less socially graded, and so do

not account for more of the socio-economic attainment gaps. We will return to this in section 6.

The final column in Table 5.1 includes all the variables (apart from prior attainment) in our model simultaneously. In total we can explain over 75% of the SEP differences in level outcomes at age 11. These estimates show that, although parental and child variables can explain similar proportions of the SEP gaps, they are not simply measuring the same thing. The inclusion of both groups simultaneously drives down the SEP coefficients by more than the inclusion of either group on its own, and similarly results in a higher adjusted R-squared than either of the two more restricted models. This implies that measured parental attitudes and beliefs are associated to some degree with children’s attitudes, but that they also have an independent association with outcomes that is not captured by any of the pathways specified in the model.

Table 5.1. Socio-economic gaps in Key Stage 2 scores, conditional on successive groups of controls

Variable (Lowest SEP quintile omitted)	Regression coefficients						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Middle SEP quintile <i>As % of column (1)</i>	14.3*** 100%	8.7*** 61%	7.3*** 51%	5.9*** 41%	4.0*** 28%	4.3*** 30%	3.4*** 24%
Top SEP quintile <i>As % of column (1)</i>	31.3*** 100%	15.1*** 48%	12.9*** 41%	9.8*** 31%	5.8*** 19%	6.6*** 21%	4.5*** 14%
Observations	7972	7972	7972	7972	7972	7972	7972
Adjusted R-squared	0.136	0.205	0.240	0.275	0.340	0.405	0.439
Controls:							
Parental education		√	√	√	√	√	√
Demographic characteristics			√	√	√	√	√
School composition and quality				√	√	√	√
Parental attitudes and behaviours					√		√
Child attitudes and behaviours						√	√

Regressions also contain dummy variables for the second and fourth SEP quintiles (not shown). ***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

Figure 5.1. Socio-economic gaps in Key Stage 2 scores, conditional on successive groups of controls

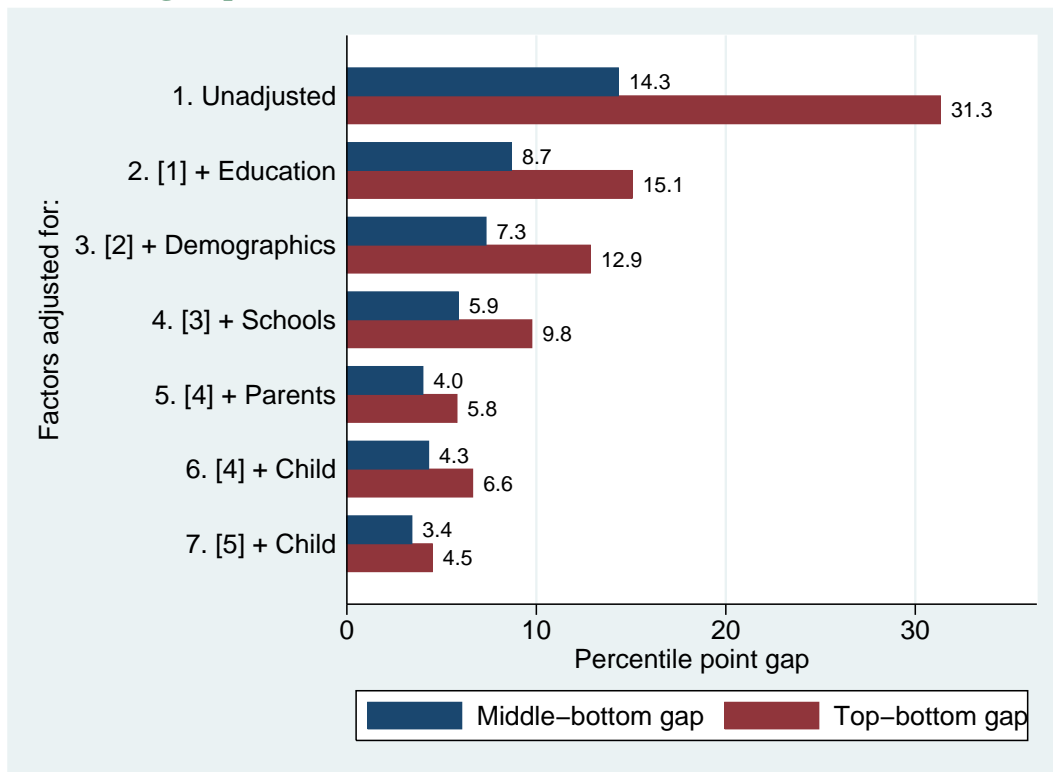


Table 5.2 (and Figures 5.2) shows results for the same models as Table 5.1, but in this case for the value-added model (holding constant prior achievement at Key Stage 1). As shown in the right panel of Figure 1.1, the addition of the Key Stage 1 control in the unconditional model (Column 1) reduces the middle-bottom gap from 14 to 4 points and the top-bottom gap from 31 to 11 points. Conditioning on age 7 attainment increases the proportion of the variance in Key Stage 2 that is explained by the model from 0.14 to 0.62. There is clearly very strong persistence in children’s performance across the four year period. Nevertheless, our estimates imply that a child of average ability at age 7 in the lowest socio-economic quintile will fall 11 points behind an child of the same ability in the richest quintile by age 11. Hence there are non-trivial differences in progress to be explained.

Column 2 shows that differences in progress between parental education groups account for a nearly half or more of these differential trajectories, whereas differences related to demographic characteristics (Column 3) play virtually no additional role. The quality and composition of schools attended by the richest children appear to help them to progress somewhat faster still (Column 4), although this is not the case for middle-income children.

In common with the results for the levels model shown in Table 5.1, both parental attitudes and behaviours and child attitude and behaviours independently account for further portions of the socio-economic gaps in progress between 7 and 11 (Columns 5 and 6). And again, the parental behaviours are the relatively more powerful of the two groups. However, in the value-added specification, the addition of the child-level variables to a model that already contains the parental variables (moving from Columns 5 to 7) has only a small impact on the remaining socio-economic gradients. This implies that the parental attitudes and behaviours that matter for performance at 11 are less strongly related to age 7 achievement than are children’s own attitudes and behaviours at age 8 to 9.

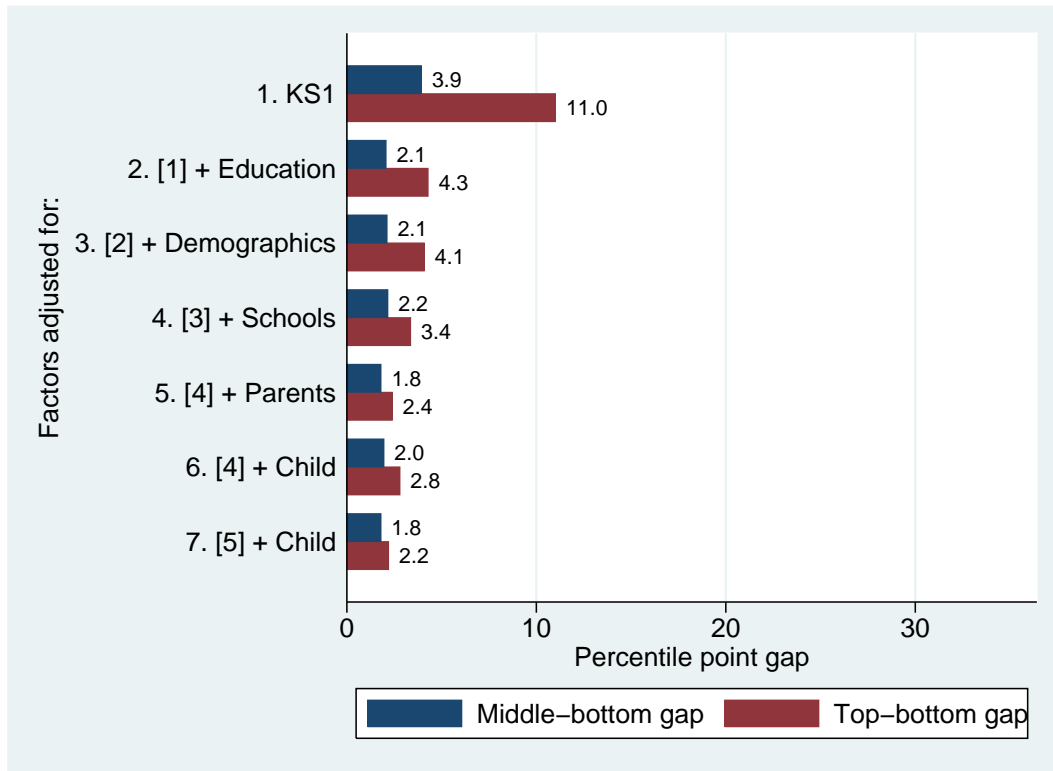
Finally, we note that our fully controlled model in Column 7 explains virtually all the gap in value-added between the middle and top quintiles (the unexplained difference is only $2.2 - 1.8 = 0.4$ percentile points). Factors that we cannot account for, however, still lead children in the lowest quintile to fall around 2 percentile points behind the rest.

Table 5.2. Socio-economic gaps in Key Stage 2 scores, conditional on Key Stage 1 and successive groups of controls

Variable (Lowest SEP quintile omitted)	Regression coefficients						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Middle SEP quintile <i>As % of column (1)</i>	3.9*** 100%	2.1*** 53%	2.1*** 54%	2.2*** 55%	1.8*** 46%	2.0*** 50%	1.8*** 46%
Top SEP quintile <i>As % of column (1)</i>	11.0*** 100%	4.3*** 39%	4.1*** 37%	3.4*** 31%	2.4*** 22%	2.8*** 25%	2.2*** 20%
Observations	7972	7972	7972	7972	7972	7972	7972
Adjusted R-squared	0.617	0.632	0.637	0.68	0.687	0.698	0.703
Controls:							
Key Stage 1	√	√	√	√	√	√	√
Parental education		√	√	√	√	√	√
Demographic characteristics			√	√	√	√	√
School composition and quality				√	√	√	√
Parental attitudes and behaviours					√		√
Child attitudes and behaviours						√	√

Regressions also contain dummy variables for the second and fourth SEP quintiles (not shown). ***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

Figure 5.2. Socio-economic gaps in Key Stage 2 scores, conditional on Key Stage 1 and successive groups of controls



5.2 Other between-group differences in educational achievement at 11

Tables 5.3 and 5.4 explore whether the effects of other distal characteristics besides SEP are mediated by attitudes, behaviours and beliefs. Table 5.3 focuses on the levels model (without the Key Stage 1 control), with Columns 1 to 5 giving further details of the specifications first shown in Columns 3 to 7 of Table 5.1. The aim is to explore the extent to which the proximal variables also mediate dimensions of social disadvantage other than socio-economic position.

The gradients in terms of both mother’s and father’s education are as large as or larger than the SEP gradients. Column 1 implies that a child whose parents both have degrees and who is in the top SEP quintile scores $12.9+18.4+14.7 = 46.0$ percentile points higher on average than a child in the bottom SEP quintile whose parents have no qualifications. This is a very large difference. Column 2 introduces controls for school characteristics. The change in the coefficients compared with column 1 gives an indication of how far the effect of each characteristic is explained by its association with attendance at a good school. There is some small indication that parental education and SEP are mediated by school choice, but it is

perhaps surprising that the coefficients on these variables do not fall by more. A comparison of columns 3 and 4 shows that parental and child attitudes and behaviours are both mediators of parental education (in that the coefficients fall), but the child variables are somewhat less powerful, particularly with respect to maternal education. Overall the additional variables in the model can account for around half of the parental education effects (Column 5).

Girls tend to score slightly better than boys at Key Stage 2 (Column 1), and this is entirely explained by their relatively positive attitudes and behaviours at age 8 to 9 (Column 4). We find no significant ethnic differences in performance at 11 in the baseline model in Column 1, although the non-White coefficient becomes significantly negative after controlling for parental and child attitudes and behaviours (Column 5). This implies that the ethnic minorities in our sample have relatively positive attributes along these dimensions compared with Whites, and that these attributes help to off-set other ethnic-specific disadvantages. It must be noted, however, that non-White children make up only 3% of our sample. The 1% of sample children with English as an additional language (EAL), in contrast, tend to do somewhat better than the average, and school quality seems important here.

We find little evidence that the outcomes of children in single parent or step families differ from those in intact couple families. The significant positive effect of single parenthood that emerges when children's attitudes and behaviours are held constant (column 4) implies that children of lone mothers tend to have relatively adverse characteristics along this dimension. Children who are younger within their year group because of their month of birth, however, score 1.2 percentile points lower for every additional month, a large difference of, for example, 7.2 percentile points between children born in July and those born in January.

The children of mothers who were younger at the time of the birth perform somewhat more poorly than the children of older mothers. The attitudes and behaviour of the children of older mothers help to account for this association. However, the gaps between young mothers and the more typical mother aged 25-29 are more influenced by the child-level rather than the parental-level variables included in our models (Column 3 versus Column 4).

Birth order differences – at least when we look at older siblings – are large, with first born children performing significantly better than those born second or more. The results suggest this is a birth order effect, rather than an effect of family size in general, as the presence of

younger siblings or a twin has little association with the outcome. The penalties associated with lower birth order are little affected by the inclusion of any of our groups of controls.

Maternal and paternal employment at age 4 have opposing associations with Key Stage 2 scores⁵. 58% of mothers were employed when the child was 4, and children of these mothers do slightly worse, all else equal, than the children of stay-at-home mothers. However, it is paternal *unemployment* at that age – which affected 8% of children in couple households – that is associated with adverse outcomes at 11. Neither of these associations can be explained by the mediating factors measured in our models. Maternal and paternal health measures at age 4 have only small and counter-intuitive associations with educational outcomes seven years later.

School peer composition and average value-added are strongly associated with individual performance on 11. However, we find little evidence that they impact on individual outcomes via their association with parent or child attitudes and behaviours, as the estimated effects change only slightly between Columns 2 and 5. Hence we find little support for the idea that the measured effect of school characteristics is in fact picking up differences in terms of parental motivation and interest, rather than the influence of the school environment itself.

⁵ Age 4 was the latest date at which parental employment data were available at the time this study was undertaken.

Table 5.3. Other group differences in Key Stage 2 scores, conditional on successive groups of controls

Variable	Regression coefficients				
	(1) No additional controls	(2) (1) + School variables	(3) (2) + Parent variables	(4) (2) + Child variables	(5) All controls
SEP quintile 1			Omitted		
SEP quintile 2	4.4***	3.1***	2.3**	2.5***	2.2**
SEP quintile 3	7.3***	5.9***	4.0***	4.3***	3.4***
SEP quintile 4	9.9***	7.5***	4.7***	5.1***	3.7***
SEP quintile 5	12.9***	9.8***	5.8***	6.6***	4.5***
Mother: CSE/none			Omitted		
Mother: Vocational/O-level	6.1***	5.3***	3.3***	4.3***	3.2***
Mother: A-level	11.7***	10.3***	6.2***	7.6***	5.4***
Mother: Degree	18.4***	16.5***	10.4***	12.2***	8.8***
Father: CSE/none			Omitted		
Father: Vocational/O-level	5.9***	5.3***	4.1***	4.3***	3.5***
Father: A-level	8.0***	7.1***	5.5***	5.8***	4.8***
Father: Degree	14.7***	12.8***	9.2***	9.9***	7.7***
Female	2.3***	2.2***	2.0***	0.1	0.1
Non-white	0.2	-0.2	-1.5	-2.1	-3.1**
Resident bio father at 7			Omitted		
Resident step-father at 7	-1.8	-1.8	-2.1	0	-0.6
Single parent at 7	1.4	1	0	2.3**	1.4
Month of birth (Sept = 0)	-1.2***	-1.2***	-1.1***	-1.0***	-1.0***
Mother's age at birth: <20	-2.6	-2.2	-1.9	-1.6	-1.6
Mother's age at birth: 20-24	-2.2**	-1.9**	-1.8**	-1	-1.2
Mother's age at birth: 25-29			Omitted		
Mother's age at birth: 30-34	1.2*	0.7	-0.3	0.1	-0.4
Mother's age at birth: 35+	3.0***	2.5**	1.1	1	0.3
First born child			Omitted		
One older sibling	-3.3***	-3.2***	-3.3***	-2.6***	-2.9***
Two older siblings	-6.6***	-6.1***	-5.6***	-5.6***	-5.4***
Three or more older siblings	-6.4***	-5.9***	-4.9***	-5.4***	-5.2***
0 younger siblings by age 9			Omitted		
1 younger sibling by age 9	-0.3	-0.5	-0.9	-0.8	-0.9
2+ younger siblings by age 9	-0.6	-0.7	-1.4	-1.4	-1.6*
Child is twin	-1.9	-2.6	-0.3	-2.1	-0.7
English second language at 11	7.0*	4.2	3.4	4.9	4
Mother employed at age 4	-1.1*	-1.2*	-1.3**	-0.9	-1.0*
Father employed at age 4	3.3***	2.9**	2.8**	2.8***	2.7***
Mother's health at age 4 (scale 1-4)	0.3	0	-0.5	-1.1**	-1.1**

Variable	Regression coefficients				
	(1) No additional controls	(2) (1) + School variables	(3) (2) + Parent variables	(4) (2) + Child variables	(5) All controls
Father's health at age 4 (scale 1-4)	-1.0*	-0.9*	-0.8	-1.5***	-1.3***
Mean pupil Key Stage 1 (std score)	-	8.6***	7.0***	7.9***	6.9***
Mean pupil value added KS1-2 (std sc)	-	21.9***	20.4***	21.2***	20.2***
Proportion pupils FSM	-	6.2*	5.1	8.5**	7.2**
Observations	7972	7972	7972	7972	7972
Adjusted R-squared	0.240	0.275	0.34	0.405	0.439

***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

Table 5.4 shows the results when Key Stage 1 is included as a control in all models. Many of the coefficients – for example on parental education – show the same patterns as in Table 5.3, but are attenuated in size. This implies that part of the association shown in the levels models reflects the higher prior attainment of those with positive family characteristics, but that such characteristics are also associated with progress between 7 and 11. It is this progress since age 7 that we wish to focus on here and is the main focus of the study.

We find evidence of ‘catch-up’ between the ages of 7 and 11 for a number of population sub-groups. Catch-up is indicated when a coefficient differs in sign after the inclusion of age 7 attainment: for example, girls score better than boys at Key Stage 2 according to Table 5.3, but when Key Stage 1 is held constant in Table 5.4 the coefficient on girl becomes negative. Given their higher initial performance, girls do not progress as fast as boys over the period, even though their scores remain higher, on average, at age 11. We also find evidence that gaps narrow for children who are relatively young within their year group because of month of birth between 7 and 11. The positive coefficients on single parenthood in Table 5.4 also suggest a catching up of children in this group. Although children of single parents do not perform differently, on average, than children from other family types at age 11, they do appear to have progressed faster over the preceding four years, implying that there was a gap at Key Stage 1 that has closed by Key Stage 2.

Table 5.4. Other group differences in Key Stage 2 scores, conditional on Key Stage 1 and successive groups of controls

Variable	Regression coefficients				
	(1) + KS1	(2) (1)+ School variables	(3) (2)+ Parent variables	(4) (2)+ Child variables	(5) All controls
SEP quintile 1			Omitted		
SEP quintile 2	1.3*	1.2*	1.1*	1.2*	1.1*
SEP quintile 3	2.1***	2.2***	1.8***	2.0***	1.8***
SEP quintile 4	3.4***	2.9***	2.3***	2.5***	2.1***
SEP quintile 5	4.1***	3.4***	2.4***	2.8***	2.2***
Mother: CSE/none			Omitted		
Mother: Vocational/O-level	1.6***	1.1**	0.6	1.0**	0.7
Mother: A-level	5.1***	4.0***	2.7***	3.4***	2.6***
Mother: Degree	8.9***	7.0***	5.1***	6.0***	4.7***
Father: CSE/none			Omitted		
Father: Vocational/O-level	2.3***	1.9***	1.7***	1.8***	1.6***
Father: A-level	3.2***	2.7***	2.4***	2.5***	2.2***
Father: Degree	6.0***	4.7***	3.8***	4.1***	3.4***
Female	-3.2***	-3.4***	-3.3***	-3.4***	-3.3***
Non-white	-0.1	-1.3	-1.9*	-2.1**	-2.6**
Resident bio father at 7			Omitted		
Resident step-father at 7	0.5	0.5	0.3	0.9	0.7
Single parent at 7	2.2***	2.1***	1.8**	2.5***	2.2***
Month of birth (Sept = 0)	0.1**	0.2***	0.2***	0.1**	0.1*
Mother's age at birth: <20	0.6	0.3	0.3	0.4	0.3
Mother's age at birth: 20-24	-0.9	-1.2**	-1.2**	-0.9	-0.9
Mother's age at birth: 25-29			Omitted		
Mother's age at birth: 30-34	0.7	0.7	0.3	0.5	0.2
Mother's age at birth: 35+	1.9***	1.7***	1.3*	1.2*	0.9
First born child			Omitted		
One older sibling	-1.2**	-1.3**	-1.5***	-1.1**	-1.4***
Two older siblings	-2.5***	-2.1***	-2.3***	-2.3***	-2.5***
Three or more older siblings	-1.5	-1.2	-1.4	-1.5	-1.8*
0 younger siblings by age 9			Omitted		
1 younger sibling by age 9	-0.1	-0.2	-0.4	-0.3	-0.4
2 or more younger siblings by age 9	0.2	0.0	-0.3	-0.1	-0.3
Child is twin	1.2	0.6	1.1	0.8	1.1
English second language at 11	5.1**	2.4	2.1	2.9	2.5

Variable	Regression coefficients				
	(1) + KS1	(2) (1)+ School variables	(3) (2)+ Parent variables	(4) (2)+ Child variables	(5) All controls
Mother employed at age 4	-0.5	-0.8*	-0.8*	-0.7*	-0.7*
Father employed at age 4	1	0.9	0.9	1	1
Mother's health at age 4 (scale 1-4)	0.1	-0.2	-0.2	-0.6*	-0.5
Father's health at age 4 (scale 1-4)	-0.5	-0.4	-0.3	-0.6	-0.5
Mean pupil Key Stage 1 (std score)	-	-3.8***	-3.9***	-3.2***	-3.2***
Mean pupil value added KS1-2 (std sc)	-	26.8***	26.0***	26.1***	25.5***
Proportion pupils FSM	-	1.2	0.9	3.1	2.7
Observations	7972	7972	7972	7972	7972
Adjusted R-squared	0.637	0.68	0.687	0.698	0.703

***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

This section allowed us to assess how far the attitudes and beliefs of parents and children mediate a large number of other aspects of family background over and above socio-economic position. With the marked exception of the gaps associated with parental education, parental and child attitudes and beliefs have relatively little role to play in explaining other sub-group differences in children's educational progress through the primary years. A child of a degree-educated mother and father, however, is predicted to score 15 points higher at age 11 than a child of parents with no qualifications, given the same starting attainment at age 7 and other aspects of family circumstances. School quality (as measured, for example, by value added) accounts for 3 points of this, but parent and child attitudes account for a further 3.6 points. So parental and child attitudes and beliefs make a substantial contribution to the transmission of poor socio-economic position and low parental education into poor educational development. However, we have not explored how important these attitudes and beliefs are in educational attainment in their own right and which measures are doing the heavy lifting. We turn to this in Chapter 6.

6. The role of specific attitudes, behaviours and beliefs

- The adverse attitudes to education of disadvantaged mothers are one of the single most important factors associated with the children's deficits at age 11. In particular, 9-year-olds whose mothers hope they will go to university score 13.7 percentile points higher at Key Stage 2 than those whose mothers hoped for only good GCSEs. Our results imply that even if we take two children with the same Key Stage 1 score (and all other observable characteristics) the child of the parent with the highest aspirations will score 5.7 percentile points higher than the child of the parent with the lowest aspirations. This factor alone explains 19% of the test score gap between the richest and poorest children at 11, and 16% of the widening gap between the ages of 7 and 11.
- The greater behavioural problems of disadvantaged children are the second key factor in accounting for their poorer educational outcomes. We find evidence children with high levels of anti-social behaviours, hyperactivity and conduct problems at the ages of 8 to 9 scored lower at Key Stage 1, but even taking this into account, such behaviours appear to interfere with the learning process between 7 and 11. Other types of behaviour problems do not appear to play the same role. Children who exhibit high levels of emotional symptoms (such as depression and anxiety) and more self-contained solitary children perform as well as, or better than, children without these characteristics.
- Although parental aspirations and behaviour problems are of key importance, a whole range of adverse attitudes, behaviours and beliefs contribute to the educational deficits of low income children. Other factors we identify as important are the lack of a sense of personal efficacy (both of mothers and their children), and the view that school results are not important in life.

In this chapter we shift the focus from the broad groups of factors that explain the educational deficits of disadvantaged children, and explore the relative importance of specific attitudes, behaviours and beliefs. The explanatory power of a given variable depends on two associations: the extent to which it varies by socio-economic group, and the extent to which it independently predicts educational outcomes. In Chapter 4 we explored the first of these two stages, and concluded that factors that vary little with socio-economic position – such as parent-child interactions at age 9 – cannot play an important role in generating the social gradient in outcomes. This does not imply, however, that such factors are not consequential for educational achievement in general. Equally, a factor may be strongly socially graded but

if it has little association with outcomes its role in explaining the gradient will be small. In the search for the key attitudes and behaviours that drive the observed SEP gaps, we need to identify factors that are both concentrated in disadvantaged families, and that strongly interfere with the development of children's learning. Chapter 5 explored how adding groups of variables reflecting how schools, as well as parents' and children's attitudes and beliefs, contributed to the mediation of the effects of socio-economic position and parental education. These analyses, however, do not show how important attitudes and behaviours are to attainment overall, but only how they mediate family background. Nor do these broad analyses identify which aspects of our range of measures of parent and child behaviours and beliefs contribute most to the transmission of socio-economic position.

In Section 6.1 we focus on the relationship between behaviours and educational attainment in a fully conditioned model. This provides estimates of the direct effects of each of the individual variables over and above other aspects of family background. We step back from the question of socio-economic gradients in this section, and explore the association of each of our proximal variables with test scores for the sample as whole. In Section 6.2 we combine information from the fully conditioned model with the information on social grading from Chapter 4 to provide estimates of the independent contribution of each variable to the socio-economic attainment gaps at 11.

6.1 The conditional association of different attitudes, behaviours and beliefs with Key Stage 2 scores

In this section we explore the direct link between parental and child attitudes and beliefs and educational attainment and progress in the primary school years. We do this in two models (levels and value-added), reporting the marginal association of each individual measure of attitudes and behaviours with Key Stage 2, given all other aspects of family background. This analysis allows us to identify factors that are not, or only weakly, socially graded but that may nevertheless be consequential for educational achievement.

Table 6.1 shows selected coefficients from two fully-controlled regression models of Key Stage 2, with the sole difference between the two the inclusion of Key Stage 1 control in Column 2. Both models include controls for SEP quintile, parental education, and demographic and school characteristics. The coefficients on these variables from the identical regressions are shown in Tables 5.3 and 5.4 (Column 5 in each case) and discussed in Chapter 5, but here the focus is on attitudes and behaviours rather than family background

characteristics. Column 1 explores attainment at age 11, whilst column 2 explores progress between 7 and 11, as the Key Stage 1 control is used to hold attainment at 7 constant.

Looking first at the influence of preschool environments, we find significant associations of the expected sign between Key Stage 2 and birth weight and gestation, breastfeeding, and the home learning environment at 3, which is notable given the rich set of other controls included in the model. Birth weight and the preschool learning environment become insignificant when Key Stage 1 is added to the model, implying that their influence on academic ability is fully apparent by age 7. In contrast the effects of breast feeding for 6 months or longer appear only to emerge between 7 and 11. Since breast feeding for shorter durations has no effect, this is perhaps capturing effects of the mother's parenting knowledge and beliefs, or mother-child bonding, rather than a physiological influence.

Two 'perverse' results are the positive association of prenatal smoking and the negative association of reading to the child daily at age 3 with Key Stage 2. Both of these factors appear uncorrelated with Key Stage 1 as the associations remain strong when prior ability is controlled. We cannot say conclusively why these patterns arise, but it perhaps an illustration of the dangers of an 'over-controlled model', where strong co-linearities between the covariates result in the identification of individual marginal effects from rare and unrepresentative observations. The method used in our previous analysis of sequentially adding groups of controls to the model, and focusing on their combined influence on the SEP coefficients only, is designed to avoid this problem of interpretation.

Looking next at maternal attitudes and behaviours during primary school, we see that maternal locus of control is a significant predictor of age 11 outcomes, because it is associated both with higher ability at 7 and faster progress between 7 and 11. The magnitude of the association between maternal aspirations and child outcomes is, however, far more dramatic. Holding all else constant, children of mothers who hope they will go to university score 13.7 percentile points higher at Key Stage 2 than children of mothers who want them to get good GCSEs then leave. Compare this with the gap of 4.5 between the lowest and the highest SEP quintiles, and the gap of 8.8 between having a mother with no qualifications and a mother with a degree (Column 5, Table 5.3). More than half of the effect of maternal aspirations is absorbed when we control for Key Stage 1, but aspirations remain one of the biggest single predictors of progress between 7 and 11. It is not the case, then, that maternal aspirations simply reflect the child's revealed level of ability from school tests two years previously, although they are related. These findings are particularly strong given that they

are direct effects, that is, net of any indirect effects on outcomes via children's own attitudes and behaviours.

Virtually all of our variables capturing children's attitudes, behaviours and beliefs have independent, statistically significant, if modest associations with Key Stage 2 outcomes. Children's beliefs in their own scholastic ability and their locus of control are associated partly with faster progress between 7 and 11, but also reflect higher ability as measured at age 7. This may be because educational success promotes positive attitudes, but it may also be that positive attitudes begin earlier in life, and that this in part determines attainment at 7. A positive intrinsic valuation or enjoyment of school is also associated with higher scores at 11, but this effect is entirely explained by the higher prior achievement of children with positive valuations of school. Extrinsic values, however, or beliefs that something is important in life, continue to influence learning after the age of 7. Children who believe that school results or hobbies and interests are important in life score better at both ages, while those that believe material possessions to be important tend to fall behind. We find further evidence that hobbies and interests are associated with educational achievement as the frequency of participation in leisure activities (such as sports, singing/drama lessons and groups such as Scouts) is a significant predictor of the outcome, although again only because it is positively correlated with prior achievement.

Children's social and behavioural skills are indeed key factors explaining educational success. Hyperactivity or attention problems are particularly associated with adverse outcomes, as are conduct problems and anti-social behaviours (fighting, stealing, substance abuse, etc). In all these cases controlling for prior attainment does not eliminate the effect, which would appear to be evidence against a hypothesis that they are simply correlated with low cognitive ability. Instead our results provide support for the idea that behavioural difficulties interfere with the learning process over the course of primary school and lead to under-performance at age 11. Interestingly, we find no association between emotional symptoms (which relate more to depression, anxiety and internalising behaviours) and performance at either 7 or 11. And pro-social and peer relations have the opposite effects than expected. Children who exhibit strongly pro-social behaviours (e.g. volunteering to help others, sharing readily with other children) and also those who experience fewer problems with peers (e.g. tending to be liked by other children and spending time with them) score worse at Key Stage 1 and progress more slowly thereafter than more self-contained solitary children. These results are interesting because they highlight that different types of social and behavioural problems differ strongly in their association with educational performance.

Overall it is worth noting that the fit of these models is high, especially when age 7 attainment is included. In the model for age 11 attainment just under half the total variance is explained, and included lagged age 7 attainment raises this to 70%. This suggests that given the obvious measurement problems for many of the concepts being discussed here, the models being described do capture to a large degree of the variance in child attainment.

Table 6.1. Estimated effects of attitudes, behaviours and beliefs on Key Stage 2 scores

Variable	Regression coefficient	
	(1) Without KS1 control	(2) With KS1 control
Pre-school environments		
Birth weight (kg)	2.0***	0.5
Gestation < 37 weeks	2.0*	1.5*
Breast fed: Never		Omitted
Breast fed: < 3 mths	0.1	0.1
Breast fed: 3-6 mths	0.8	0.9
Breast fed: 6 mths +	1.9***	1.9***
Mother smoked in pregnancy	1.3**	0.9*
Mother had post-natal depression	0.5	0.5
HLE at 3: Lowest quintile		Omitted
HLE at 3: Second quintile	1.3*	-0.2
HLE at 3: Middle quintile	4.1***	0.7
HLE at 3: Fourth quintile	4.6***	0.2
HLE at 3: Highest quintile	5.2***	0.4
Child read to daily at 3	-2.2***	-1.4***
Child has regular sleeping routine at 3	0.8	0
Centre-based child care pre-age 3	-0.3	-0.3
Nursery age 3 to 4	-0.3	-0.5
Parental attitudes, behaviours and beliefs		
Mother's locus of control (scale)	1.1***	0.5**
Mother found school valuable (scale)	0.2	0.2
Mother hopes child will get good GCSEs		Omitted
Mother hopes child will get at least 1 A-level	8.3***	3.3***
Mother hopes child will go to university	13.7***	5.7***
Mother hopes other for child	6.7***	3.0***

Variable	Regression coefficient	
	(1) Without KS1 control	(2) With KS1 control
Mother-child interactions: Education (scale)	-4.7***	-0.8**
Mother-child interactions: Non-educational (scale)	-1.4**	-1.0**
Child's attitudes, behaviour and beliefs		
Ability beliefs (scale)	3.4***	1.3***
Locus of control (scale)	4.0***	2.2***
Enjoyment of school (intrinsic values, scale)	2.0***	0.3
School results important in life (extrinsic values)	6.1***	2.0***
Hobbies/interests important in life (extrinsic values)	1.9***	1.3***
Material possessions important in life (extrinsic values)	-3.1***	-2.1***
Anti-social behaviours (scale)	-3.6***	-1.5***
Hyperactivity (scale)	-4.5***	-1.5***
Emotional symptoms (scale)	0	-0.1
Conduct problems (scale)	-1.3***	-0.9***
Experience of bullying (scale)	-1.4**	-1.1***
Pro-social behaviours (scale)	-1.8***	-0.8***
Peer problems (scale)	0.7**	0.5**
Participation in leisure/out-of-school activities (scale)	2.3***	0.7
Teacher-child relations (scale)	-0.1	-0.4
Observations	7972	7972
Adjusted R-squared	0.439	0.703

Both regressions include controls for SEP, parental education, demographic and school characteristics. See Tables 5.2 (Column 5) and 5.3 (Column 5) for coefficients on these variables. Regressions also include controls for missing values on covariates.

***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

6.2 Individual variable contributions to the socio-economic gradient in educational achievement at 11

Table 6.1 tells us about the strength of the association between individual mediating variables and the outcome of interest. As we saw in Table 4.1, however, each variable differs in the strength of its association with SEP, and hence in how much it matters in terms of explaining the attainment gap. Next we can combine the two pieces of information to provide a summary measure of the relative importance of each factor in accounting for the attainment gaps.

Formally, we can break down the SEP gaps according to the following method. First, we estimate the fully controlled models shown in Tables 5.3 and 5.4 (Column 5 in each) and Table 6.1:

$$KS2_i = \sum_{q=2}^5 \gamma_q (1 | SEP_i = q) + \sum_j X_{ij} \beta_j + \mu_i \quad (1a)$$

$$KS2_i = \sum_{q=2}^5 \gamma_q^V (1 | SEP_i = q) + \sum_j X_{ij} \beta_j^V + \rho^V KS1_i + \mu_i^V \quad (1b)$$

Equation 1b is the value-added model because it contains a control for Key Stage 1. X_{ij} is the value of the j th mediating variable for individual i , $KS1_i$ is the individual's Key Stage 1 score, and $(1 | SEP_i = q)$ is an indicator variable equal to 1 if the observation is in the q th SEP quintile. The error terms μ_i and μ_i^V are treated as uncorrelated with the included regressors (the Ordinary Least Squares regression assumption).

Next we regress each of the individual mediating variables on the SEP quintile dummies, again in a levels and value-added specification.

$$X_{ij} = \sum_{q=2}^5 \lambda_{qj} (1 | SEP_i = q) + \nu_{ij} \quad (2a)$$

$$X_{ij} = \sum_{q=2}^5 \lambda_{qj}^V (1 | SEP_i = q) + \pi_j^V KS1_i + v_{ij}^V \quad (2b)$$

The error terms v_{ij} and v_{ij}^V again are defined by the OLS regression assumption. Substituting 2a into 1a and 2b into 1b gives:

$$KS2_i = \sum_{q=2}^5 \left\{ \left(\sum_j \lambda_{qj} \beta_j \right) + \gamma_q \right\} (1 | SEP_i = q) + \left\{ \left(\sum_j \beta_j v_{ij} \right) + \mu_i \right\} \quad (3a)$$

$$KS2_i = \sum_{q=2}^5 \left\{ \left(\sum_j \lambda_{qj}^V \beta_j \right) + \gamma_q^V \right\} (1 | SEP_i = q) + \left\{ \left(\sum_j \pi_j^V \beta_j \right) + \rho^V \right\} KS1_i + \left\{ \left(\sum_j \beta_j^V v_{ij}^V \right) + \mu_i^V \right\} \quad (3b)$$

Equation 3a is simply a regression of $KS2_i$ on the SEP quintile dummies, and 3b is a regression of $KS2_i$ on the SEP quintile dummies and the Key Stage 1 control. Hence the first term in curly brackets in 3a corresponds to the raw SEP gradient from the levels model, and in 3b to the raw gradient from the value-added model. The expressions inside those brackets show that the gap in scores between the omitted quintile 1 and quintile q can be broken down into a sum of terms – the product of the SEP difference in each explanatory variable (λ_{qj}) and its estimated effect on the outcome (β_j), plus a residual unexplained component (γ_q).

Table 6.2 shows the results of this exercise. The left panel presents results from the levels model and the right panel results from the value-added model. For each set of results we show the contribution of a particular factor to the raw middle-bottom and top-bottom gaps, first in terms of percentile point Key Stage 2 scores, and then as a percentage of the total raw gap.

The top panel first repeats the basic results from our previous analysis. Of the 14.3 percentile point middle-bottom SEP gap in level scores, we can explain 10.9 (76%) using all our measured factors, leaving 3.4 percentile points (24%) – unexplained. And of the 31.3 percentile point top-bottom gap, 26.8 points (86%) are explained and 4.5 points (14%) unexplained. The right panel shows the conditioning on Key Stage 1 gives us total value-

added gaps of 3.9 and 11.0, or in other words, conditioning reduces the level gaps by 10.4 points (73%) and 20.3 points (65%). Of the 3.9 middle-bottom value-added gap, 2.1 percentile points (54%) are explained by measured factors, leaving 1.8 points (46%) unexplained. And 8.8 points (80%) of the top-bottom value-added gap can be accounted for, compared with 2.2 points (20%) that are unaccounted for.

The main body of the table shows how the numbers in the ‘All measured factors’ row can be broken down into different components. The first line shows that differences in parental education between deprived and more advantaged children can account for about 3 (8) percentile points of the Key Stage 2 gap between bottom and middle (top) SEP quintile children, or about 21% (25%) of the total gap. This is the contribution of parental education over and above any influence through the mediating influences we discuss further on. When we consider progress between 7 and 11, we see that parental education accounts for increases in the gaps of 1.1 and 3.6 percentile points between the lowest SEP and the two higher SEP groups, or 29% and 33% respectively of the total increase between 7 and 11. Parental education differences between socio-economic groups are clearly the most important factor in explaining the gaps in attainment at 7, and the gaps in progress during the primary school years. The huge importance of parental education is particularly notable because, as noted previously, these numbers relate only to the direct effects of parental education, or the part that is not explained by any of the other variables in the model.

All other demographic influences contribute very little to the attainment gaps. So lone parenthood, numbers of siblings, ethnicity, etc. contribute little to attainment gaps in terms of total attainment at age 11 or progress since 7. Schools do matter, especially the school value-added measure between ages 7 and 11 for child progress, as might be expected. Our measures of parental attitudes, behaviours and beliefs explain in the region of a fifth of the gradients in both level and value-added scores. Interestingly, children’s views and behaviours independently explain a similar proportion to parents’ in the levels model, but their importance is halved to 10% in the value-added model. This illustrates that the child-level variables that matter for Key Stage 2 are more strongly related to previous academic achievement than parent-level variables measured at the same date. Unfortunately, without earlier measures of the key variables, we cannot distinguish whether success at Key Stage 1 leads to improvements in children’s outlooks, or whether persistence in these factors means that causation runs the other way from attitudes and behaviours to achievement at 7. Differences in preschool environments can account for little of the gaps.

Hence parental attitudes and beliefs have an influence that is not far away from that of parental

education in driving the social gradient in attainment at age 11 and progress since age 7. Taken together, parent and child attitudes, beliefs and behaviours and school quality explain over half of the attainment gaps between the most and least affluent children. As a proportion of the child's progress between 7 and 11, however, they explain a somewhat smaller proportion.

Table 6.2 also shows that the conclusions as to the key attitudes, behaviours and beliefs we drew from the partial models in Section 6.1 also hold in the fully conditioned specifications. The method used here, however, allows us to refine our understanding in some cases. Differences in maternal aspirations for university alone account for 19% of the top-bottom gap in levels terms and only a slightly smaller value-added proportion of the value-added gap. Assuming causality, equalising aspirations for university across socio-economic groups would narrow the Key Stage 2 gap by 6.0 percentile points or, if we assume that performance at 7 is fixed and determined by other factors, by 1.8 percentile points. Mother's locus of control and attitudes to education play a smaller but not trivial supporting role in making parental attitudes and beliefs such important predictors of child outcomes.

The four dimensions of child behavioural problems – anti-social, hyperactivity, emotional symptoms and conduct problems – together account for 9.6% (6.6%) of the middle- (top-) bottom gap in level scores and 9.3% (3.6%) of the middle- (top-) bottom gap in value-added scores, a substantial amount relative to the other child-level variables. Of these, the greater emotional symptoms of disadvantaged children play no explanatory role, whereas hyperactivity and conduct problems are the most important. Similarly, it is the beliefs that school results and hobbies and interests are important in life that drive the beneficial effects of the educational values of higher-income children, and a more internal locus of control, rather than a strong belief in their own ability, that drives the explanatory power of child self-concept.

Altogether, just the four factors of: maternal aspirations for university; hyperactivity; child locus of control; and the belief that school results are important in life can account for 32% and 23% of the top-bottom SEP gaps in level and value-added scores respectively, and for 28% and 19% of the equivalent middle-bottom SEP gaps.

Table 6.2. Breakdown of the bottom-middle and bottom-top SEP gaps in average Key Stage 2 scores

Factor Of which	Difference from Q1 attributed to factor							
	(1) Levels model				(2) Value-added model			
	Percentile scores		As % of total gap		Percentile scores		As % of total gap	
	Q3	Q5	Q3	Q5	Q3	Q5	Q3	Q5
All	14.33	31.33	100%	100%	3.93	11.01	100%	100%
Key Stage 1 (as % raw gap)					10.40	20.32	72.5%	64.9%
All measured factors (sum I to VII)	10.9	26.82	76.1%	85.6%	2.13	8.80	54.2%	80.0%
Residual unexplained component	3.43	4.51	23.9%	14.4%	1.80	2.24	45.8%	20.0%
I. Parental education	2.98	7.83	20.8%	25.0%	1.13	3.58	28.6%	32.5%
Mother's education	1.40	3.86	9.8	12.3	0.48	1.98	12.3	18.0
Father's education	1.58	3.97	11.0	12.7	0.64	1.60	16.3	14.5
II. Demographic characteristics	0.80	1.31	5.6%	4.2%	0.20	0.59	5.0%	5.3%
Female	0.00	0.00	0.0	0.0	0.16	0.32	4.0	2.9
Non-white	0.13	0.13	0.9	0.4	0.11	0.12	2.9	1.0
Family structure	-0.21	-0.24	-1.4	-0.8	-0.41	-0.50	-10.4	-4.6
Month of birth	-0.18	-0.05	-1.3	-0.2	0.06	0.09	1.6	0.8
Mother's age at birth	0.30	0.38	2.1	1.2	0.16	0.34	4.0	3.1
Number older siblings	0.22	0.45	1.5	1.4	0.05	0.13	1.2	1.2
Number younger siblings by 9	-0.03	-0.08	-0.2	-0.2	-0.02	-0.02	-0.4	-0.2
Twin	0.00	0.01	0.0	0.0	0.00	-0.01	0.0	-0.1
English second language at 11	0.00	0.00	0.0	0.0	0.00	0.00	-0.1	0.0
Parental employment at age 4	0.82	0.97	5.7	3.1	0.20	0.23	5.0	2.1
Parental health at age 4	-0.24	-0.25	-1.7	-0.8	-0.11	-0.12	-2.7	-1.1
III. School composition and quality	1.76	4.39	12.3%	14.0%	0.14	1.79	3.7%	16.2%
Mean pupil KS1 (std score)	1.65	2.85	11.5	9.1	-0.66	-1.11	-16.8	-10.1
Mean VA KS1-2 (std score)	0.80	2.50	5.6	8.0	1.05	3.23	26.6	29.3
Proportion pupils FSM	-0.69	-0.96	-4.8	-3.1	-0.24	-0.33	-6.2	-3.0
IV. Preschool environments	0.49	1.10	3.4%	3.5%	-0.20	-0.05	-5.1%	-0.4%
Birth weight	0.18	0.22	1.3	0.7	0.04	0.04	1.0	0.4
Gestation	0.00	-0.01	0.0	0.0	0.01	0.00	0.2	0.0
Breast feeding	0.24	0.68	1.7	2.2	0.20	0.60	5.1	5.4
Smoking in pregnancy	-0.37	-0.50	-2.6	-1.6	-0.24	-0.32	-6.1	-2.9
Post-natal depression	-0.07	-0.08	-0.5	-0.3	-0.07	-0.08	-1.9	-0.7
HLE	0.71	1.20	5.0	3.8	0.03	0.06	0.7	0.5
Read to daily at 3	-0.32	-0.50	-2.2	-1.6	-0.18	-0.26	-4.5	-2.4
Regular sleeping routine at 3	0.11	0.16	0.8	0.5	0.00	0.00	0.0	0.0
Centre-based care pre-3	-0.01	-0.04	0.0	-0.1	0.00	-0.03	-0.1	-0.3
Nursery age 3 to 4	0.01	-0.04	0.0	-0.1	0.02	-0.05	0.5	-0.4
V. Parent's attitudes and behaviours	2.61	6.46	18.2%	20.6%	0.74	1.97	18.8%	17.9%
Mother found school valuable	0.06	0.13	0.4	0.4	0.05	0.10	1.2	0.9
Maternal locus of control	0.54	1.02	3.8	3.3	0.22	0.40	5.5	3.7

Factor Of which	Difference from Q1 attributed to factor							
	(1) Levels model				(2) Value-added model			
	Percentile scores		As % of total gap		Percentile scores		As % of total gap	
	Q3	Q5	Q3	Q5	Q3	Q5	Q3	Q5
Mother hopes at least 1 A-level	0.14	-0.64	1.0	-2.0	0.07	-0.22	1.8	-2.0
Mother hopes university	1.95	6.03	13.6	19.3	0.45	1.81	11.5	16.4
Mother hopes other for child	-0.06	-0.42	-0.4	-1.3	0.01	-0.12	0.2	-1.1
Mother-ch interactions: Ed	0.03	0.33	0.2	1.1	-0.02	0.01	-0.5	0.1
Mother-ch interactions: Non-ed	-0.05	0.00	-0.3	0.0	-0.04	-0.01	-1.0	-0.1
VI. Child attitudes and behaviours	2.74	6.14	19.1%	19.6%	0.38	1.19	9.7%	10.8%
Ability beliefs	0.13	0.64	0.9	2.0	-0.07	0.01	-1.8	0.1
Locus of control	0.33	1.43	2.3	4.6	0.01	0.45	0.4	4.1
Enjoyment of school	0.04	0.04	0.3	0.1	-0.01	-0.02	-0.1	-0.1
School results important in life	0.80	1.25	5.6	4.0	0.15	0.18	3.7	1.6
Hobbies important in life	0.26	0.47	1.8	1.5	0.13	0.23	3.2	2.1
Possessions important in life	-0.24	-0.44	-1.7	-1.4	-0.13	-0.24	-3.4	-2.2
Anti-social behaviours	0.17	0.28	1.2	0.9	0.05	0.07	1.3	0.6
Hyperactivity	0.89	1.41	6.2	4.5	0.13	0.13	3.2	1.2
Emotional symptoms	0.00	0.00	0.0	0.0	0.01	0.02	0.3	0.1
Conduct problems (scale)	0.31	0.39	2.2	1.2	0.18	0.19	4.5	1.7
Experience of bullying (scale)	0.07	0.13	0.5	0.4	0.04	0.06	0.9	0.6
Pro-social behaviours	-0.11	0.05	-0.7	0.2	-0.03	0.05	-0.9	0.4
Peer problems (scale)	-0.17	-0.2	-1.2	-0.6	-0.1	-0.11	-2.6	-1.0
Teacher-child relations (scale)	-0.01	0.00	0.0	0.0	-0.01	0.00	-0.3	0.0
Leisure activities (scale)	0.23	0.68	1.6	2.2	0.05	0.17	1.3	1.5
VII. Missing flags	-0.49	-0.41	-3.4%	-1.3%	-0.25	-0.27	-6.4%	-2.4%

See Section 6.2 for a description on the methodology employed.

7. Antecedents of key attitudes, behaviours and beliefs

- Disadvantaged children have, on average, the same beliefs about their own ability and the same likelihood of believing school results to be important as more advantaged children with the same prior achievement levels. However, they tend to have more behavioural problems and less of a sense of personal control than better-off children with the equivalent levels of ability.
- Of mothers whose children had the same attainment at Key Stage 1, those in the richest quintile are 30 percentage points more likely to hope their child goes to university than those in the poorest quintile.
- We find evidence of strong intergenerational persistence in attitudes and beliefs. A mother's perceptions of the value of her own schooling, and the degree of control she feels she has over her life, are correlated with a number of her child's own behavioural characteristics and beliefs.
- A positive preschool home learning environment is associated with a stronger sense that education is important in life in a child, even given attainment at 7.
- Different background variables are associated with different types of favourable attitudes, behaviours and beliefs. For example, less educated parents have lower aspirations and children with a less favourable locus of control, but their children do not exhibit notably greater behaviour problems or less belief in their own ability.
- A number of factors show sharp differences in their association with educational and behavioural outcomes. Being a first born child, pre-natal maternal smoking and post-natal depression are all strongly associated with greater behavioural problems, but showed a negligible or positive association with educational achievement.

Having identified some of the key attitudes and behaviours associated with socio-economic gaps in attainment, we can look in more detail at which factors predict the attributes that promote educational success. Table 7.1 (and Figure 7.1) looks at the SEP gaps in six variables, and at how these gaps are affected when we control for Key Stage 1. In addition to four of the key variables identified in Chapter 6 – maternal aspirations for university, hyperactivity; child locus of control, and the belief that school results are important in life – we look at the SDQ Total Behavioural Difficulties score (the sum of the hyperactivity, emotional symptoms, peer problems and conduct problems scales), and at children's beliefs about their scholastic ability. The first of these is provided for comparison with the

companion paper that explores cognitive and behavioural deficits of low income children in the preschool period. Although we know that the sub-scales differ in their association with educational performance, they are also likely to be correlated with one another, and so may give a different picture of differences across socio-economic groups when looked at in the aggregate. We identified ability beliefs as significant predictors of educational outcomes in Table 6.1, but they are less socially graded than some of the other variables, and therefore less powerful in accounting for the SEP gaps.

Table 7.1 (and Figure 7.1) show that the familiar gradients in these outcome variables are affected differently by conditioning on Key Stage 1. The effects of conditioning may reflect several processes. Because all the outcomes are measured at age 8 to 9, it is possible that successful school performance promotes positive beliefs and behaviours in a virtuous circle. Alternatively, it may be that cognitive and non-cognitive ability are correlated in a way that is stable over time, such that attainment at 7 was influenced by earlier realisations of the outcome measures. Equalising Key Stage 1 scores across all children at the average reduces the SEP gradients in all the outcomes. For ability beliefs and the belief that school results are important in life, almost no significant differences remain. So low income children hold exactly the beliefs we would predict for them on the basis of their prior attainment.

Significant gradients do remain in behaviour problems, locus of control and maternal aspirations. The adjusted gradients in total behaviour problems and hyperactivity are interesting because they become non-monotonic. Children in the richest SEP quintile in fact have slightly more behavioural problems than we would predict on the basis of their very high scores at Key Stage 1. The fact that top quintile mothers are still 30 percentage points more likely to hope their child will go to university than bottom quintile mothers even when earlier academic performance is taken into account is notable. It implies that aspirations do not just adapt to ability, but also reflect social and cultural factors.

Tables 7.2a and 7.2b look in more detail at predictors of the key attitudes and behaviours. For each variable, we explore specifications with and without a Key Stage 1 control. It is clear there are marked differences in the factors associated with different outcome variables. Parental education is strongly associated with locus of control and maternal aspirations, but only very weakly with behavioural problems and ability beliefs. The results for extrinsic valuation of school results imply that children who do better at 7 do perceive school results to be more important, but much more strongly so if their parents have lower levels of education than if their parents are highly educated.

Girls tend to exhibit fewer behavioural problems than boys and are more likely to perceive school results as important, but they also tend to have a more external locus of control and more negative ability beliefs when their better performance at age 7 is taken into account. There are no significant differences in mother's aspirations by gender of the child until Key Stage 1 is taken into account, when it emerges that mothers are slightly less likely to hope girls go to university than boys with the same prior attainment.

Non-white children do not appear to differ in their behaviour from white children, but do tend to have much more positive beliefs and more aspirational parents. Children in non-intact families exhibit significantly higher levels of hyperactivity, but not of behaviour problems defined more broadly. Children of single parents tend to have more negative beliefs about their own abilities. But they do not differ from children in two-parent families in terms of locus of control or a belief in the importance of school results and single mothers, like the non-white mothers in our sample, appear to have higher than average aspirations for their children's futures.

Results for birth order are also interesting. The presence of older siblings is associated with fewer behaviour problems (as reported by the mother), a sharp contrast to the results for academic performance, where there was a significant advantage to being a first born child. There is also evidence that the fewer the children a mother has, the higher aspirations her aspirations for them are.

Poor parental health is very strongly associated with children's behaviour problems, even though they are measured with a gap of five years, and the association of low birth weight, prenatal smoking and post-natal depression with behaviour problems holds over an even longer time period. These latter two results again contrast with the findings for cognitive outcomes, where we found no evidence of a negative impact of either post-natal depression or smoking. Post-natal depression is also strongly associated with children's perceptions of themselves and their control over their lives years later, and unlike behaviour, these two variables are reported by the child his- or herself, rather than the mother. The effects of breastfeeding are somewhat unclear, although mothers who breastfeed are also more likely to hope their children will go to university, perhaps indicating a high value placed on their children's long-term well being.

Greater stimulation in the home learning environment at 3 is positively associated with many outcomes, including maternal aspirations, which again suggests that the same mothers invest in their children's futures through a variety of means. In many cases, however, the positive influence of the home learning environment appears to operate mostly through its impact on academic ability levels at age 7. Having a regular sleep routine at 3, which captures something about family routines as opposed to cognitive stimulation, is associated with fewer behavioural problems six years later. Centre-based care before the age of 3, however, is associated with greater behavioural problems in children even though it is far more likely to be used by affluent families.

Finally and perhaps most importantly, we find evidence of strong intergenerational persistence in attitudes and beliefs, even when we condition on a rich set of controls. The mother's perceptions of the value of her own schooling, and the degree of control she feels she has over her life, are predictive of all the outcomes here apart from children's ability beliefs.

Figure 7.1. Socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9

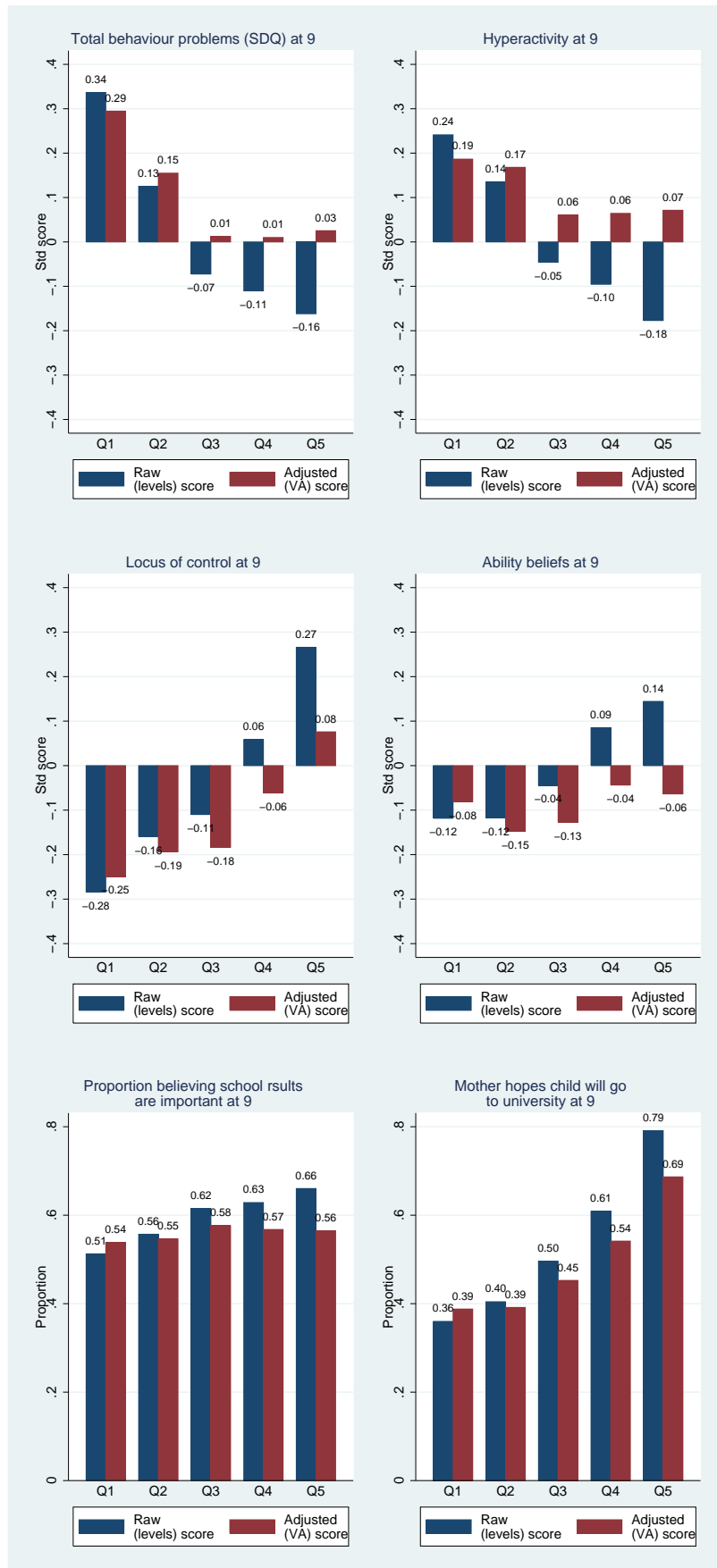


Table 7.1. Socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9

Variable	Regression coefficients					
	(1) Total behaviour problems (SDQ) (std score)		(2) Hyperactivity (std score)		(3) Child locus of control (std score)	
	(a)	(b)	(a)	(b)	(a)	(b)
SEP quintile 2	-0.211***	-0.140***	-0.106**	-0.018	0.125**	0.056
SEP quintile 3	-0.409***	-0.282***	-0.287***	-0.126***	0.174***	0.066
SEP quintile 4	-0.447***	-0.285***	-0.337***	-0.122***	0.342***	0.188***
SEP quintile 5	-0.499***	-0.270***	-0.418***	-0.115***	0.550***	0.326***
KS1 (std score)	-	-0.261***	-	-0.350***	-	0.271***
Constant	0.337***	0.295***	0.241***	0.187***	-0.284***	-0.250***
Observations	5599	5599	6234	6234	5338	5338
Adjusted R-squared	0.028	0.074	0.021	0.104	0.034	0.083
Variable	Regression coefficients					
	(4) Child ability beliefs (std score)		(5) School results important in life (binary indicator)		(6) Mother hopes child will go to university (binary indicator)	
	(a)	(b)	(a)	(b)	(a)	(b)
SEP quintile 2	0.001	-0.066	0.044**	0.008	0.044**	0.004
SEP quintile 3	0.074	-0.046	0.103***	0.038*	0.136***	0.065***
SEP quintile 4	0.203***	0.037	0.116***	0.029	0.249***	0.154***
SEP quintile 5	0.263***	0.018	0.148***	0.026	0.431***	0.299***
KS1 (std score)	-	0.295***	-	0.136***	-	0.148***
Constant	-0.118***	-0.081**	0.513***	0.539***	0.360***	0.388***
Observations	5810	5810	6745	6745	6615	6615
Adjusted R-squared	0.011	0.068	0.01	0.061	0.093	0.152

Table 7.2a. Socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9, detailed predictors

	Regression coefficients					
	(1) Total behaviour problems (SDQ) (std score)		(2) Hyperactivity (std score)		(3) Locus of control (std score)	
	(a)	(b)	(a)	(b)	(a)	(b)
SEP Q2	-0.105**	-0.069	-0.022	0.016	0.049	0.014
SEP Q3	-0.221***	-0.159***	-0.122**	-0.053	0.037	-0.009
SEP Q4	-0.239***	-0.169***	-0.124**	-0.041	0.131**	0.066
SEP Q5	-0.286***	-0.189***	-0.141**	-0.027	0.157**	0.069
KS1 (std score)		-0.258***		-0.323***		0.262***
Mother: Voc/O-lev	-0.025	0.01	0.019	0.069*	0.075*	0.042
Mother: A-level	-0.003	0.045	-0.013	0.055	0.189***	0.140***
Mother: Degree	0.029	0.105*	-0.048	0.051	0.290***	0.217***
Father: Voc/O-level	-0.012	0.03	-0.056	-0.011	0.071*	0.029
Father: A-level	0.001	0.05	-0.039	0.016	0.125***	0.073*
Father: Degree	0.031	0.114**	-0.089*	0.014	0.254***	0.173***
Child female	-0.152***	-0.094***	-0.330***	-0.255***	-0.045*	-0.106***
Child non-white	-0.053	-0.048	-0.079	-0.072	0.188**	0.199**
Step-father at 7	0.089	0.068	0.220***	0.194***	0.113	0.137*
Single parent at 7	0.066	0.06	0.124**	0.109**	0.053	0.057
Month of birth	0.014***	0.000	0.016***	-0.002	-0.003	0.012***
Mother: <20	0.029	0.000	0.132	0.097	0.057	0.072
Mother: 20-24	-0.001	-0.011	-0.049	-0.064*	-0.085*	-0.073*
Mother: 30-34	-0.016	-0.014	0.002	0.004	0.025	0.026
Mother: 35+	-0.086*	-0.077*	-0.080*	-0.077*	0.114**	0.099**
1 older sib	-0.076**	-0.099***	-0.057*	-0.084***	-0.007	0.010
2 older sibs	-0.063	-0.106**	-0.061	-0.112***	0.047	0.082*
3+ older sibs	-0.166**	-0.219***	-0.185***	-0.250***	-0.058	-0.002
1 ynger sib by 9	0.056*	0.049	-0.015	-0.027	0.003	0.006
2+ ynger sibs by 9	0.053	0.034	-0.053	-0.076*	-0.057	-0.047
Twin	-0.193**	-0.198**	-0.301***	-0.303***	-0.082	-0.062
EAL at 11	-0.142	-0.058	0.096	0.177	0.046	0.021
Mother emplyd at 4	0.005	-0.005	0.038	0.022	-0.023	-0.016
Father emplyd at 4	0.027	0.049	0.018	0.048	-0.01	-0.021
Mother's health at 4	-0.140***	-0.143***	-0.103***	-0.108***	0.029	0.032
Father's health at 4	-0.189***	-0.197***	-0.109***	-0.118***	-0.02	-0.013
Birth weight (kg)	-0.071***	-0.054**	-0.082***	-0.056**	0.053*	0.035
Gestation < 37 wks	0.014	0.015	0.079	0.087	0.068	0.077
Breast fed <3 mths	0.092**	0.095**	0.103***	0.112***	0.025	0.018
Breast fed 3-6 mths	0.021	0.027	0.063	0.075*	0.076*	0.063
Breast fed 6 mths+	0.034	0.04	0.025	0.039	0.131***	0.106***

	Regression coefficients					
	(1) Total behaviour problems (SDQ) (std score)		(2) Hyperactivity (std score)		(3) Locus of control (std score)	
	(a)	(b)	(a)	(b)	(a)	(b)
Smoked in preg	0.075**	0.059*	0.031	0.016	0.013	0.016
Post-natal depress'n	0.418***	0.410***	0.249***	0.236***	-0.113**	-0.091**
HLE quintile 2	-0.003	0.008	0.008	0.03	0.012	-0.008
HLE quintile 3	-0.043	0.002	-0.083*	-0.026	-0.041	-0.084*
HLE quintile 4	-0.101**	-0.034	-0.122***	-0.036	0.077	0.018
HLE quintile 5	-0.125**	-0.061	-0.163***	-0.078*	0.061	-0.006
Read to daily at 3	-0.080**	-0.096***	-0.057*	-0.076**	0.019	0.022
Reg sleep time at 3	-0.130**	-0.098*	-0.133***	-0.097**	-0.032	-0.064
Centre care pre-3	0.084**	0.082**	0.116***	0.110***	0.085*	0.075*
Nursery age 3-4	0.042	0.043	0.039	0.039	0.038	0.036
Mother values sch	-0.056***	-0.053***	-0.060***	-0.055***	-0.038**	-0.039**
Mother locus cntrl	-0.034**	-0.021	-0.046***	-0.028*	0.052***	0.037**
Constant	1.642***	1.573***	1.335***	1.237***	-0.583***	-0.499***
Observations	5599	5599	6234	6234	5338	5338
Adjusted R-squared	0.104	0.142	0.099	0.158	0.071	0.110

Table 7.2b. Further socio-economic gaps in selected attitudes, behaviours and beliefs at ages 8 to 9, detailed predictors

	Regression coefficients					
	(4) Ability beliefs (std score)		(5) School results important in life (proportion)		(6) Mother hopes child will go to university (proportion)	
	(a)	(b)	(a)	(b)	(a)	(b)
SEP Q2	-0.030	-0.060	0.042*	0.024	0.023	0.007
SEP Q3	0.009	-0.04	0.091***	0.061***	0.088***	0.060***
SEP Q4	0.102*	0.039	0.094***	0.058**	0.146***	0.112***
SEP Q5	0.106*	0.015	0.121***	0.071***	0.207***	0.162***
KS1 (std score)		0.287***		0.139***		0.129***
Mother: Voc/O-lev	0.015	-0.017	-0.021	-0.042**	0.024	0.006
Mother: A-level	0.062	0.015	-0.026	-0.054**	0.120***	0.095***
Mother: Degree	0.109*	0.033	0.000	-0.044	0.192***	0.153***
Father: Voc/O-level	-0.012	-0.065*	0.013	-0.006	0.052***	0.034**
Father: A-level	0.068	0.005	-0.014	-0.038**	0.084***	0.061***
Father: Degree	0.075	-0.028	-0.024	-0.069***	0.163***	0.122***
Child female	-0.012	-0.079***	0.122***	0.088***	0.009	-0.022*
Child non-white	0.242***	0.253***	0.079**	0.072*	0.131***	0.124***
Step-father at 7	-0.093	-0.061	-0.075**	-0.065**	0.026	0.036
Single parent at 7	-0.131**	-0.123**	0.010	0.018	0.103***	0.110***
Month of birth	-0.025***	-0.009**	-0.002	0.005***	-0.005***	0.003*
Mother: <20	0.035	0.066	0.143***	0.163***	0.090**	0.111***
Mother: 20-24	0.028	0.039	-0.017	-0.008	0.033*	0.040**
Mother: 30-34	-0.009	-0.012	-0.006	-0.006	0.037***	0.037***
Mother: 35+	-0.065	-0.076*	0.017	0.015	0.052**	0.050**
1 older sib	-0.047	-0.027	-0.003	0.009	-0.036**	-0.024
2 older sibs	-0.077	-0.041	-0.018	0.004	-0.090***	-0.068***
3+ older sibs	-0.029	0.038	0.02	0.051	-0.112***	-0.083***
1 ynger sib by9	-0.031	-0.028	-0.008	-0.004	-0.021	-0.017
2+ ynger sibs by 9	-0.02	-0.015	-0.001	0.006	-0.058***	-0.053***
Twin	-0.147*	-0.128	0.079*	0.075*	0.067	0.064
EAL at 11	0.007	-0.022	0.057	0.033	0.197**	0.175**
Mother emplyd at 4	-0.032	-0.027	0.011	0.018	0.02	0.025*
Father emplyd at 4	0.012	-0.004	0.012	-0.002	-0.053**	-0.063***
Mother's health at 4	-0.003	0	0.009	0.01	0	0.002
Father's health at 4	-0.014	-0.007	0.020*	0.025**	0.003	0.008
Birth weight (kg)	0.03	0.009	-0.004	-0.017	0.008	-0.004
Gestation < 37 wks	0.024	0.034	-0.039	-0.045	0.002	-0.005
Breast fed <3 mths	0.006	-0.002	0.01	0.007	0.057***	0.054***
Breast fed 3-6 mths	0.017	0.001	-0.011	-0.017	0.087***	0.081***
Breast fed 6 mths+	-0.005	-0.029	-0.005	-0.012	0.089***	0.084***

	Regression coefficients					
	(4) Ability beliefs (std score)		(5) School results important in life (proportion)		(6) Mother hopes child will go to university (proportion)	
	(a)	(b)	(a)	(b)	(a)	(b)
Smoked in preg	0.006	0.005	-0.001	0.003	0.031**	0.036**
Post-natal depress'n	-0.192***	-0.170***	0.003	0.009	0.014	0.019
HLE quintile 2	0.112**	0.087*	0.018	0.008	0.036*	0.027
HLE quintile 3	0.110**	0.057	0.082***	0.057***	0.039*	0.015
HLE quintile 4	0.175***	0.103**	0.075***	0.038*	0.052**	0.018
HLE quintile 5	0.119**	0.039	0.076***	0.038*	0.061***	0.027
Read to daily at 3	-0.008	0.004	-0.014	-0.006	0.024	0.032**
Reg sleep time at 3	0.042	0.015	0.063***	0.051**	0.008	-0.004
Centre care pre-3	0.032	0.026	-0.034*	-0.031	0.042**	0.045**
Nursery age 3-4	0.047	0.048*	0.002	0.002	0.039***	0.039***
Mother values sch	-0.02	-0.021	0.026***	0.024***	0.014**	0.012*
Mother locus cntrl	0.000	-0.016	0.024***	0.016**	0.028***	0.021***
Constant	-0.068	0.025	0.302***	0.350***	0.182**	0.224***
Observations	5810	5810	6745	6745	6615	6615
Adjusted R-squared	0.027	0.073	0.036	0.081	0.166	0.203

Omitted categories are SEP Q1; Mother: CSE/None; Father: CSE/None; Resident bio father at 7; Mother: 25-29; First born child; 0 younger siblings by 9; Never breast fed; HLE quintile 1.

8. Focus on pre-school environments and educational achievement at 11

- Birth weight, breast feeding, the home learning environment at age 3 and centre-based child care are all positively associated with educational outcomes at age 11.
- The positive association of preschool child care with Key Stage 2 appears to reflect selection, in that children placed in formal care tended to come from more highly-educated families with positive demographic characteristics.
- The benefits for educational development of greater cognitive stimulation in the early home environment, and regular routines such as bedtimes, are entirely apparent by Key Stage 1, and appear to have little influence on progress after that date.
- This suggests that these early markers do not only reflect wider parental beliefs and attitudes to learning which will always be associated with enhanced educational progress, but rather that they are indicators of age-specific positive investments.

This section explores the long term effects of children's preschool environments. Recent research in psychology, neuroscience and economics has spurred much interest in this area, with many scholars arguing that the early years are a key period for the development of cognitive and non-cognitive skills. As alluded to in previous chapters, it is difficult to quantify the full effects of these influences in our analysis so far because it is likely the impacts will be absorbed by the effects of other variables included in the model.

Table 8.1 shows the coefficients on our early environment variables in a variety of specifications. Column 2 shows that including them as the only covariates alongside SEP accounts for 3 percentile points of the 14.3 middle-bottom gap and 6.7 points of the 31.3 top-bottom gap. Virtually all the unconditional effects of the variables are significant and of the expected sign, and so are clear predictors of attainment 8 to 11 years after the behaviours in question. The exceptions are pre-term birth, pre-natal smoking and post-natal depression, which are unrelated to school performance, and being read to daily at 3, which has a negative association.

This last finding shows that the negative coefficient on the early reading variable in our previous models is not simply the result of over-controlling for correlated factors. However, it should be noted that reading at 3 forms is one component of the home learning environment (HLE) index, and so by construction the variables are positively correlated. As a guide to

interpretation note that, compared with the child of parent who does not read to him/her daily at age 3 and who provides a HLE in the bottom fifth of the distribution (the baseline), the child of parent in the middle HLE quintile who *does* read daily scores 3.9 points higher at Key Stage 2 (6.0-2.1). Only in the unusual case of a parent in the middle HLE quintile who *does not* read daily at age 3 will the child score the full 6.0 higher than the baseline. Hence the negative coefficient implies that reading may be one of less powerful elements in the HLE index, rather than that reading has a negative effect on the outcome.

Conditioning on parental education (Column 3) and other demographics (column 4) reduces the coefficients on most of the preschool variables. The effect of centre care pre-age 3 becomes insignificant suggesting the raw results are entirely due to selection of who chooses to have their child in early care. The same is true to a large degree for breast-feeding duration. The coefficient on post-natal depression becomes significantly negative, implying that (conditionally) it is more common in more highly-educated families.

Column 5 introduces a control for Key Stage 1 into the baseline model in Column 4. This modification alone wipes out virtually all of the significant associations, particularly for the home learning environment. Hence pre-school factors appear to impact on later life outcomes almost entirely through their effect on cognitive ability at the start of school. This finding is important because it implies that these behaviours are not just markers for wider unobserved but permanent differences in beliefs or attitudes that contribute to enhanced educational progress at all ages. Rather they are specific behaviours applying to early childhood. The exception is long durations of breast feeding, which as noted in the previous chapter may capture something about maternal attitudes and discount rates.

Columns 6 to 8 drop the Key Stage 1 control and add different groups of variables to the baseline specification in column 4. The only evidence that later beliefs and behaviours are simply earlier parental attitudes in another guise comes in column 8. Here the effects of the home learning environment are significantly reduced when the child's attitudes and beliefs are controlled, suggesting that these are acting as mediating influences. The results in Tables 7.2a and b suggest this operates mainly through a greater sense that school results are important in life. We find some evidence that breast feeding is related to later beneficial parental behaviours and beliefs, but otherwise see little evidence that early influences operate either via school choice or the formation of attitudes and perceptions (except insofar as they are shaped by ability at age 7). The final two columns are again consistent with the view that the key role of the preschool environment is to foster academic skills in children early on in their schooling career, at least if our outcome of interest is later educational attainment.

Table 8.1. Regressions of Key Stage 2 on preschool environments, with alternative groups of controls

	Regression coefficients									
	(1) No controls	(2) + Preschool factors	(3) (2) + Parent education	(4) (3) + Demo- graphics	(5) (4) + KS1	(6) (4) + School variables	(7) (4) + Parent attitudes & behs	(8) (4) + Child attitudes & behs	(9) All controls excluding KS1	(10) All controls including KS1
SEP quintile 2	8.0***	6.1***	4.4***	3.9***	1.2*	2.7***	3.4***	3.5***	2.2**	1.1*
SEP quintile 3	14.3***	11.3***	7.6***	6.6***	2.1***	5.2***	5.4***	5.3***	3.4***	1.8***
SEP quintile 4	20.6***	16.3***	10.3***	8.9***	3.4***	6.7***	7.0***	6.8***	3.7***	2.1***
SEP quintile 5	31.3***	24.6***	13.3***	11.7***	4.0***	8.8***	8.7***	8.9***	4.5***	2.2***
Birth weight (kg)		2.0***	2.0***	2.8***	0.7*	2.8***	2.6***	2.3***	2.0***	0.5
Gestation < 37 wks		2.0	1.7	2.3*	1.5	2.4*	2.2	2.7**	2.0*	1.5*
Breast fed <3 mths		3.1***	2.2***	1.4*	0.6	1.2	0.2	1.7**	0.1	0.1
Breast fed 3-6 mths		5.6***	3.4***	2.9***	1.6***	2.4***	1.5*	2.8***	0.8	0.9
Breast fed 6 mths+		9.9***	5.8***	5.4***	3.7***	4.5***	3.7***	4.7***	1.9***	1.9***
Smoked in pregnancy		-0.9	0.3	0.7	0.9*	0.8	1.0	1.2*	1.3**	0.9*
Post-natal depression		-0.8	-1.4*	-1.7*	-0.1	-1.8**	-1.1	0.2	0.5	0.5
HLE Q2		2.5***	2.6***	2.1**	0.0	2.0**	2.1**	1.3	1.3*	-0.2
HLE Q3		6.0***	5.7***	5.0***	0.9	4.9***	5.4***	4.0***	4.1***	0.7
HLE Q4		8.3***	7.5***	6.8***	0.7	6.7***	6.9***	4.5***	4.6***	0.2
HLE Q5		9.7***	8.0***	7.0***	0.6	6.6***	7.5***	5.0***	5.2***	0.4
Read to daily at 3		-2.1***	-2.5***	-2.5***	-1.3**	-2.7***	-2.1***	-2.9***	-2.2***	-1.4***
Reg sleep routine at 3		4.0***	2.8**	3.0***	0.7	2.9***	2.5**	1.5	0.8	0.0
Centre care pre-3		2.3**	0.9	0.2	0.0	0.0	-0.3	0.4	-0.3	-0.3
Nursery age 3-4		2.3***	1.7***	0.3	0.1	0.4	-0.2	0.2	-0.3	-0.5
Observations	7972	7972	7972	7972	7972	7972	7972	7972	7972	7972
Adjusted R-squared	0.136	0.176	0.222	0.254	0.639	0.287	0.304	0.364	0.439	0.703

9. Conclusions

It has long been known that children from more deprived backgrounds achieve less well in terms of education attainment than their more affluent peers. More recently it has been shown that these attainment gaps start early in life and continue to widen through childhood (see Feinstein, 2003 and 2004). Furthermore the extent of these gradients is not constant through time and has recently been diminishing (Gregg and Macmillan, 2009). This research with its two companion studies undertaken by the IFS show the extent of these gradients and a sense of when in childhood they emerge for the most recent cohort data available. The main thrust of this study is to explore the contribution of parent and child attitudes, beliefs and aspirations make toward these gaps and their emergence in the Primary School years.

A number of features stand out from the study as worthy of note. First, one third of the large educational gaps that are apparent at age 11 emerge through the primary school years. A sizable portion of these attainment gaps are associated with other aspects of families that differ by social background, especially parental education and also school quality. Parental education, which is obviously related to variations in economic circumstances within families, offers an important and distinct source of education attainment gradients. These gradients by parental education account for 40-50% of the gaps across socio-economic groups. Hence as we consider the contribution of parental and child aspirations, beliefs and behaviours in driving the socio-economic gradients educational attainment, it is also important to assess their role in driving gradients by parental education as well.

Parental aspirations and attitudes to education vary particularly strongly with socio-economic position. 81% of the richest mothers say they hope their 9-year-old will go to university, compared with only 37% of the poorest mothers. There are also large differences according to whether the mother found school valuable for themselves. Children's attitudes and behaviours in primary school vary in the degree to which they are socially graded. Poor children tend to view themselves as scholastically less able, are less likely to believe school results are important in life, and exhibit higher levels of hyperactivity, conduct problems and peer problems. However, their levels of school enjoyment and cooperative behaviour differ little from those of more affluent children.

The attitudes, beliefs, and behaviours of parents and children have a major role to play in accounting for the gaps that remain unexplained. Together they explain around 30-40% of the social gradient in educational attainment, both in the total gaps at age 11 and the increase

since age 7. These act as major transmission mechanisms for how both social disadvantage itself and parental education impact on educational attainment. The adverse attitudes to education of disadvantaged mothers are one of the single most important factors associated with the children's deficits at age 11. In particular, 9-year-olds whose mothers hope they will go to university will score 5.7 percentile points higher at age 11 than the child of the parent with the lowest aspirations given the same prior attainment and parental education etc. This factor alone explains 19% of the test score gap between the richest and poorest children at 11, and 16% of the widening gap between the ages of 7 and 11. Likewise greater behavioural problems of disadvantaged children are the second key factor in accounting for their poorer educational outcomes. We find evidence children with high levels of anti-social behaviours, hyperactivity and conduct problems at the ages of 8 to 9 scored lower at Key Stage 1, but even taking this into account, such behaviours appear to interfere with the learning process between 7 and 11. Other types of behaviour problems do not appear to play the same role. Yet whilst parental aspirations and behaviour problems are of key importance, a whole range of adverse attitudes, behaviours and beliefs contribute to the educational deficits of low income children. Other factors we identify as important are the lack of a sense of personal efficacy (both of mothers and their children), and the view that school results are not important in life.

The fact that parental aspirations and attitudes to education for their children and the children's own attitudes and behaviours are important to educational attainment in the Primary school years has a number of important policy implications. First, attempts to raise school results and progression through to university for reasonably able children from poorer families needs to start before secondary school starts. Furthermore, parents' expectations and attitudes need to be shifted not just those of the children. Poorer parents' attitudes do appear to reflect in part their own experiences of education, which were often negative, but they may also be substantially out of date in the educational opportunities open to middle ability children these days, with a third of children attending university. Other important dimensions are school quality which is a lesser but still substantial transmitter of disadvantage. Which suggests that either more resources need to be directed to schools serving poorer children or access rules need to be changed to address this school selection problem. The pre-school environment is influential on attainment at 7 but is perhaps unsurprisingly not on learning development through primary school. Finally, improving educational attainment in this generation of children and reducing inequalities in attainment will have knock-on effects on the next generation as parental education is such an important driver of attainment and parental aspirations.

10. References

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