

# The consequences at age 7 of early childhood disadvantage in Northern Ireland and Great Britain



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**A report to the Northern Ireland  
Office of the First Minister and Deputy First  
Minister**

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## Executive Summary

1. This report presents an analysis of child outcomes at age 7 from the Millennium Cohort Study (MCS), a longitudinal study tracking children and their families who were born at the turn of the century, in terms of conditions and experiences which precede them as recorded at pre-school sweeps of the survey. In particular the analyses aim to unpack the relationship between child poverty and child outcomes, examining how far the statistical link can be accounted for by background factors and modifiable behaviours. Running through the exercise is a search for any explanatory factor which may be particularly prevalent in Northern Ireland compared to other countries of the UK.
2. This report builds on a previous report which examined outcomes at age 5: [http://www.ofmdfmi.gov.uk/the\\_consequences\\_of\\_childhood\\_disadvantage\\_in\\_northern\\_ireland.pdf](http://www.ofmdfmi.gov.uk/the_consequences_of_childhood_disadvantage_in_northern_ireland.pdf)  
In the present report, we have been able to examine change between the ages of 5 and 7.
3. The Millennium Cohort Study is a longitudinal birth cohort study, tracking a cohort of 18, 818 children born in the UK in 2000/01. There is now evidence from four surveys at ages 9 months (MCS1), 3 years (MCS2), 5 years (MCS3) and 7 years (MCS4). The longitudinal design of the study allows us to examine child development over time, and to assess outcomes at a given age in the light of circumstances and characteristics at earlier points in time. The MCS is a major resource for understanding the implications of the social conditions surrounding birth and early childhood for child outcomes.
4. Whereas NI children were advantaged in their cognitive scores compared to GB children at age 5, this was no longer the case by age 7.
5. In terms of teacher ratings of educational attainment, children in NI fared slightly but significantly better than those in Wales and Scotland at age 7.
6. Children in NI were better behaved than GB children at age 7, as they also had been at age 5. They also made greater progress on this measure between the ages of 5 and 7 than GB children.
7. Whereas NI children were in better general health than GB children at age 5, this was no longer the case at age 7, as GB children caught up.
8. NI children continued to be more likely to be overweight than GB children at age 7, as they also were at age 5.
9. In both NI and GB, income poverty is associated with all the outcomes we examine here: cognitive scores, teacher assessments, behavioural scores, general health, and overweight and obesity.

10. However, the effect of income poverty is accounted for by the inclusion in our models of associated variables reflecting social background and the home environment.
11. Social class, based on the highest parental occupation by age 3, is a powerful predictor both of cognitive and educational scores at age 5, and of progress in these scores between the ages of 5 and 7. Social class is a stronger predictor of progress between 5 and 7 than parents' education and a range of parenting variables.
12. Children of Indian, Pakistani and Bangladeshi ethnicity (mainly in England) showed substantial progress in cognitive and educational scores between the ages of 5 and 7.
13. Being a boy is a strong predictor of increased behavioural difficulties between the ages of 5 and 7. Parental psychological distress and longstanding illness and disability are also robust predictors of increased behavioural difficulties.
14. Parents' longstanding illness and disability and psychological distress as well as fathers' BMI, controlling for other factors, are linked to an increase in the risk of poor general health for children between the ages of 5 and 7.
15. Children who are overweight at age 5 had an overwhelmingly greater risk of being overweight at age 7. Girls and only children are more likely to become overweight between the ages of 5 and 7. Parents' BMIs and mothers' smoking are also substantial risk factors.
16. Although we are looking at only a two-year period, we can see that certain inequalities have been exacerbated during this time. However, the predictors of widening and narrowing trajectories between the ages of 5 and 7 vary according to which indicator of child progress is being considered. In common with our previous report, we find that socio-economic disadvantage structures cognitive and educational outcomes most strongly, followed by behavioural outcomes, and has far less marked a pattern in general health and overweight. Parents' physical and mental health when the child was aged 3 are important predictors of change in child behaviour and child health between the ages of 5 and 7, while parents' BMI is unsurprisingly important in predicting change in children's BMI.
17. The patterns observed applied equally in Northern Ireland and Great Britain. In other words, we found no evidence to suggest that the impact of social disadvantage was greater or less in Northern Ireland than in Great Britain, or that the factors intervening between poverty and children's cognitive, educational, behavioural, health and BMI outcomes differed between NI and GB.

## Chapter 1: Introduction

This report presents an analysis of child outcomes at age 7 in the Millennium Cohort Study in terms of the conditions and experiences which precede them as recorded at earlier sweeps of the survey. In particular the analyses aim to unpack the relationship between earlier child poverty and child outcomes at 7 examining how far the statistical link can be accounted for by background factors and modifiable behaviours.

Inequalities are socially structured not just by income poverty, but also by related dimensions of social stratification such as parental education and social class. These dimensions of stratification are in turn related to human, cultural and social capital resources, and to related behaviours. We are interested in the extent to which the effects of these structural dimensions of inequality are direct or indirect. Running through the exercise is a search for any explanatory factor which may be particularly prevalent in Northern Ireland compared to other countries of the UK, and to test whether the existence or strength of the relationships is different in Northern Ireland from the rest of the UK.

In previous work (Sullivan et. al. 2010), we examined outcomes at age 5 and it is recommended that the reader acquaints themselves with that report<sup>1</sup>. This current report builds on our previous work and develops it by examining development beyond age 5 to age 7. This means that we are able to examine whether inequalities widen, narrow or remain stable during these important early primary school years, and which of those aspects of children's lives associated with disadvantage have continuing impacts on outcomes at age 7, even taking into account their status regarding the same outcome at age 5.

### 1.1 The Millennium Cohort Study (MCS)

Understanding the social conditions surrounding the first seven years of a child's life is fundamental to the study of the whole of the life course. The MCS provides an opportunity to answer major questions about the prospects of children born in 2000-01 concerning wealth and poverty, the quality of family life, and outcomes for children.

The evidence accumulated over the first seven years of life for the MCS children is both longitudinal and multi-faceted. It allows us to assess the cumulative impact of disadvantage experienced in previous waves of the study. It also allows us to assess the impact of different forms and indicators of disadvantage across the various domains of the child's life, and to consider the extent to which the same indicators predict adverse outcomes in, for example, health and education, which would suggest a concentration of disadvantage across domains within the same families. It

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<sup>1</sup> See: [http://www.ofmdfmi.gov.uk/the\\_consequences\\_of\\_childhood\\_disadvantage\\_in\\_northern\\_ireland.pdf](http://www.ofmdfmi.gov.uk/the_consequences_of_childhood_disadvantage_in_northern_ireland.pdf)

further allows us to consider the extent to which the predictors of adverse outcomes are domain specific.

The sample population for the study was drawn from all live births in the UK over 12 months from 1 September 2000 in England and Wales, and 13.5 months from 23rd November 2000 in Scotland and Northern Ireland. The sample was selected from a random sample of electoral wards, disproportionately stratified to ensure adequate representation of all four UK countries, deprived areas and areas with high concentrations of Black and Asian families in England. The sample design of the MCS differs from that of its predecessors (The National Child Development Study 1958 and British Cohort Study 1970) in that it took a whole year's births, and covers the whole of the United Kingdom. The sample was drawn slightly later in Scotland and Northern Ireland so as not to coincide with another survey being carried out on families with babies in these areas, and recruitment was extended into January 2002 in response to a lower than expected birth rate. There have, so far, been four surveys:

- Millennium Cohort Survey (MCS) 1: at age 9 months
- MCS 2 at age three
- MCS 3 at age five
- MCS 4 at age seven

At each survey there have been interviews with both resident parents, collecting a wide range of socio-economic and health data. At the three most recent sweeps there have been assessments of the child's height and weight (used to measure obesity) and cognitive development. These variables are supplemented at ages 5 and 7 by teacher rating of the child's progress at school.

## **1.2 Analytical Strategy**

We have run a set of paired statistical regression models predicting a set of outcomes at sweep 4 (age 7) as follows:

Model 1: Predictors are taken from waves 1 and 2 (age 9 months and 3 years). The same list of predictors as for the analyses of outcomes at age 5 reported in the previous study is used. Variables which proved non-significant (at the 0.05 level) were generally omitted. A descriptive account of differences between the countries of the UK in terms of these variables is provided in our previous report (Sullivan, et al. 2010).

Model 2: The relevant outcome variable from the previous age 5 research is included as a predictor, so, for example, cognitive outcomes at age 5 are included in the model of cognitive outcomes at age 7. The second model then becomes a model of how far the predictions of model 1 had already been established by age 5, and how far they continued to be reflected in changes in the outcome between age 5 and

age 7, allowing the question to be addressed of whether inequalities and differences, within and between NI and GB, have widened, narrowed, or stayed constant.

We analyzed outcomes at age 7 in terms of indicators taken at earlier sweeps, avoiding the possible ambiguity of explaining outcomes in terms of current circumstances which could be affected by reverse causation. Our analysis thereby presents an estimate of some medium-term outcomes of the children's circumstances and conditions of life in their first three years.

All analyses were appropriately weighted to account for the sample design, attrition and non-response and was carried out in STATA software (Ketende 2010).

### **1.2.1 Child Outcomes**

We examine the following five indicators at MCS4 (at around age 7).

#### ***Cognitive***

Three scales were used for the cognitive assessment in the fourth MCS sweep. They are the Pattern Construction and Word Reading subscales from the British Ability Scales (BAS) (Elliott 1996; Hill 2005) and the Progress in Maths assessment. All were directly administered to the children by interviewers who were specially trained, but were not professional psychologists. For the two subscales of the BAS, age-related starting points, decision points and alternative stopping points were used to ensure that the motivation and self-esteem of the child were protected, that the testing focused on the most suitable items for the child, and that the assessment time was kept to a minimum (Hill, 2005).

Following Jones and Schoon (2010), the three assessment scales, adjusted for age at the MCS3 interview (using norms from the BAS reference population), were combined into a single index using principal components analysis (PCA), as had been done with an overlapping set of scales at age 5 (Jones and Schoon 2008). PCA analysis of the three scales confirmed the presence of a general underlying cognitive factor. The underlying factor accounted for 63 per cent of the total variance among the three tests. The scores for the Overall Cognitive Index, based on the first unrotated factor from the PCA were then standardised to a mean of 100 and a standard deviation of 15. No age adjustment was done for the age 7 scores as variations in age at the MCS4 interview are allowed for by internal standardization, that is, by including the age at the MCS4 interview within the regression model.<sup>2</sup> The composite score for age 7 has a mean of 100 and a standard deviation of 15, similar to an IQ score.

#### ***Education***

Teacher assessment at age 7 was based on a paper questionnaire sent to the child's teacher in all four countries of the UK.

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<sup>2</sup> In practice there was least variation around age 7 in the interviews conducted in Northern Ireland, but the adjustment is needed for the sample in GB

The aspects of the child's abilities rated by teachers were as follows:

- (i) Speaking and listening
- (ii) Reading
- (iii) Writing
- (iv) Science
- (v) Maths and numeracy
- (vi) Physical Education (PE)
- (vii) Information and Communication Technology (ICT)
- (viii) Expressive and Creative Arts (e.g. art & design, music, drama)

The above 8 items were summed to generate a teacher assessment scale, with scores for each item ranging between 1 (well below average) to 5 (well above average). This generates a scale with the range 8-40. Cases with 3 or more missing items ( $n = 81$ ) were excluded from the scale. In cases where only 1 or 2 items had missing information, the average of the remaining scores was imputed. For the regression analyses, the combined score was converted into a z score with standard deviation (sd) of 1 and mean of zero.

At age 5 the teacher evidence came from routine administrative data on the Foundation Stage Profile (FSP) in England, and a postal survey asking analogous questions in the other three countries, including Northern Ireland

### ***Behavioural***

Total difficulties scores, derived from the four behaviour problems subscales of the Strengths and Difficulties (SDQ) Questionnaire were treated as z scores.

The behavioural development of the children is measured with the SDQ. The SDQ is a behavioural screening questionnaire for 3 to 16-year-olds (Goodman 2001; Goodman, et al. 1998). It consists of 25 items which generate scores for five subscales measuring: conduct problems; hyperactivity; emotional symptoms; peer problems; and pro-social behaviour. The child's behaviour is reported by a parent, normally the mother, in the computer assisted self-completion module of the questionnaire. For the following analysis an overall difficulties score was computed by summing replies to the 20 items in subscales indicating behaviour problems, i.e. conduct problems, hyperactivity, emotional symptoms, and peer problems.

The same questions were put to the main informant (almost always the child's mother) at both age 5 and age 7 surveys, and the scores are constructed the same way at each wave. Rather than age-adjusting these scores based on the non-representative BAS population, we adjust for age in our regression analyses.

## **Child Health**

- a. Child's general health (as reported by main respondent).
- b. Overweight (including obesity)

Both these indicators are measured at ages 5 and 7.

The main respondent (typically the mother) reported on the general health of the child, rating it as excellent, very good, good, fair or poor. This provides a broad subjective indicator of the child's general health. This indicator was then combined with the mother's report on whether the child had experienced any long term illness. The resulting binary derived measure tells us whether the child is reported to have excellent health (without a long term illness), or either less than excellent health or a long term illness.

Children from the MCS were weighed and measured by interviewers trained for this purpose. This provided an opportunity to examine the prevalence of overweight and obesity within this contemporary cohort of UK children. Body Mass Index (BMI; weight/height squared), a proxy for adiposity, is the most common measurement of body size at the population level. Childhood overweight and obesity is defined by the International Obesity Task Force cut-offs for BMI (Cole, et al. 2000). These cut-offs were based on data from six countries, including the UK, and the centiles are linked to the widely accepted adult cut-offs for overweight and obesity. On that basis therefore, the data can be compared across ages and internationally

### **1.2.2 Predictors and controls**

1. Disadvantage, Northern Ireland and child specific controls
  - N Ireland versus GB (also distinguishing England for Education)
  - Experience of income below poverty line at either or both of the first two interview sweeps
  - Gender
  - Age at interview
  - Birthweight
  - Birth order
2. Social background controls (mainly from sweeps 1 and 2)
  - Ethnic group<sup>3</sup>
  - Religion
  - Family structure
  - Number of younger siblings born up to age 5
  - Parents' educational level (highest of both parents at first 2 interview sweeps)
  - Parents' social class (highest of both parents at first 2 interview sweeps), based on the NS-SEC categorisation, which groups

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<sup>3</sup> Although there are few ethnic minority families in the Northern Ireland sample, there are substantial minority groups in Great Britain, particularly England. Ethnicity is included as one of the control variables in our models as a possible source of explanation of differences between children and between countries.

occupations according to their employment relations and conditions (see: Office for National Statistics [www.ons.gov.uk/about-statistics/classifications/current/ns-sec/history/index.html](http://www.ons.gov.uk/about-statistics/classifications/current/ns-sec/history/index.html))

- Parental employment
  - Parental longstanding illness
  - Parental mental health/life satisfaction
3. Neighbourhood characteristics (mainly from Sweep2)
- Sampled in a disadvantaged ward ( Sweep 1)
  - Reported satisfaction with local area social capital indicator  
Rural or urban
  - Moved home at all between interview sweep 1 to sweep 3  
Housing tenure
4. Other potential moderating/mediating indicators (data from first two surveys)
- Parental smoking (in pregnancy and anyone in home later)
  - Breastfed
  - Indicators of parenting practices at interview sweeps 1 and 2, such as rules and regular mealtimes
  - The home learning environment
  - Fathers' involvement in parenting
  - Use of different types of childcare before and after age 3
  - Parental BMI at wave 2

The full regression template is provided in appendix A1 and a full description of the variables and the dates of measurement is in appendix A2.

### **Modelling**

The outcomes were modelled using linear regression for continuous variables and logistic regression for categorical variables.

We ran a set of nested models for each outcome, building up the following blocks of variables:

1. Predictors and controls measured at interview sweeps 1 to 3 as outlined above;
2. Predictors from model 1, plus relevant outcome variables at age 5.

The first model replicates our models of outcomes at age 5, allowing us to address whether the same predictors are important at age 5 and age 7 and whether differentials that were found between NI and GB at age 5 persist at age 7. Variables which are not significant at the 0.05 level are dropped from the model.

Models are run for the whole of the UK. A dummy variable for GB is used to test for interactions between Northern Ireland and other factors included in our models. This approach allows the investigation of whether there were significant differences in the patterns found between Northern Ireland and Great Britain. This approach enables the examination of specific questions such as, for example, whether markers of

disadvantage, such as low income, are more or less powerful in determining each outcome in Northern Ireland compared to Britain?

While regression analysis is a powerful tool, we would nevertheless caution the reader about the possibility of misinterpretation or over interpretation of the output of the sort of models presented here. Given a large enough number of independent significance tests carried out at the 0.05 level, some spurious positive results are inevitable. It is also important to stress that variables which emerge as being linked to the outcome, are a function of all the other variables included in the model. The modelling process, like any other form of analysis, is subject to the decisions of the analyst, which are always open to debate. The reader should also be wary of drawing causal implications from the findings and should consider the possibility of non-causal and reverse-causal mechanisms. For example, a link between non-working mothers and children in poor health is more plausibly interpreted as being due to mothers leaving the labour market to care for a sick child than to the child's health being damaged by having a mother at home. The longitudinal approach we take here is designed to deal with these sorts of difficulties but nevertheless, does not render interpretation entirely unproblematic. Experienced readers of statistical analysis will be well aware of these provisos which apply to all analyses of this sort, but as this report is aimed at a broad audience, we hope that this note of caution will not go amiss.

## Chapter 2: Cognitive Outcomes

**Table 2.1: Cognitive Index at age 7 by Country**

	Mean	[95% CI]	Unweighted sample
England	101.3	[101.0,101.7]	7133
Wales	98.1	[97.4,98.9]	1703
Scotland	101.1	[100.3,101.9]	1329
NI	99.5	[98.7,100.4]	1126
GB	100.8	[100.5,101.1]	10165
<i>Observations</i>			11291

Table 2.1 shows that the mean test score in NI was very slightly, but statistically significantly lower than the mean score in GB. We should note that the content and construction of the cognitive test score has changed between wave 3 and wave 4, so the comparison is not between identical measures, and it is possible that this may be reflected in the results. Nevertheless, this represents a notable change since age 5, when children in NI had higher test scores than those in GB. At age 7, England and Scotland had higher mean scores, and Welsh children had the lowest mean scores.

**Table 2.2: Cognitive Index at age 7 by UK Income poverty at wave 1 and 2**

S4 Cognitive Index	GB		NI	
	Mean [95% CI]	Unweighted sample	Mean [95% CI]	Unweighted sample
Not Poor Above 60% median at both waves	104.1 [103.5,104.8]	5419	103.1 [101.6,104.6]	444
Transient Poor Below or above 60% median at one wave	98.1 [97.3,99.0]	3022	97.8 [95.9,99.6]	464
Poor Below 60% median at both waves	94.5 [93.5,95.6]	1509	94.4 [91.4,97.4]	174
Missing data at both	99.3 [96.2,102.4]	215	100.9 [97.1,104.6]	44
<i>Observations</i>		10165		1126

Table 2.2 shows that there is a strong relationship between income poverty and cognitive scores with the same pattern apparent in both GB and NI. Those who had not experienced income poverty during interview at waves 1 and 2 had the highest mean scores, followed by those who had experienced poverty at one wave only; and those who had experienced poverty at both waves who had the lowest scores.

The gap of nearly 10 points between those above and below the poverty line at both surveys in GB represents two thirds of a standard deviation of the cognitive score, or analogous to 10 points on an IQ score (1 standard deviation on an IQ score represents 15 points. Our variable is not formally an IQ score, but it is measured in the same metric).

**Model 1** (Appendix Table A3), as in the raw scores on Table 2.1, shows no significant Northern Ireland advantage. This is in contrast to the outcomes observed at age 5, when the NI advantage was statistically significant in a model based on the same set of regressor variables. The outcome at age 5 may be accounted for by the earlier NI advantage being due to the earlier school starting age, in which case, its effect may have entirely 'washed out' by age 7. The age of the child in months is highly significant, increasing by 0.7 points (or about 0.05 of a standard deviation) with a month of age, although this only varies by a few months in the sample, and especially little in Northern Ireland. Girls are significantly advantaged compared to boys, equivalent to just over one month's lead according to this estimate. Low birth weights are significantly negative, especially very low birth weights (below 2kg).

Regarding ethnicity, only the 'other ethnic' parameter, which relates to a small category, is significant, and this is positive on cognitive outcomes. Older mothers are associated with higher test scores. The number of older siblings is negatively linked to test scores, with the size of the negative coefficient increasing in line with the number of older siblings. The number of younger siblings was also investigated but found to make no significant difference.

The children of the most highly educated parents have higher test scores than those with no qualifications, and this is statistically significant for degree level (NVQ4) and postgraduate (NVQ5) qualifications. Comparing the latter coefficient with the one for age in this model, the cognitive lead for children whose parents had postgraduate degrees over those with no qualifications, all else being equal, was equivalent to 8 months of difference, almost more than the age range actually observed. Social class is statistically significant across all categories, with the children of professional and managerial class parents being most advantaged. The gap between parents in professional and managerial jobs at sweep 2 and those with minimal employment is even greater than that between high and low parental qualifications but it cannot be simply extrapolated into an age equivalent since it implies a greater range of age than those observed. In other words, the coefficient implies a difference in cognitive scores between the highest and lowest social class categories of greater than 8 months, which is off the scale of the reliably observed age in our sample.

Renting (whether privately or socially) is negative on cognitive outcomes compared to home ownership. Perhaps surprisingly, living in the town or fringe is significantly negative compared to living in an urban environment.

Turning to variables reflecting parenting and the home environment, breastfeeding has a strong positive association with cognitive scores. Breastfeeding for 3 months or more, all else being equal is associated with around 3 months worth of progress in cognitive scores at age 7. Regular bedtimes and regular mealtimes are both highly

significant and positive, whereas family rules are only marginally significant. The PIANTA scale of parental warmth also has only a small, significant positive coefficient, given all the other factors. The Home Learning Environment and daily reading to the child, and especially taking the child to the library at age 3, are significantly positively associated with cognitive outcomes at age 7.

In **model 2**, the child's cognitive scores at age 5 are introduced. Test scores at age 5 are predictive of test scores at age 7, to the tune of half of a point on the age 7 score for every point on the age 5 score and, in general, this reduces the other coefficients in the model where the score at age 5 is already reflecting the association with the predictor variables. To some degree model 2 provides us with a model of the change in the children's cognitive test score performance between the ages of 5 and 7, but we also note that the age 5 scores are not necessarily measuring all the same skills.

The association with the child's age at the age 7 interview is of approximately the same magnitude in both models, which is as expected as it would not have been reflected in the age 5 score.

The birth weight coefficients are reduced in this model, but some remain significantly negative, and the coefficient for birth weights below 2kg remains substantial, suggesting cumulative disadvantage for this group, and indeed the estimate of the impact of low birth weight on cognitive score at 7 is greater than the estimate on the outcome at age 5 shown in model 4 of Appendix A3 of our previous report (allowing for the different units of measurement).

The association between the age of the mother at first birth and cognitive scores at age 7 is fully captured by cognitive scores at age 5. The effect of the number of older siblings is also largely captured by the age 5 test score suggesting that the disadvantage of having two or more older siblings is already established at age 5. The association between parents' qualifications and children's test scores is reduced in this model, with only the parameter for postgraduate level qualifications remaining significant. Perhaps surprisingly, social class in the early years is more predictive than parental education of children's test scores in this model. Social class remains significant across all categories, with all classes significantly disadvantaged compared to the professional and managerial category, showing a widening of the social class gap in cognitive scores between the ages of 5 and 7 despite the wide range of controls included in the model. A widening of differentials between age 5 and 7 by parental education and social class is also apparent if we compare Model 1 with the analysis of outcomes at age 5 in our previous report.

The housing tenure parameters on this outcome at 7 are reduced in model 2 compared to model 1, although private renting remains somewhat significantly negative compared to home ownership and these terms were less significant at age 5. Area type, also not independently predictive at age 5, becomes more significant in model 2, and both town and village/rural dwellings are significantly negative compared to urban areas. This is surprising given that urban environments are often viewed negatively. It is possible that school quality is superior in urban areas.

Within the indicators of parenting behaviour, breastfeeding, whose effect was not well determined at age 5, retains significance in model 2, although the coefficients are reduced from model 1. The fact that breastfeeding is significant in model 2 suggests that the apparent benefits of breastfeeding for cognitive development become more apparent in the early school years. It may be that breastfeeding is acting as a proxy for other important maternal characteristics, such as maternal IQ (Der, et al. 2006). Regular bedtimes and meal times at age 3, which had positive but poorly determined estimates in explaining the cognitive score at age 5 become significant at 7, and remain so in model 2. The PIANTA warmth scale becomes insignificant in model 2, as does daily reading, and the Home Learning Environment scale parameter is much reduced, suggesting most of this benefit is already apparent at age 5. However, the library visiting measure remains highly significant, with a positive coefficient, suggesting that the benefit of having parents who take the child to the library in the early years persists into improvement in the child's attainment even after they have started school. One variable which was found to be positively associated with cognitive scores at age 5, but which was not detected in improvements to age 7, was the experience of formal childcare at or before age 3.

Rather than moderating the effects of ethnic group, stronger ethnic parameters emerge in model 2. There are increased positive coefficients for the Indian and 'other ethnic' groups and the Pakistani and Bangladeshi coefficient becomes positive and significant in this model having been negative but non-significant in model 1. It is important not to misinterpret this as suggesting an absolute advantage for this group, rather this should be interpreted as reflecting greater progress for Pakistani and Bangladeshi children between the ages of 5 and 7, from a lower base than white children, controlling for the other variables in the model. This is evidence that the closing ethnic gap which has been demonstrated in bivariate associations is not accounted for by anything else in the model. The passage of time between age 5 and 7 is especially favourable for the ethnic minorities, gaining ground from a lower base. This may well be due at least in part to rapid progress in English language on starting school for children in families where English is not the only or main language.

Overall, we can say that children with low birth weights and those from lower social class origins, in particular the children of the long term unemployed and semi-routine and routine workers are particularly disadvantaged in terms of cognitive progress between the ages of 5 and 7. These variables stand out as more important than either parental education or our measures of parenting behaviours and the home environment when we examine progression in this period of early schooling.

## Chapter 3: Educational Outcomes

The teacher questionnaire asked class teachers to rate the cohort child in the following way:

*“You are asked below to rate some aspects of the study child's ability and attainment. Each area is subdivided into five categories. In so far as your professional experience will allow, please rate the child in relation to all children of this age (i.e. not just their present class or, even, school).”*

*“Tick one box in each row: Well above average; Above average; Average; Below average; Well below average”*

The aspects of the child's abilities rated by teachers were as follows:

1. Speaking and listening
2. Reading
3. Writing
4. Science
5. Maths and numeracy
6. Physical Education (PE)
7. Information and Communication Technology (ICT)
8. Expressive and Creative Arts (e.g. art & design, music, drama)

Tables 3.1 to 3.8 show these ratings broken down by country. Although one might have expected the reference group used by teachers to be determined by the country they are teaching in, leading to negligible differences between countries on these measures, in fact some significant differences do emerge. Children in NI are more likely to be rated as 'well above average' in writing compared to children in England, Scotland and Wales (9% compared to between 4.2 and 6.9%) and do significantly better than GB. In terms of reading skills, there is no significant difference between the UK and GB, although the difference between the four countries is significant, with children in Scotland most likely to be rated as 'average'. There is a significant difference between NI and GB in teacher ratings of speaking skills, with NI children more likely to be rated as 'well above average' compared to children in England, Scotland and Wales (14% compared to between 8% and 9.6%).

**Table 3.1 Skill with writing (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	6.2	8.6	6.2	6.8	6.4	6.4
Below average	22.5	20.8	18.4	16.7	22.3	21.8
Average	38.5	43.9	44.4	40.4	39.3	39.4
Above average	25.9	20.7	26.8	27.0	25.5	25.8
Well above average	6.9	6.0	4.2	9.0	6.5	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4572	1082	903	785	6557	7342
Weighted sample	4732	1072	890	785	6586	7422
Chi-square P-value	0.000				0.011	

**Table 3.2 Skill with reading (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	5.3	7.2	4.5	6.0	5.3	5.3
Below average	15.4	18.1	14.5	15.4	15.6	15.4
Average	31.7	35.4	39.5	32.9	32.9	32.7
Above average	34.4	27.6	34.0	31.4	33.7	33.9
Well above average	13.3	11.7	7.5	14.3	12.5	12.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4575	1079	906	785	6560	7345
Weighted sample	4737	1068	895	783	6594	7429
Chi-square P-value	0.000				0.593	

**Table 3.3 Skill with speaking (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	3.1	3.2	3.0	3.7	3.1	3.1
Below average	12.7	12.2	8.0	8.7	12.5	12.1
Average	43.7	46.7	49.4	40.8	44.6	44.2
Above average	31.0	29.0	31.7	32.8	30.6	31.0
Well above average	9.6	8.8	8.0	14.0	9.3	9.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4579	1083	903	791	6565	7356
Weighted sample	4742	1073	898	790	6603	7442
Chi-square P-value	0.001				0.002	

**Table 3.4 Skill with maths (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	3.9	5.4	2.5	4.2	3.8	3.8
Below average	15.5	15.5	13.0	12.4	15.5	15.2
Average	38.9	44.1	49.0	41.5	40.4	40.3
Above average	32.1	27.8	31.8	33.4	31.5	31.9
Well above average	9.6	7.2	3.7	8.6	8.8	8.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4562	1080	913	784	6555	7339
Weighted sample	4723	1070	907	784	6587	7422
Chi-square P-value	0.000				0.304	

**Table 3.5 Skill with science (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	2.6	2.7	2.0	2.4	2.5	2.5
Below average	10.1	11.0	8.8	8.5	10.2	10.0
Average	52.0	52.8	66.5	55.9	53.7	53.6
Above average	29.1	26.6	21.0	27.4	27.8	28.2
Well above average	6.2	6.9	1.6	5.8	5.7	5.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4573	1080	874	770	6527	7297
Weighted sample	4736	1071	865	772	6574	7401
Chi-square P-value	0.000				0.734	

**Table 3.6 Skill with PE (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	1.5	1.2	0.9	1.6	1.4	1.4
Below average	7.1	6.7	6.2	4.8	7.0	6.9
Average	61.5	66.1	69.4	61.1	62.7	62.5
Above average	25.4	23.1	21.5	26.4	24.7	24.9
Well above average	4.5	2.8	2.0	6.1	4.2	4.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4566	1085	912	786	6563	7349
Weighted sample	4729	1074	906	786	6594	7432
Chi-square P-value	0.000				0.059	

**Table 3.7: Skill with ICT (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	1.6	1.8	1.1	2.2	1.6	1.6
Below average	8.9	8.8	8.4	8.2	9.0	8.9
Average	62.5	65.7	72.2	64.4	63.8	63.6
Above average	24.1	21.5	16.4	21.7	22.9	23.1
Well above average	2.9	2.3	1.9	3.6	2.7	2.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4567	1084	904	787	6555	7342
Weighted sample	4727	1073	895	786	6584	7421
Chi-square P-value	0.003				0.595	

**Table 3.8: Skill with arts (teacher assessment), age 7**

	England	Wales	Scotland	NI	GB	UK
Well below average	1.9	2.4	1.2	1.4	1.8	1.8
Below average	10.0	9.9	9.0	8.5	10.1	9.9
Average	60.7	62.3	67.5	60.8	61.7	61.4
Above average	23.2	22.2	20.0	25.0	22.6	22.9
Well above average	4.2	3.1	2.3	4.3	3.9	4.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	4575	1084	916	787	6575	7362
Weighted sample	4738	1074	909	785	6606	7444
Chi-square P-value	0.027				0.466	

There are no further significant differences between NI and GB, although an interesting pattern of differences between the four countries emerges with teachers in Scotland consistently rating a higher proportion of children as 'average' than those in the other three countries. This is also the case in maths, science, ICT, PE and arts.

The above 8 items were summed to generate a teacher assessment scale with scores for each item ranging between 1 (well below average) to 5 (well above average). This generates a scale with the range 8-40. Cases with 3 or more missing items (n = 81) were excluded from the scale. In cases where only 1 or 2 items had missing information, the average of the remaining scores was imputed. Table 3.9 shows the weighted mean of the total score for each country. Differences between the four countries are small, but the mean score in Northern Ireland (26.3) is significantly higher than the mean scores in Wales and Scotland (25.3 in each case).

**Table 3.9: Total education score (teacher assessment), age 7**

	Weighted Mean	95% CI
England	25.9	[25.7, 26.1]
Wales	25.3	[24.9, 25.6]
Scotland	25.3	[25.0, 25.7]
NI	26.3	[25.9, 26.7]
UK	25.8	[25.6, 25.9]
Observations	7364	

Table 3.10 shows the relationship between teacher ratings and poverty in the first two waves of the survey. Children who had not experienced poverty in either wave received the highest ratings from their teachers, followed by those who had experienced poverty in only one wave. Those who had experienced poverty in both waves received the poorest evaluations from their teachers. The gap between the never-poor and the consistently poor is around 4 points. This pattern does not differ between GB and NI.

**Table 3.10: Total education score (teacher assessment), age 7, GB/NI and poverty wave 1 or 2**

	NI		GB	
	Weighted mean	95% CI	Weighted mean	95% CI
Not Poor Above 60% median at both waves	27.8	[27.2, 28.3]	26.8	[26.7, 27.0]
Transient Poor Below or above 60% median at one wave	25.6	[24.9, 26.2]	24.8	[24.6, 25.1]
Poor Below 60% median at both waves	23.6	[22.5, 24.8]	23.0	[22.6, 23.3]
Missing data at both waves	25.7	[23.9, 27.5]	25.0	[23.9, 26.0]

We carried out a linear regression analysis (Appendix Table A4) treating the z-score (mean=0, sd=1) of the teacher assessment scale as the dependent variable. Model 1 includes variables measured in the first two waves of the study which are significant predictors of the educational assessment scale at age 7. Model 2 also includes the educational assessment variable from age 5. Thus, model 2 captures progress between the ages of 5 and 7.

**Model 1** shows that children in Northern Ireland received higher teacher ratings than children in GB controlling for the other variables in the model. Girls and older children also received higher ratings. Children with lower birth weights received relatively poor ratings. Ethnicity is not significant, with the exception of the small 'other' category, which includes Chinese – these children received significantly higher ratings from their teachers compared to white children.

Children from workless households at age 3 scored about 0.25 standard deviations lower than children from households with two working parents and children in households where the main respondent (typically the mother) worked, but the partner was not employed were also similarly disadvantaged. Older mothers were linked to higher ratings, while having two or more older siblings was linked to lower ratings. Surprisingly, parents' qualifications has almost no significant effect (with the exception that children of parents with NVQ1 level qualifications actually fared significantly worse than those with no qualifications). In contrast, parents' social class proved highly significant, with lower social classes scoring relatively poorly (by nearly one quarter of a standard deviation, other things being equal) compared to the professional and managerial class. Housing tenure is also significant, with relatively negative outcomes for both private and social renters. The father's risk of depression at wave 1 is also linked to poorer scores for children.

Turning to variables measuring aspects of parenting, breastfeeding for over three months was significantly linked to higher scores. Regular bedtimes and regular mealtimes at age 3 are both positively associated, while shouting at the child is negatively associated. Warm parenting, as measured on the PIANTA scale is positive, while the PIANTA measure of conflict is negatively linked to the teacher assessment score. Higher scores on the 'Home Learning Environment', having someone who takes the child to the library, and watching fewer than three hours of TV a day are all positively linked to the teacher assessment score. There is a small positive effect of early formal childcare. Finally, the children of underweight mothers received more positive assessments, but we would not set too much store on this, since the numbers of such mothers are very small. On the whole the estimated coefficients on social class and employment variables at age 3 (which we have already shown swamp income indicators of poverty) imply a stronger connection with the teacher rating at age 7 than the battery of variables about parenting behaviour, significant though they are.

In **model 2**, we introduce the child's Foundation Stage Profile (FSP) score at age five. This, unsurprisingly, is a powerful predictor of the teacher assessment score at age seven. For every standard deviation unit increase at age 5, the score at age 7 rises by half a standard deviation. The effects of many of the other variables in the model, though predictive at age 5, are fully or largely captured by this variable. For example, the Northern Irish advantage is absent in model 2, showing that NI cohort children did not increase their teacher ratings between the ages of five and seven by any more than GB cohort children. The female advantage is also fully captured by the inclusion of the age five score. However, the child's age at the fourth sweep interview (which was some time before the actual assessment) is linked to progress between the ages of five and seven, with the older children increasing their advantage, while lower birth-weight children maintain a disadvantage. The 'other including Chinese' ethnic group also increases its advantage, while the coefficients for mixed race and Pakistani and Bangladeshi children become significantly positive in this model confirming that they make greater progress than white children between the ages of five and seven, based on the teacher assessments.

The effect of household employment and family structure on teacher assessments at age seven is largely captured by the teacher assessments at age five, with the exception that the non-traditional set-up of the mother working while the partner stayed at home remains significantly negatively associated. It may be that this fairly unusual situation is less likely to be chosen, and reflects economic misfortune, such as the partner losing his job or being unable to work. The age of the mother is insignificant in this model, and the negative association with the number of older siblings is largely, though not entirely, captured by the inclusion of the age five teacher assessment measure.

The effect of social class is strikingly robust and persistent and is only slightly reduced by the inclusion of the age five outcome measure. Clearly, social class differentials widen between the ages of five and seven in teacher evaluations as well as cognitive scores.

The effects of partner's malaise and housing tenure are fully captured by the inclusion of the age five outcome.

Turning to the parenting variables, the effects of regular bedtimes and mealtimes, PIANTA warmth and conflict, shouting, and formal childcare, are all fully captured by the inclusion of the age five outcome. However, the Home Learning Environment, taking the child to the library, and less than three hours of TV a day in the pre-school period are all linked with a positive trajectory in teacher assessment between the ages of five and seven.

We tested for interactions between NI and the other parameters in this model in order to assess whether the pattern of predictors differs in NI compared to GB, but found no significant differences, which means we cannot reject the hypothesis that the estimated relationships apply in Northern Ireland as elsewhere.

In summary, low birth weight and low social class status stand out as the most important negative predictors of continuing divergence in teacher ratings between the ages of 5 and 7, while library usage is a notable protective factor. The predictors of teacher ratings at age 7, conditional on the rating at age 5, are similar to the predictors of cognitive test scores and gaps with respect to social class.

## Chapter 4: Behavioural Outcomes

The Total Difficulties score derived from the Strength and Difficulties Questionnaire (SDQ) yields scores in the range of 1-40, where anything over 17 is regarded as warranting clinical attention. Table 4.1 shows that children in Northern Ireland had significantly lower difficulties scores (i.e. were at an advantage) than children in GB at wave 4 as they also did at wave 3. Breaking this down by country, England and Wales both have a higher mean difficulties score (7.5) than Northern Ireland (6.9) or Scotland (6.8) which are not significantly different from each other.

**Table 4.1 mean of total difficulties score by UK country**

	Mean	95% CI
England	7.5	[7.4,7.6]
Wales	7.5	[7.2,7.7]
Scotland	6.8	[6.5,7.1]
Great Britain	7.4	[7.3,7.5]
Northern Ireland	6.9	[6.6,7.2]
Observations	11210	

**Table 4.2 SDQ total difficulties score by Income poverty at Sweep 1 and 2**

S4 SDQ total difficulties score	GB	NI
	Mean [95% CI]	Mean [95% CI]
Not Poor Above 60% median at both waves	6.5 [6.3,6.6]	6.0 [5.5,6.5]
Transient Poor Below or above 60% median at one wave	8.3 [8.0,8.5]	7.4 [6.7,8.0]
Poor Below 60% median at both waves	10.0 [9.7,10.4]	8.9 [7.9,9.9]
Missing at both	7.3 [6.4,8.3]	7.5 [6.0,9.0]
Observations	10087	1123

Our regression analysis in **model 1** (Appendix Table A5) shows that the Northern Ireland advantage in behaviour (i.e. lower total difficulties scores), remains when we control for a large number of relevant factors. All else being equal, the children in Northern Ireland score on average 0.54 better than Great Britain which is about one quarter of the difference between certainly having one of 20 problem behaviours and not having any at all. Girls and older children both had lower difficulties scores. Higher birth weights were linked to lower difficulties scores as compared to low birth weights.

Family labour market status at age 3 is also significant as children from workless families, whether they are single-parent or two-parent households, receive higher difficulties scores. Other things being equal, the children of older mothers (i.e. those who started childbearing relatively late) have lower difficulties scores than the children of younger mothers. The greater the number of older siblings, the lower the difficulties score compared to the score for only children.

Social class is highly significant. Compared to the professional/managerial category, all other categories barring the 'intermediate' class, report significantly higher difficulties scores with a particularly large coefficient for the long-term unemployed category.

Children whose parents had had a longstanding illness or disability at wave 2 have higher difficulties scores at age 7. In addition, children whose parents suffered medium or high distress on the Kessler scale at sweep 2 get a substantially higher difficulties rating at age 7, the biggest coefficient in this model at 3 points, which translates as an additional one and a half items, or having 3 problems 'certainly' rather than 3 problems 'somewhat'. The children of respondents with high life satisfaction at wave 2 also receive lower difficulties scores.

Turning to area and housing variables, as compared to mothers who perceived their area as 'excellent' for bringing up children at wave 2, lower neighbourhood ratings (especially 'poor' or 'very poor') were linked to significantly higher child difficulties scores at age 7. Compared to having felt 'very safe' in the area, feeling less safe is also linked to higher difficulties scores. Cohort members who had never moved home in the pre-school period also receive lower difficulties scores compared to those whose families had moved

Both black children and children from the small 'other' ethnic category received lower difficulties scores as compared to white children. Caution must be exercised in interpreting this effect, given the heterogeneity within the black ethnic group and given the number of other variables in the model which are also linked with ethnic group and which are being held constant. However, it suggests that, other variables in the model being equal, black and 'other' ethnic minority children are rated as better behaved by their parents.

A number of parenting and parental behaviour variables are also linked to the child's difficulties score. Breastfeeding is only marginally linked to behaviour, as the variable taken as a whole is statistically significant, but none of the parameters are significant taken individually. Moderate TV viewing (between one and three hours daily) is linked to lower difficulties scores as compared to high levels of viewing (over three hours). Library visits and frequent reading to the child are also linked to lower levels of social and behavioural difficulties. Regular mealtimes are also linked to lower difficulties scores.

Parental health attributes and behaviours are also significant. Mothers' BMI is linked to difficulties (high BMI is linked to greater difficulties), and the children of mothers

who did not smoke during pregnancy have fewer difficulties compared to the children of mothers who smoked in pregnancy.

The pattern and often the magnitude of associations between the predictors of behaviour problems at 5 and at 7 are very similar. A notable difference is the insignificance of maternal education at age 7.

In **model 2**, the total difficulties score at age five is included as a predictor of total difficulties at age seven. Unsurprisingly, difficulties at age five are strongly linked to difficulties at age seven by a factor of 0.71. Having accounted for this, model 2 is close to a model of change in the total difficulties score between the ages of five and seven. In other words, this model informs us of the additional contribution of early years circumstances at age 7 over and above those accounted for in the age 5 outcome. Northern Ireland is still significantly advantaged in this model. The female advantage is reduced by about half, but still highly significant, suggesting that the behavioural gap between boys and girls actually widens between the ages of five and seven. The small association of behavioural improvement with age of interview is also substantially reduced though it remains significant. The cohort members' birth weight is already accounted for by variations at age 5.

Family and labour market status at age 3 becomes insignificant after allowing for behaviour at age 5. The association of problems with younger mothers is reduced but still significant. The social class effect is substantially reduced, and only the 'small employer and self-employed' category show significantly growing disadvantage compared to the professional and managerial class. This contrasts with the intensification of disadvantage according to social class on the cognitive and educational dimensions.

Parental longstanding illness or disability and psychological distress show reduced coefficients, but remain highly significant, suggesting that they are linked to a negative behavioural trajectory over time. The main respondents' life satisfaction at age 3 does not, however, show effects beyond those apparent at age 5.

The effect of the perceived quality of the local area, as a place to bring up children, and in which the main respondent feels safe, are reduced, but remain significant in this model. The effect of residential mobility is also reduced, but still significant.

The negative coefficients for black and 'other' ethnicity remain significant in this model, and the black coefficient is actually increased in size (though not significantly), suggesting that black children have relatively good rates of behavioural progress between the ages of five and seven, controlling for the other variables in the model.

TV viewing and library use at age 3 cease to add additional explanation beyond that reflected in the age 5 score. Reading is still significant (in one category only) but reduced. Regular mealtimes at age 3 remain significantly predictive, though the coefficient is reduced substantially.

Mother's BMI is not significant in this model, but smoking during pregnancy retains a significant effect (at the 0.05 level).

Overall, aside from gender, the effects of parents' physical illness and mental distress stand out as having highly significant long term intensifying effects on the children's difficulties scores between the ages of five and seven. The 3 point impact of high malaise in Model 1 reduced to 1 point after allowing for the effect of including the behaviour score at age 5 in model 2. The excess behaviour problem score at age 7 associated with parents in poor health at wave 2 of 0.6 reduces to 0.4 after including the link to behaviour at age 5 in model 2. Its legacy continues to add directly to the difficulties score. Note however that this additional effect amounts to less than the difference implied by having one problem 'certainly' rather than 'somewhat' or 'somewhat' rather than 'not at all'.

We can conclude that the situation at and before age 3 has mostly affected age 7 scores through the level established at age 5 in so far as socio-economic and family structure is concerned, but that there is evidence of widening gaps by some of the indicators of parental behaviour such as smoking in pregnancy, reading to child at age 3, regular mealtimes at 3, area satisfaction at age 3, and moving home between 3 and 5. There also appear to be widening differences in behaviour problems at age 7 for parents with a long-term illness or mothers with psychological distress when the child was aged 3. Of these results there is at least some confirmation within the NI sample of the results concerning area quality and mothers' psychological distress when the child was aged 3. We tested for interactions between these regressors and NI, but found no significant interactions suggesting a broadly similar pattern of predictors between NI and GB. Any differences there may possibly be are not big enough to detect in a sample of this size.

## Chapter 5: Child Health

Table 5.1 shows the proportion of children who had excellent as compared to less than excellent health and did not suffer from long-term illness. There are no significant differences between the four countries or between GB and the UK as a whole although Wales and Scotland appear to have somewhat higher levels of excellent health than NI and England.

**Table 5.1 General health, age 7**

	England	Wales	Scotland	NI	GB	UK
Excellent	55.3	58.2	57.7	54.1	55.4	55.6
Less than excellent	44.7	41.8	42.3	45.9	44.6	44.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	7264	1760	1356	1141	10380	11521
Weighted sample	7336	1741	1337	1138	10272	11473
Chi-square P-value	0.163				0.51	

Table 5.2 shows general health according to poverty status at waves 1 and 2 in NI and GB. Poverty has a similar impact in NI and GB, and this is highly significant in both cases. Those who were above the poverty line at both waves were most likely to be in excellent health in both NI (62.6%) and GB (61.2%). In NI, both those who were poor at one wave and poor at two waves had a roughly 50/50 chance of being in excellent or less than excellent health. The pattern in GB was similar, but with somewhat less than half (45.7%) of those who were poor at both waves in excellent health.

**Table 5.2 General health, age 7, GB/NI poverty wave 1 or 2**

	NI			GB		
	Excellent	Less than excellent	Total	Excellent	Less than excellent	Total
Not Poor Above 60% median at both waves	62.6	37.4	100.0	61.2	38.8	100.0
Transient Poor Below or above 60% median at one wave	50.3	49.7	100.0	51.2	48.8	100.0
Poor Below 60% median at both waves	49.4	50.6	100.0	45.7	54.4	100.0
Missing data at both	33.2	66.8	100.0	43.8	56.2	100.0
Total	54.1	45.9	100.0	55.4	44.6	100.0
Observations	616	522	1138	5691	4581	10272
Chi2 p-value	0.001			0.000		

Table A6 in the Appendix shows a binary logistic regression analysis predicting the likelihood of having less than excellent health and/or a long term illness (henceforth described as 'poor health') compared to being in excellent health with no long term illness. In **model 1**, there is no statistically significant difference between NI and GB. Girls are significantly less likely to be in poor health than boys, while children with low birth weights are at increased risk of poor health.

The children of lone parents not in work at age 3 had an excess risk of poor health at age 7 of 1.49. The risk was low for the children of parents with the highest levels of qualifications (NVQ4 and NVQ5).

Longstanding disability or illness on the part of the main respondent is linked to over 1.5 the odds of the child suffering poor health compared to the child of a healthy parent. Longstanding illness or disability on the part of the partner also significantly raises the risk of the child's poor health. Psychological distress on the part of either the main respondent or the partner is linked to poor health on the part of the child.

The respondent feeling unsafe in the local area at wave 2 is linked to a higher risk of poor health for the child at age 7 (odds of 1.2).

Indian and 'other' ethnic groups are at elevated risk of poor health, but the highest significant excess risk is for Pakistani and Bangladeshi children (1.9). Poor health outcomes for children in this group have previously been linked to the practice of first-cousin marriage (Bunday and Alam 1993).

Not having regular bedtimes is linked to a higher risk of poor health (odds of 1.2). The PIANTA scale of warm parenting is linked to better health (0.95), while PIANTA conflict is mildly linked to a higher chance of poor health.

The father having a normal BMI as opposed to being overweight is linked to better health for the child (0.48). The mother's body mass does not add significantly to the explanation of this variable.

The estimated differentials are relatively modest (seldom as high as an odds ratio of 2) and showing a similar pattern as at age 5. Social class was not significant, but we find a significant advantage for the children of graduates. Our previous report also showed significantly better health at age 5 among those who had been in formal childcare at or before age 3, but this was not significant in our models of health at age 7.

In **model 2**, we introduce the child's health status at age five. Children in poor health at age five had 5.3 times the odds of poor health at age seven compared to children in good health at age five (reflecting a 40 point gap in the chances of being in poor health at 7 by health status at 5). The 'protective' GB parameter becomes statistically significant in this model, suggesting that the health of GB children improves relative to that of NI children between the ages of five and seven.

The female advantage becomes insignificant in this model. The effect of low birth weights is reduced, but still significant. The increased risk of poor health for Pakistani and Bangladeshi children remains significant in this model, though the other ethnic parameters become insignificant. The higher risk for children of lone non-working parents remains significant. The effect of parents' education becomes non-significant having had its effect on the age 5 outcomes.

The main respondent's longstanding illness or disability remains a powerful predictor of poor child health in this model. The partner's illness/disability status is also significant. Aside from the child's health status at age five, the main respondent's longstanding illness or disability and Pakistani/Bangladeshi heritage are the two most important predictors of child health in the model.

Both the main respondent's and the partner's psychological distress remain significant predictors of child health, over and above their impact on the outcome at age five. Feeling unsafe in the local neighbourhood also remains significant.

The effect of regular bedtimes at age 3 becomes statistically insignificant in this model, but the effects of the PIANTA warmth and conflict scales bear an additional imprint beyond that on the age 5 outcomes. The protective effect of father's normal BMI also remains significant. As for all models, we tested for significant interactions with NI but found none.

## Chapter 6: Child overweight and obesity

At age seven, as at ages 3 and 5, height and weight measurements were taken and a measure of Body Mass Index (BMI) derived. Standard cut-offs for overweight and obesity were applied. Table 6.1 shows a statistically significant difference in rates of overweight between the four UK countries, with similar rates of overweight in NI (23.8%) and Wales (22.7%) higher than in England (19.9%) and Scotland (19.3%). It is particularly interesting to include overweight at age 7 as a possible outcome of conditions in the earlier years since adiposity tends to become more of a problem after around age 5.

**Table 6.1 Overweight, age 7**

	England	Wales	Scotland	NI	GB	UK
Normal/underweight	80.1	77.3	80.7	76.2	79.9	79.8
Overweight/obese	19.9	22.7	19.3	23.8	20.1	20.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Observed sample	7208	1740	1335	1135	10283	11418
Weighted sample	7285	1722	1311	1131	10181	11378
Chi-square P-value	0.003				0.004	

Table 6.2 shows a clear link between poverty and overweight. In NI, about a fifth of children who had not been in poverty at waves 1 and 2 were overweight at age 7, compared to about a quarter of those who had been in poverty at one wave, and nearly a third of those who had been in poverty at both waves. The pattern in GB was similar, but with somewhat less overweight among the children who were poor at one or both waves compared to poor children in NI.

**Table 6.2 Overweight, age 7, GB/NI experience of poverty at wave 1 or 2**

	NI			GB		
	Not overweight	Overweight	Total	Not overweight	Overweight	Total
Not Poor Above 60% median at both waves	80.1	19.9	100.0	81.5	18.5	100.0
Transient Poor Below or above 60% median at one wave	75.4	24.6	100.0	79.1	20.9	100.0
Poor Below 60% median at both waves	68.2	31.8	100.0	76.3	23.7	100.0
Missing data at both	80.8	19.2	100.0	77.0	23.0	100.0
Total	76.2	23.8	100.0	79.9	20.1	100.0
Observations	862	269	1131	8130	2051	10181
Chi2 p-value	0.041			0.009		

Table A7 in the Appendix shows a logistic regression model of overweight at age seven. **Model 1** shows that children in Northern Ireland were significantly more likely to be overweight than those in GB. There are somewhat fewer significant predictors of overweight than for the other age 7 outcomes and indeed for this outcome at age 5. Girls had almost 1.5 times the odds of being overweight than boys. Older children were more likely to be overweight than younger children although by a small margin (odds= 1.022).

This is the only outcome for which we found significant differences by religion. The children of Protestant, Catholic and 'other Christian' respondents were more likely to be overweight than those from non-religious backgrounds, by a factor of around 1.2. The presence of both younger and older siblings had highly significant independent protective effects regarding overweight. Moving home between waves 1 and 3 was linked to a lower risk of overweight.

Compared to white children, Black and mixed heritage children were more likely to be overweight.

The mother smoking in wave 2, and, to a lesser extent, the partner's smoking, were significantly linked to overweight. Regular bedtimes and taking the child to the library were linked to a lower risk of overweight.

Finally, both the mother's BMI and the father's BMI are powerful independent predictors of the child's BMI. Odds ratios are 1.6 each relative to 'overweight' used as the reference category here because it is the largest category among parents. The children of obese parents are substantially more likely to be overweight than the children of parents who are merely overweight, while the children of underweight fathers and normal and underweight mothers are less likely to be overweight. The other effects in the model, as well as the absence of certain variables due to non-significance, must of course be interpreted in the light of the inclusion of mother's and father's BMI, which, as we have seen from previous analysis, is a significant mediator of other background factors.

In **model 2**, overweight at age five is included as a predictor of overweight at age seven. Children who were overweight at age five had 24.8 times the odds of being overweight at age seven compared to those who were not overweight at age five, reflecting a 60 point gap in the percentage overweight at 7 by overweight status at 5. Having accounted for this, model 2 reflects the emergence of continuing or emerging influences on BMI categories between the ages of five and seven. The differential between NI and GB becomes statistically insignificant in this model.

Girls are more likely to move into overweight between the ages of five and seven than boys and older children have an increased risk of moving into overweight. The effect of black ethnicity becomes insignificant in this model, but children of mixed heritage have a statistically significant increased risk of moving into overweight. Children from Catholic and 'other religion' backgrounds are at increased risk of overweight compared to the 'no religion' category in this model. Older siblings retain a significant protective effect in this model, and the effect of younger siblings is even stronger.

The mother's smoking remains highly significant in this model, and failure to have regular bedtimes also carries significant predictive power beyond its effect on being overweight at 5.

Finally, father's obesity and mother's BMI category remain significant predictors in this model, with mother's BMI of particular importance. We found no significant interactions between NI and the other variables in our models.

## Chapter 7: Conclusions

At age 5, children in NI fared better than children in GB in terms of cognitive, educational and behavioural outcomes and in terms of general health, but were more likely to be overweight. However, the picture for Northern Ireland children is less rosy when we consider developments between ages 5 and 7. One notable change at age 7 is that NI children are no longer advantaged in their cognitive scores, and in fact fare slightly worse than children in GB as a whole, although this difference is not significant once we control for a range of other predictors. The most likely explanation is that the earlier school starting age in NI led to higher test scores at age 5, but that children in GB caught up by age 7. Although the gap is very small, the fact that children in NI are actually slightly behind children in GB by age 7 could be seen as slightly worrying if it reflected a trend, and it will be important to monitor the gap between NI and the other UK countries as the children progress through school.

In terms of teacher ratings of educational attainment, children in NI fared slightly but significantly better than those in Wales and Scotland. Once a range of other predictors were controlled for, NI children scored significantly higher than GB children. However, there was no significant difference between NI and GB once education scores at age 5 were introduced as a predictor in model 2.

Children in NI maintained their behavioural advantage, receiving lower behavioural difficulties scores than children in GB. This advantage was robust to the set of background controls in model 1, and also persisted once the total difficulties score at age 5 was introduced as a predictor in model 2.

There was no significant difference in general health between NI and GB either in terms of the raw percentages or in terms of the coefficients of model 1, which controls for a range of predictors. However, in model 2, which controls for general health at age 5, there is a positive coefficient for GB, reflecting the fact that GB children had worse health outcomes at age 5, but had improved and caught up by age 7.

Children in NI continue to be more likely to be overweight than those in GB at age 7 as they were at age 5. This difference persists when we control for a range of other predictors, but becomes non-significant once overweight at age 5 is introduced as a predictor in model 2.

As far as we can tell the explanatory models which fit UK data also apply within Northern Ireland.

Income poverty is correlated with all these outcomes, but is not directly linked to any of them in the models we have considered. This should certainly not be taken to imply that poverty does not matter. Rather, it reflects the fact that the consequences of poverty are captured in a range of other variables and pathways which either measure or are related to social background. As seen in our previous report, the

strength of the relationship of income poverty to the outcomes observed, is very often reduced once more variables are added to the statistical models which themselves are directly related to the causes and consequences of income poverty. This effect is to be expected. Income poverty can often be viewed as a high level summary variable encapsulating the impacts of a broad range of causative and consequential factors.

Social class emerges as a powerful predictor of both cognitive outcomes and educational scores in children, even once attainment at age 5 is controlled for. Surprisingly, social class is a more powerful predictor of these outcomes than parents' education. This finding runs counter to our expectations, and warrants further investigation. We would have expected parental education to be particularly strongly linked to children's cognitive and educational scores because of the assumption that parental education is a good proxy for parents' cognitive and cultural resources, and that these resources are more important than material resources and social status in predicting favourable cognitive and educational outcomes for children. Either of these assumptions could be false. Either: 1. Parental education, as we have measured it here, is not a good proxy for parents' cognitive and cultural resources; and/or 2. Cognitive and cultural resources are actually less important than the class-based resources linked to labour-market position, such as material resources and social status, as predictors of cognitive and educational outcomes. To investigate the first of these possibilities, we would ideally want parents' cognitive scores and measures of parents' cultural capital. Failing this, a more refined measure of parents' education than the one we have in the current dataset would allow us to test the hypothesis that educational expansion has rendered NVQ-level based measures too crude a proxy for respondents' actual educational standing, necessitating more detailed information, e.g. degree-awarding institution and subject rather than just whether the respondent has a degree. Effectively, it is possible that our social class measure is actually operating as a better proxy for parental education than the parental education variable itself. If, even controlling for a more refined set of measures designed to capture parents' educational, cognitive and cultural resources, we were still to find a powerful direct impact of social class, this may suggest a different set of causal mechanisms, potentially including the direct benefits of material resources, more family-friendly treatment from employers for people in more privileged occupational groups, differential treatment of children according to social status, and the impact of occupational aspirations. The effects of social class and parents' education and the intersection between the two certainly warrant further investigation.

Social class and family labour market status (but not parents' education) are linked to the child's behavioural difficulties, but this link is largely captured by the child's difficulties score at age 5. Family employment status and parents' education are linked to the child's health at age 7, but this is largely captured by the child's health at age 5. There is no direct link between social class, education or employment status and childhood overweight, which should not be taken to imply that BMI is not socially structured, but rather that the effects of these factors are captured by other variables in our model, notably parents' BMI, which are both related to social status and have powerful direct effects on children's overweight risk.

Social background (whether captured by social class, employment status, and/or education) is most strongly associated with child developmental outcomes and behavioural difficulties at age 7. These three factors do not display the strength of relationship with the child's general health and weight outcomes at age 7.

Low birth weights are linked to cognitive and educational scores even when the relevant age 5 scores are controlled for. Low birth weights are also linked to a higher risk of behavioural difficulties, but this becomes insignificant once difficulties at age 5 are introduced in model 2. High birth weights are linked to overweight at age 7, but this is accounted for by overweight at age 5.

Girls achieved both higher test scores and higher teacher ratings than boys at age 7, but this was accounted for by their scores at age 5, suggesting that the gap has not grown between the ages of 5 and 7. Boys' lower behaviour scores are robust to the inclusion of the age 5 measure, suggesting a growing gender gap between ages 5 and 7 on this measure. Boys have poorer general health at age 7 which is accounted for by their poorer general health at age 5. Girls are substantially more likely to be overweight at age 7, as they were at age 5, but this is not accounted for by overweight at age 5 suggesting a growing differential risk for girls.

Older siblings are negatively linked to educational and cognitive scores at age 7 and protectively linked to behavioural scores. However, all of these associations are largely captured by the outcomes at age 5. Having both older and younger siblings is protective against overweight and these coefficients remain significant despite the inclusion of overweight at age 5 in the second model.

Housing tenure is somewhat linked to both cognitive and educational scores, though largely captured by the age 5 scores. Interestingly, children in urban areas made more progress in their cognitive scores between the ages of 5 and 7 than those in town and rural settings. The perception of how good the area was to bring up children and area safety were linked to difficulties scores and not fully captured by difficulties at age 5. General health was also linked to feeling safe in the area, and this was also not fully captured by health at age 5. Surprisingly, being sampled in a disadvantaged ward was not linked to any of the outcomes, suggesting that area-based deprivation, with the other variables already controlled, has no direct effect.

Parental longstanding illness and parental psychological distress are linked to both behavioural difficulties and the child's general health, and these associations are robust to controls for the relevant age 5 variables.

Breastfeeding is linked to cognitive and educational outcomes even when the relevant age 5 outcomes are controlled for in model 2. However, breast feeding is only marginally linked to behaviour and is not linked to general health or overweight in our models.

Both the mother's and father's BMI and smoking behaviour are linked to overweight at age 7. Controlling for overweight at age 5 in model 2, both parents' BMI and

mothers' smoking all remain significant. However, of these variables, only the father's BMI is linked to the child's general health in our models. Mother's BMI is linked to behavioural difficulties, but this is accounted for by difficulties at age 5. Smoking during pregnancy is linked to difficulties at age 7 even when difficulties at age 5 are controlled for.

We examined a wide range of parenting variables, and many of them were significantly associated with the child's cognitive and educational scores. The strongest and most robust associations with cognitive scores were with regular bedtimes and library usage. Of these variables, library usage also retained the largest association with the child's educational scores at age 7, once age 5 scores were controlled for in model 2. Of this set of variables, only reading to the child had a significant association with the child's difficulties score at age 7 once the age 5 score was controlled for. The PIANITA scales of warmth and conflict are significantly linked to the child's general health at age 7 once health at age 5 is controlled for in model 2. Regular bed times are linked to a lower risk of overweight, including a continuing benefit beyond the age of 5.

We are aware of the need for caution in drawing policy conclusions, as these models are not necessarily evidence of causal mechanisms amenable to intervention. However, we offer the following tentative suggestions.

### **Cognitive and educational outcomes**

The link between social class and cognitive and educational scores is striking and robust. The finding that social class is a stronger predictor of differences in the cognitive and educational scores of 5 and 7 year-olds than either parents' educational qualifications and a range of parenting measures, confounds a good deal of received wisdom. For example, Nick Clegg, the Deputy Prime Minister, has recently blamed low levels of social mobility on class based differences in parenting (Telegraph 2010). However, our findings support other research which argues that, while parenting is important, a policy focus on parenting alone is insufficient to tackle the impacts of social inequalities on children (Kiernan 2010).

As we argued in our previous report, it may also be naïve for policymakers to believe that parenting practices can be addressed in isolation, given the links between living conditions, well-being and parenting practices. Another implication of this finding is that exposure to schooling has not put social differentials in attainment into reverse. We cannot say how far they might have diverged further under some different regime, but at least the encounter with the school system has not brought about a convergence of the differences associated with unequal home backgrounds. The direct link between social class and cognitive and educational outcomes does not lead to easy answers for policymakers, but does suggest the importance of a recognition of the social structural basis for childhood inequalities. It may be suggested, at any rate, that, since policymakers have limited leverage on parenting, policy attention would be better focussed elsewhere. On the other hand, there may be scope for further development in this area, e.g. in terms of increasing engagement

with parents through the education system. To the extent that there is any possibility of directing additional resources to schools serving disadvantaged children, we support the view that this would ideally be based on the social class composition of the school, as opposed to the more commonly used Free School Meals measure which is essentially a measure of poverty. However, we acknowledge that FSM is an efficient and available variable, and will often be the best proxy available. Nevertheless, policymakers need to be aware of its limitations, in order to avoid falling into the common trap of describing use of FSM as accounting for social class or 'social background', rather than acknowledging that FSM is a relatively crude proxy for these characteristics (Sullivan and Whitty 2007). Caution must be exercised in drawing inferences from evidence which uses FSM as a proxy for other aspects of social background (Hobbs and Vignoles 2007).

It is also notable that Indian, Pakistani and Bangladeshi ethnicity predicts substantial progress in cognitive and educational scores between the ages of 5 and 7: in other words, children from these ethnic minorities have caught up to a remarkable extent by age 7.

### **Behaviour (SDQ)**

Being a boy is one of the strongest predictors of increased behavioural difficulties between the ages of 5 and 7. While this could be seen as unsurprising, it could be that addressing it would have an impact on the gender gap in educational attainment later on, if not indeed at these ages. Parental psychological distress and longstanding illness and disability are also robust predictors of increased behavioural difficulties. This suggests that a policy focus on supporting parents with both physical and mental health difficulties may also benefit children and help prevent future anti-social behaviour.

### **Health**

Parental longstanding illness and disability and psychological distress as well as fathers' BMI are linked to an increase in the chance of poor health outcomes for children. Again, this supports the view that children's health cannot be seen in isolation from that of their parents, which itself partly reflect socio-economic inequalities (Kelly and Bartley 2010). A holistic approach to family health would be supported by these findings, rather than treating child health separately from parental health.

### **Overweight (including obesity)**

Children who are overweight at age 5 have an overwhelmingly greater risk of being overweight at age 7, suggesting that 'puppy fat' should not be ignored and early intervention is crucial. Substantial risk factors for being overweight at age 7 once overweight at age 5 is controlled for include being a girl, being an only child, having an overweight or obese mother, an obese father, and a mother who is a smoker. The importance of parents', and especially mothers' BMI, suggests that overweight is a family problem, and health messages need to be targeted at mothers in particular. Childhood overweight appears to be primarily due to an obesogenic home environment rather than individual child level factors. It is not clear whether the increased risk for girls is due to girls being overfed compared to boys, or less

physical activity for girls (perhaps due to over-protectiveness on the part of parents), or some combination of the two. Similarly, we do not know to what extent only children may be less active due to a lack of siblings, or overfed by indulgent parents. Either way, making parents aware of the increased risk to girls and only children may help to modify their behaviour.

Finally, we would like to restate some of the provisos that we raised in our previous report on outcomes at age 5. We have attempted to unpack the effects of poverty, and the mechanisms through which childhood disadvantage affects children. This is a complex task, as the various dimensions of disadvantage are powerfully interrelated (Duncan and Brooks-Gunn 1997; Ermisch 2008). Parents' social class and educational status are linked to family size, structure and the age of the mother, as well as to parenting behaviours, physical and mental health, and to the type of neighbourhood. The potential causal pathways between these variables are many. A positive angle on this is that policy interventions addressed at any one of these factors may have positive spill-overs for the others.

We also need to remember the limitations of individual and household-level analysis for understanding inequalities which are also driven by social structures which do not feature in our models. Comparative research suggests that educational inequalities are smaller, and social mobility higher in those societies which have lower levels of overall inequality of income and wealth (Shavit and Blossfeld 1993). Therefore, redistributive economic policies may be more effective than policies aimed directly at addressing parenting practices for example, if our aim is to tackle inequality.

## Appendix A1: Regression Template

1. Disadvantage , Northern Ireland and child specific controls
  - N Ireland versus GB (also distinguishing England for Education)
  - Indicator of advantage/ disadvantage: Income poverty waves 1 and 2 (1=poor at both waves/ 2=poor at one wave/ poor at neither wave).
  - Gender
  - Age in months at interview wave 3
  - Birthweight (<2/2-3/3-4/4+ kg)
  
2. Social background controls
  - Ethnic group (6 groups)[we include this variable in order to investigate whether including ethnicity makes a difference, whether stratum variable is sufficient to account for higher levels of minority groups in England].
  - Religion (main respondent, 5 categories: Protestant/Catholic/other Christian/ other religion/ no religion)
  - Family structure and parental employment combined variable (both employed/ m not p employed/ p not m employed/ both not employed/ lone employed/ lone not employed) MCS2
  - Mother's age at first birth
  - Number of younger sibs born up to age 5 (0/1/2/3-4)
  - Number of older sibs up to age 5 (0/1/2/3/4-12)
  - Parents' educational level (highest of both parents and first 2 sweeps)
  - Parents' social class (highest of both parents and first 2 sweeps)
  - Parental longstanding illness (none/longstanding/longstanding and limiting waves 1 and 2)
  - Parental mental health (malaise and Kessler) and life satisfaction MCS1 and 2
  
3. Neighbourhood characteristics
  - Ward type wave 1: disadvantaged/ ethnic/ non-disadvantaged
  - Reported satisfaction with local area wave 2:
    - Good area to raise children (0= excellent, good/ 1= average, poor, very poor)
    - How safe do you feel (0= very safe, fairly safe/ 1= neither safe nor unsafe, fairly unsafe, very unsafe)
  - Rural or urban (urban/ semi-urban/ rural) wave 2

- Moved home between W1 and W3 (moved at least once/ never moved)
- Housing tenure (private rent/ social rent/ owner occupier) wave 2

#### 4. Other potential moderating/mediating indicators

- Parental smoking: in pregnancy: yes/no; MCS2 main and partner yes/no.
- Breastfed (not/ 3 months/ 6 months/ more)
- Indicators of parenting practices at sweeps 1 and 2:
  - Regular bedtimes (0=always, usually/ 1= never, sometimes)
  - Regular mealtimes (0= always, usually/ 1=never, sometimes)
  - Smacking (0=never, rarely/ 1=once a month or more).
  - Shouting (0= never, rarely, once a month/ 1=once a week or daily)
  - Rules (0= not many rules, it varies/ 1= lots of rules)
  - Strict rules (0=not very strict, it varies/ 1= strictly enforced).
  - PIANTA parent-child relationship scale
  - PIANTA parent-child conflicts scale
- The home learning environment (sweep 2):
  - Home learning environment scale
  - TV viewing (1= more than 3 hours/ 0= less than 3 hours)
  - Reading to child (1= daily/ 0= less than daily)
  - Taking child to library (0= not at all/ 1= ever)
  - Help child to learn sport/dance (0=no/ 1=yes)
- Fathers' involvement in parenting (scales MCS1 and 2)
- Use of different types of childcare MCS1 (0=none/ 1= family/ 2=other informal/ 3=formal).
- Parental BMI category (mother and partner): (underweight/ normal/ overweight/ obese)

## **Appendix A2: Detailed Information on Derivation of Variables and Scales**

### **Strengths and Difficulties Questionnaire (SDQ)**

For the next section please answer on the basis of your child's behaviour over the last six months. For each question, please say whether the statement is not true, somewhat true or certainly true of your child.

- (1) Not true
- (2) Somewhat true
- (3) Certainly true

[Lchildact] shows concern for other people's feelings  
[Lchildact] is restless, overactive and cannot stay still for long  
[Lchildact] often complains of headaches, stomach-aches or sickness  
[Lchildact] is happy to share with other children (treats, toys, pencils etc..)  
[Lchildact] often has temper tantrums or hot tempers  
[Lchildact] tends to play alone, is rather solitary  
[Lchildact] generally obeys, usually does what adults ask  
[Lchildact] has many worries, often seems worried  
[Lchildact] is helpful if someone is hurt, upset or feeling ill  
[Lchildact] can't sit still, is constantly fidgeting or squirming  
[Lchildact] has at least one good friend  
[Lchildact] often fights with other children or bullies them  
[Lchildact] is often unhappy, tearful, or downhearted  
[Lchildact] is generally liked by other children  
[Lchildact] is easily distracted, attention wanders  
[Lchildact] is nervous or clingy in new situations, easily loses confidence  
[Lchildact] is kind to younger children  
[Lchildact] often argues with adults  
[Lchildact] is picked on or bullied by other children  
[Lchildact] often volunteers to help others (parents, teachers, other children)  
[Lchildact] can stop and think things over before acting  
[Lchildact] can be spiteful towards others  
[Lchildact] gets on better with adults than with other children  
[Lchildact] has many fears, is easily scared  
[Lchildact] sees tasks through to the end, has good attention span

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, 38, 581-586.

Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire (SDQ) *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(1337-1345).

### **Malaise scale (Measured at Sweep 1)**

1. tired most of time
2. often miserable or depressed
3. often worried about things
4. often gets in violent rage
5. suddenly scared for no good reason
6. easily upset or irritated
7. constantly keyed up or jittery
8. every little thing gets on nerves
9. heart often races like mad

Response categories and score

- yes=1
- no=0

### **Baby parenting practices (Sweep 1)**

baby\_parenting (reverse scale).

Range 4-20. Cronbach's Alpha = 0.666

#### **Response scale**

- 1 strongly agree
- 2 agree
- 3 neither agree nor disagree
- 4 disagree
- 5 strongly disagree

- it is important to develop a regular pattern of feeding and sleeping with a baby.
- babies need to be stimulated if they are to develop well.
- talking, even to a young baby, is important.
- cuddling a baby is very important.

### **PIANTA Sweep 2**

#### **Response scale**

- 1 Definitely does not apply
- 2 Not really
- 3 Neutral
- 4 Applies sometimes
- 5 Definitely applies

**PIANTA\_conflict** Range 7-35. Cronbach's Alpha = 0.787

- My child and I always seem to be struggling with each other.
- My child easily becomes angry at me.
- My child remains angry or is resistant after being disciplined.
- Dealing with my child drains my energy.

- When my child is in a bad mood, I know we're in for a long and difficult day.
- My child's feelings toward me can be unpredictable or can change suddenly.
- My child is sneaky or manipulative with me.

**PIANTA\_warmth** Range 7-35. Cronbach's Alpha = 0.668

- I share an affectionate, warm relationship with my child.
- If upset, my child will seek comfort from me.
- My child values his/her relationship with me.
- When I praise my child, he/she beams with pride.
- My child spontaneously shares information about himself/herself.
- It is easy to be in tune with what my child is feeling.
- My child openly shares his/her feelings and experiences with me.

### **Home Learning environment (HLE) Sweep 2**

HLE, Range 0-28. Cronbach's Alpha = 0.63

#### **Response scale**

- 0 Not at all
  - 1 Occasionally or less than once a week
  - 2 1 - 2 days per week
  - 3 3 times a week
  - 4 4 times a week
  - 5 5 times a week
  - 6 6 times a week
  - 7 7 times a week/constantly
- how often help to learn the ABC or the alphabet
  - how often try to teach numbers or counting
  - how often try to teach any songs, poems or nursery rhymes
  - how often paint or draws at home

### **Partner's involvement, MCS1**

f\_inv\_sw1 (reverse scale), Range 3-18. Cronbach's Alpha = 0.62

#### **Response scale**

- 1 More than once a day
  - 2 Once a day
  - 3 A few times a week
  - 4 Once or twice a week
  - 5 Less than once a week
  - 6 Never
- how often looks after his baby on his own
  - how often changes a nappy
  - how often feeds baby

- how often gets up at night for a baby

### **Partner's involvement, MCS2**

f\_inv\_sw2, Range 4-25. Cronbach's Alpha = 0.63

#### **Response scale**

- 1 Not at all
- 2 Less than once a week
- 3 Once or twice a week
- 4 A few times a week
- 5 Once a day
- 6 More than once a day

- reads to baby (scale A)
- plays with baby (scale A)
- gets him/her ready for bed or put him/her to bed (scale A)

housework\_eq, Range 0-7. Cronbach's Alpha = 0.58 MCS!

#### **Response scale**

- 0 Main respondent or partner or someone else
- 1 We share more or less equally

- who cooks meals
- who cleans
- laundry, ironing
- household repairs, DIY
- looks after the household money and pays bills
- who stays with children when they are ill
- who looks after children in general

**Appendix Table A3: Cognitive outcomes**

Predictor variables		Model 1 B	Model 2 B
GB	Northern Ireland	0	0
	Great Britain	-0.414	0.916
Cohort member age at interview	Age in months	0.677***	0.887***
Cohort member sex	Male	0	0
	Female	0.931**	-0.119
Cohort member's Birth weight	<2 Kg	-6.804***	-4.238***
	2-3 Kg	-1.668***	-0.777*
	3-4 Kg	0	0
	4+ Kg	0.760	0.581
Ethnicity	White	0	0
	Mixed	-0.696	0.704
	Indian	2.463	4.351***
	Pakistani and Bangladeshi	-0.797	3.685**
	Black or Black British	-2.292	-0.0124
	Other ethnic (inc. Chinese)	2.594	4.609**
Age of natural mother at first birth	Age in years	0.106**	0.0320
Number of cohort child's older siblings at wave 3	Cohort member is only child	0	0
	1	-0.496	0.240
	2	-1.651***	-0.802*
	3	-2.375***	-0.393
	4-12	-3.118**	-0.573
Parents' highest level of education across wave 1 and 2	No qualifications	0	0
	Overseas only	-0.727	-0.585
	NVQ1	-0.791	-1.108
	NVQ2	0.921	-0.386
	NVQ3	1.189	-0.0652
	NVQ4	2.914***	0.734
	NVQ5	5.680***	2.692***
Highest level of parental social class across wave 1 and 2	Prof/manag	0	0
	Intermediate	-2.006***	-1.170**
	Sm emp & s-emp	-2.912***	-1.861**
	Low sup & tech	-2.719***	-1.305**
	Semi-rou & routine	-3.979***	-2.457***
	Long-term unemployed /never worked, not stated /inad desc non applicable	-6.153***	-3.700**
House tenure at wave 2	Mortgage	0.814	0.248
	own	0	0
	Rent LA or HA	-1.314*	-0.608
	Rent privately	-2.237**	-1.393*
	Other	-0.952	-0.171
Area type	Urban	0	0
	Town and Fringe	-1.242*	-1.267**
	Village, hamlet & isolated dwellings	-0.332	-0.929*
Whether mother breastfed cohort child	Not at all	0	0
	Up to 3 months	0.912*	0.323
	3-6months	2.059***	0.875*
	6 months or more	1.958***	1.147**
Whether cohort child has regular bedtimes	Never or almost never	0	0
	Sometimes, usually, always	2.184***	1.358***

Predictor variables		Model 1 B	Model 2 B
(at wave 2 )			
<i>Continued</i>			
Whether cohort child has regular meal times (at wave 2 )	Never or almost never	0	0
	Sometimes, usually, always	1.793**	1.016*
Family rules	Many strict rules	0.314	-0.271
	Many rules, but not strict	0.250	-0.165
	Few rules, but strict	0.751*	0.243
	No rules?	0	0
	Missing data	16.01***	3.270***
PIANTA scale warmth in relationship with a mother (at wave 2)		0.175*	0.0268
Home Learning environment (HLE) at wave 2		0.130***	0.0544*
How often do you read to the child (at wave 2)?	Less often than daily	0	0
	Every day	1.058**	0.346
Anyone at home take child to the library (at wave 2)?	No	0	0
	Yes	1.978***	1.058***
MCS3 cognitive score			.539***
Constant		25.14***	-36.20***
<i>Longitudinal sample</i>		11070	11070
<i>Weighted analysis sample</i>		11042.2	11042.2
<i>Unweighted sample</i>		11056	11056
<i>Model F(p)</i>		1.55e-208	2.82e-249

*p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001

**Appendix Table A4: Education outcome (regression coefficients, z-scores of the total score on 8 teacher-rated items)**

Predictor variable		Model 1		Model 2	
		B		B	
GB	Northern Ireland	0		0	
	Great Britain	-0.163	***	-0.026	
Cohort member's sex	Male	0		0	
	Female	0.17	***	0.038	
Cohort member's age	Age in months	0.053	***	0.015	***
Cohort member's birth weight	<2kg	-0.586	***	-0.332	***
	2-3kg	-0.109	***	-0.032	
	3-4kg	0		0	
	4+kg	0.045		0.06	
Cohort member's ethnic group	White	0		0	
	Mixed	0.113		0.142	*
	Indian	0.145		0.078	
	Pakistani and Bangladeshi	0.086		0.238	**
	Black or Black British	0.106		0.094	
	Other ethnic group (inc. Chinese)	0.419	***	0.386	***
	Missing	0.226		0.086	
Parental combined labour market status at wave 2	Both parents in work	0		0	
	Main in Partner not in work	-0.261	**	-0.196	*
	Partner in main not in work	-0.015		-0.004	
	Both not in work	-0.243	**	-0.029	
	Lone parent in work	-0.057		-0.021	
	Lone parent not in work	-0.237	***	-0.103	
	Partner or main non response	-0.152	***	-0.109	**
Age of natural mother at first birth	Age at first birth	0.009	**	0.005	
Number of cohort child's older siblings at wave 3	None	0		0	
	One	-0.057		-0.024	
	Two	-0.126	***	-0.053	
	Three	-0.202	**	-0.113	*
	Four+	-0.285	**	-0.121	
Parents' highest level of education across wave 1 and 2	No qualifications	0		0	
	Oversees only	-0.157		-0.045	
	NVQ1	-0.17	*	-0.089	
	NVQ2	-0.116		-0.125	*
	NVQ3	-0.105		-0.119	
	NVQ4	-0.007		-0.038	
	NVQ5	0.160		0.105	
Highest parental social class	Prof/managerial	0		0	

Predictor variable		Model 1		Model 2	
		B		B	
waves 1 and 2	Intermediate	-0.091	*	-0.013	
<i>Continued</i>					
	sm emp & s-emp	-0.175	***	-0.119	**
	low sup & tech	-0.156	***	-0.114	**
	semi-routine & routine	-0.234	***	-0.178	***
	unemployed/never worked/missing	-0.235		-0.196	*
Malaise score, partner	Low risk of depression/anxiety	0		0	
	Higher risk of depression/anxiety	-0.106	*	-0.049	
	Missing	0.004		0.018	
Housing tenure at wave 2	Own	-0.020		0.033	
	Mortgage	0		0	
	Rent LA or HA	-0.097	*	-0.003	
	Rent privately	-0.102	*	-0.004	
	Other	-0.200	**	-0.099	
Breastfeeding	Not at all	0		0	
	Up to 3 months	0.028		0.027	
	3-6 months	0.137	***	0.093	**
	6 months or more	0.125	***	0.111	**
	missing	-0.255		-0.095	
Whether cohort child has regular bed time times (at wave 2 )	Always or usually	0		0	
	Never or sometimes	-0.129	***	-0.032	
Whether cohort child has regular meal times (at wave 2 )	Always or usually			0	
	Never or sometimes	-0.179	***	-0.073	
Main respondent shouts at child if being naughty, wave 2	never/rarely	-0.065	*	-0.004	
	once a month/more	0		0	
	not applicable	-0.125		-0.204	*
	can't tell	-0.045		-0.098	
PIANTA warmth score	PIANTA warmth	0.028	***	0.007	
PIANTA warmth score - missing	PIANTA warmth - missing	-0.296	***	-0.004	
PIANTA conflict score	PIANTA conflict	-0.007	**	-0.073	
PIANTA conflict score - missing	PIANTA conflict - missing	0.144		0.146	*
Home Learning Environment (HLE) at wave 2	HLE score	0.012	***	0.004	*
	HLE - missing	0.337	*	0.327	*
How many hours a day child watches TV, wave 2	More than 3 hours	0		0	
	Less than 3 hours	0.111	**	0.068	*
Anyone at home to take child to the library	No	0		0	
	Yes	0.147	***	0.11	***
Childcare between waves 1 and 2	None	0.016		0.001	
	Family	0		0	
	Other informal	-0.006		-0.058	
	Formal	0.072	*	0.055	

Predictor variable		Model 1 B		Model 2 B	
			Missing	0.187	**
<i>Continued</i>					
Mother's BMI	Normal	0.021		0.011	
	Underweight	0.082	**	0.013	
	Overweight	0		0	
	Obese	-0.064		-0.052	
	Missing	-0.199	**	-0.175	*
FSP score (age 5)	z-score			0.534	***
	Constant	-4.224	***	-1.226	***
	Weighted sample	7358		5968	
	Unweighted sample	7435		6374	

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Appendix Table A5: Total difficulties score (SDQ) at wave 4**

Predictor variable		Model 1 B	Model 2 B
GB	Northern Ireland	0	0
	Great Britain	0.450*	0.304*
Cohort member sex	Male	0	0
	Female	-1.299***	-0.567***
Cohort members age at wave 4	Age in months	-0.0681***	-0.0360*
Cohort members birth weight	<2 Kg	0.269	0.141
	2-3 Kg	0	0
	3-4 Kg	-0.444**	-0.138
	4+ Kg	-0.619**	-0.181
Main respondent's ethnic group at wave 2	White	0	0
	Mixed	0.447	0.698
	Indian	0.147	-0.336
	Pakistani and Bangladeshi	0.478	-0.337
	Black or Black British	-0.988***	-1.074**
	Other ethnic incl. Chinese	-1.458**	-0.956*
Parental combined labour market status at wave 2	Both parents in work	0	0
	Main in Partner not in work	0.159	0.153
	Partner in main not in work	0.0353	-0.0772
	Both not in work	1.028***	0.266
	Lone parent in work	-0.0349	-0.378
	Lone parent not in work	0.872**	0.198
	Partner or main non response	0.0134	-0.0581
Age of natural mother at first birth	Age at first birth	-0.0541***	-0.0263*
Number of cohort child's older siblings at wave 3	Cohort member is only child	0	0
	1	-0.382**	-0.184
	2	-0.567**	-0.196
	3	-0.886**	-0.478*
	4	-1.014*	-0.0384
Highest level of parental social class waves 1 and 2	Professional/managerial	0	0
	Intermediate	0.152	0.0899
	Sm emp & s-emp	0.870***	0.540**
	Low sup & tech	0.684**	0.185
	Semi-rou & routine	1.087***	0.271
	Long term unemployed/never worked	2.004***	0.145
Longstanding illness or disability at wave 2	No	0	0
	Yes	0.631***	0.401***

*Continued*

Predictor variable		Model 1 B	Model 2 B
Kessler	no or low distress (0-3)	0	0
	medium (4-12)	1.441 <sup>***</sup>	0.433 <sup>***</sup>
	high (13-24)	3.084 <sup>***</sup>	1.002 <sup>*</sup>
	Not able to do self completion or (refused), Self-completion administered by interviewer/Can't say in at-least one item/Missing data	1.135 <sup>***</sup>	0.263
Main respondents satisfaction with life at wave 2	Low satisfaction (1-6)	0	0
	High satisfaction (7-10)	-0.739 <sup>***</sup>	-0.251
	Not able to do self completion or refused	-0.537	-0.0821
	Self completion administered by interviewer	-0.273	-0.179
	Can't say in at least one item	-0.855	-0.0329
	Missing data	-1.421	-0.561
Main good area to bring up children at wave 2	Excellent	0	0
	Good	0.288 <sup>*</sup>	0.130
	Average	0.425 <sup>*</sup>	0.0612
	Poor / Very poor	1.363 <sup>***</sup>	0.677 <sup>*</sup>
How safe main respondent feel in the area at wave 2	Very safe	0	0
	Fairly safe	0.381 <sup>**</sup>	0.284 <sup>**</sup>
	Neither safe nor unsafe	0.604 <sup>*</sup>	0.410
	Fairly unsafe	-0.0370	-0.369
	Very unsafe	-1.060	-0.497
Residential mobility wave 1, 2 and 3	Moved at least once	0	0
	Never moved	-0.294 <sup>**</sup>	-0.198 <sup>*</sup>
Breastfeeding	Not at all	0	0
	Up to 3 months	0.190	0.162
	3-6months	-0.215	0.0557
	6 months or more	-0.363	0.0663
Main hours a day child watches TV/videos at wave 2	Not at all/ up to one hour	-0.234	-0.116
	More than 1 hour, less than 3 hours	-0.471 <sup>**</sup>	-0.113
	More than 3 hours	0	0
Anyone at home take child to the library (at wave 2)?	Yes	0	0
	No	0.394 <sup>**</sup>	0.137
How often do you read to the child (at wave 2)?	Every day	0	0
	Several times a week	0.195	0.0613
	Once or twice a week	0.614 <sup>***</sup>	0.189
	Once or twice a month/ less often	1.539 <sup>***</sup>	0.826 <sup>**</sup>
	Not at all	1.610 <sup>**</sup>	0.185
Mothers BMI at wave 2		0.0458 <sup>***</sup>	0.0200
Smoking during pregnancy	No	-0.670 <sup>***</sup>	-0.313 <sup>*</sup>
	Yes	0	0
	Missing data or n/a	-0.0607	-0.168
Whether cohort child has regular meal times (at wave 2 )	Never or almost never/ sometimes	1.435 <sup>***</sup>	0.425 <sup>**</sup>
	Usually	0.115	-0.199 <sup>*</sup>
	Always	0	0
<i>Continued</i>			
SDQ total difficulties score at wave 3			0.710 <sup>***</sup>

Predictor variable		Model 1 B	Model 2 B
<i>Constant</i>		13.77 <sup>***</sup>	5.666 <sup>***</sup>
<i>Longitudinal sample (N)</i>		11253	11253
<i>Longitudinal Weighted analysis sample (nw)</i>		10286.6	10286.6
<i>Longitudinal Unweighted analysis sample (n)</i>		10263	10263
	Model F(p)	6.26e-102	1.68e-186

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Appendix Table A6: Less than excellent general health and/or long term illness – odds ratios**

Predictor variable		Model 1		Model 2	
GB	Northern Ireland	0		0	
	Great Britain	0.858		0.791	**
Cohort member's sex	Male	0		0	
	Female	0.892	**	0.935	
Cohort member's birth weight	<2kg	1.824	**	1.623	*
	2-3kg	1.097		1.094	
	3-4kg	0		0	
	4+kg	1.008		1.079	
Cohort member's ethnic group	White	0		0	
	Mixed	1.213		1.184	
	Indian	1.667	*	1.449	
	Pakistani and Bangladeshi	1.868	***	1.465	**
	Black or Black British	1.020		0.959	
	Other ethnic group (inc. Chinese)	1.607	*	1.659	
	Missing	0.652		0.519	
Parental combined labour market status at wave 2	Both parents in work	0		0	
	Main in Partner not in work	0.823		0.787	
	Partner in main not in work	1.086		1.032	
	Both not in work	1.029		0.988	
	Lone parent in work	1.098		1.059	
	Lone parent not in work	1.487	**	1.451	*
Parents' highest level of education across wave 1 and 2	Partner or main non response	1.227		1.285	
	No qualifications	0		0	
	Oversees only	1.013		0.954	
	NVQ1	0.995		0.951	
	NVQ2	0.898		0.960	
	NVQ3	0.816		0.863	
Longstanding illness or disability at wave 2 (MAIN)	NVQ4	0.767	**	0.840	
	NVQ5	0.630	***	0.754	
	None	0		0	
	Yes	1.538	***	1.424	***
	Longstanding illness or disability at wave 2 (PARTNER)	None	0		0
Kessler psychological distress (of main respondent at wave 2)	Yes	1.169	*	1.165	*
	missing	0.809		0.753	*
	No or low distress (0-3)	0		0	
Kessler psychological distress	Medium (4-12)	1.246	***	1.169	**
	High (13-24)	1.222		1.097	
	Missing	1.297	**	1.189	
Kessler psychological distress	No or low distress (0-3)	0		0	

Predictor variable		Model 1		Model 2	
(of partner at wave 2)	Medium (4-12)	1.231	***	1.162	*
<i>Continued</i>					
	High (13-24)	1.168		1.117	
	Missing	1.031		0.981	
How safe feels in the area	very safe/fairly safe	0		0	
	neither/fairly/very unsafe	1.199	**	1.180	*
	missing	1.149		0.951	
Whether cohort child has regular bed time times (at wave 2 )	Always or usually	0		0	
	Never or sometimes	1.204	**	1.093	
PIANTA warmth score	PIANTA warmth	0.951	***	0.964	**
PIANTA warmth score - missing	PIANTA warmth - missing	1.200		1.230	
PIANTA conflict score	PIANTA conflict	1.014	**	1.011	*
PIANTA conflict score - missing	PIANTA conflict - missing	1.058		1.057	
Father's BMI	Normal	0.481	*	0.470	**
	Underweight	0.959		0.930	
	Overweight	0		0	
	Obese	1.103		1.068	
	Missing	1.148		1.214	
Less than excellent general health (age 5)				5.295	***
	Weighted sample	11518		11483	
	Unweighted sample	11469		11433	

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Appendix Table A7: Overweight (odds ratios)**

Predictor variable		Model 1		Model 2	
GB	Northern Ireland	0		0	
	Great Britain	0.836	*	0.892	
Cohort member's sex	Male	0		0	
	Female	1.489	***	1.316	***
Cohort member's age	Age in months	1.022	*	1.040	***
Cohort member's birth weight	<2kg	0.711		1.145	
	2-3kg	0.826	*	0.990	
	3-4kg	0		0	
	4+kg	1.515	***	1.025	
Cohort member's ethnic group	White	0		0	
	Mixed	1.462	*	1.545	*
	Indian	1.586		1.304	
	Pakistani and Bangladeshi	1.296		1.073	
	Black or Black British	1.752	**	1.330	
	Other ethnic group (inc. Chinese)	0.920		1.003	
	Missing	0.399	*	0.272	***
Religion of the main respondent	No religion	0		0	
	Protestant	1.193	*	1.182	
	Catholic	1.222	*	1.295	*
	Other Christian	1.255	*	1.293	
	Other religion	1.227		1.632	*
Number of cohort child's younger siblings at wave 3	No younger siblings	0		0	
	One	0.688	***	0.626	***
	Two	0.606	***	0.621	**
	Three-four	0.375	*	0.480	
Number of cohort child's older siblings at wave 3	None	0		0	
	One	0.805	***	0.816	*
	Two	0.781	**	0.758	*
	Three	0.782	*	0.770	
	Four+	0.632	*	0.651	
Whether moved between waves 1 and 3	Moved at least once	0		0	
	Not moved	1.159	*	1.057	
Mother smoked in wave 2	No	0		0	
	Yes	1.445	***	1.372	***
	Missing/non applicable	0.966		1.224	
Partner smoked in wave 2	No	0		0	
	Yes	1.208	*	1.119	
	Missing/non applicable	1.126		0.976	
Whether cohort child has regular bed time times (at wave 2 )	Always or usually	0		0	
	Never or sometimes	1.184	*	1.275	**

Predictor variable		Model 1		Model 2	
<i>Continued</i>					
Anyone at home to take child to the library	No	0		0	
	Yes	0.847	**	0.909	
Father's BMI	Normal	0.432		0.650	
	Underweight	0.650	***	0.856	
	Overweight	0		0	
	Obese	1.638	***	1.381	**
Mother's BMI	Missing	1.044		1.086	
	Normal	0.458	***	0.486	**
	Underweight	0.567	***	0.605	***
	Overweight	0		0	
	Obese	1.581	***	1.501	***
Overweight/obese (age 5)	Missing	1.057		1.183	
				24.814	***
	Weighted sample	11418		11310	
	Unweighted sample	11378		11260	

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

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