Child Development in the First Three Sweeps of the Millennium Cohort Study

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Contents

List of tables at the end of the report

Table 1:   Age 5 outcomes

Table 2:   Regression of relationship between Picture Similarity scores and child, family, parental choice and value added factors

Table 3:   Regression of relationship between BAS Naming Vocabulary scores and child, family, parental choice and value added factors

Table 4:   Regression of relationship between Pattern Construction scores and child, family, parental choice and value added factors

Table 5:   Regression of relationship between Foundation Stage Profile scores and child, family, parental choice and value added factors

Table 6:   Regression of relationship between Problem Behaviour scores and child, family, parental choice and value added factors

Table 7:   Probit model of relationship between Picture Similarity scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of the Picture Similarity scores

Table 8:   Probit model of relationship between BAS Naming Vocabulary scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of BAS Naming Vocabulary scores

Table 9:   Probit model of relationship between Pattern Construction scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of Pattern Construction scores.

Table 10:   Probit model of relationship between Foundation Stage Profile scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of the Foundation Stage Profile scores

Table 11:   Probit model of relationship between Problem Behaviour scores and child, family, parental choice and value added factors for children in the top 20 per cent of behavioural difficulties

Appendix 1:   Descriptive analysis of relationship between Age 5 MCS children's developmental outcomes and child, family and parental decision characteristics

Appendix 2:   Descriptive analysis of relationship between Age 5 MCS children's developmental outcomes and child, family and parental decision characteristics for children in the lowest 20% of the developmental outcomes.

Briefing Report

Child Development in the first 3 sweeps of the Millennium Cohort Study

Introduction

Children's development in the early years has been shown to be related to their success in later life in a range of areas including: education, employment, crime and early parenthood.

Determining why some children do better than others in the early years is a key issue for policy and is crucial in attempts to reduce inequalities.

This MCS research examines differences in early child development by examining the factors associated with the cognitive and behavioral ability of children up to age 5 in the Millennium Cohort Study (MCS).

The data used in this analysis are from the MCS which is a longitudinal survey of around 19,000 children born in the UK over a 12 month period and living in selected UK wards at age 9 months. The analysis uses data for England only from the first 3 sweeps of the MCS, which provide information on children and their families at 9 months, 3 years and 5 years of age.

Cognitive outcomes at age 5

Cognitive abilities at age five were measured in the MCS using three subscales of the British Ability Scales Second Edition (BAS II). These are the Naming Vocabulary, Picture Similarities, and Pattern Construction.

The assessments were administered using Computer Assisted Personal Interviewing (CAPI) by interviewers who were specially trained, but were not professional psychologists.

In addition to the assessments administered as part of the survey, Foundation Stage Profile (FSP) scores, teacher reported achievement recorded at the end of the first year

of school, were collected by the DCFS for cohort members in state schools in England and linked to the survey data.

The FSP score examined in this report sums six areas of learning: 1) personal, social and emotional development; 2) communication, language and literacy; 3) mathematical development; 4) knowledge and understanding of the world; 5) physical development; and 6) creative development.

Behavioural outcomes at age 5:

Behavioural outcomes at age 5 were measured by the Strengths and Difficulties Questionnaire (SDQ). This is a behavioural screening questionnaire for 3 to 16-year-olds and consists of 25 items which generate scores for five subscales measuring: conduct problems; hyperactivity; emotional symptoms; peer problems; and pro-social behaviour.

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 items are assessed via parental report, normally by the mother, in the computer-assisted self-completion module of the questionnaire.

Focus of this report

This report focuses on two aspects of achievement at age 5. The first part examines which factors are associated with the achievement at age 5. The second focuses on children in the bottom 20 per cent of the distribution of scores.

Findings in brief:

1) **Factors associated with achievement at age 5:**

Based on a child production function we run OLS regressions on each outcome while controlling for a range of variables:

- **children's characteristics** (age, birth weight, birth order and gender).

- **family characteristics** (language spoken at home, ethnicity of the mother, mother's highest educational qualification, maternal depression, maternal employment, family income, whether there is a father present, household SES).

- **parental decision variables** - includes parenting variables (reading to the child, teaching the alphabet and counting; as well as watching TV and a number of dummy variables indicating whether a mother strongly agrees with the statements: 1) babies need to be stimulated if they are to develop well; and 2) talking, even to a young baby, is important ; and childcare.

- **other factors** – living in social housing and satisfaction with area

- **value added variables** capturing achievement at age 3.

Each set of independent variables are entered into the model alone, then together in a full model.

A value added model (achievement at age 3) makes the final model.

Broad results:

Despite the fact that each test measures slightly different aspects of a child's development at age 5 and some are measured directly from the child's performance, others by the teacher and mother, on the whole similar characteristics are associated with all the outcomes.

Child characteristics:
The child characteristics are consistently associated with the outcomes across all models. In general **older children, girls, heavier birth weight babies** and **first born children** achieve **higher cognitive test scores** than other children. With the exception of first borns they also have **fewer behavioural problems.**
Family characteristics:

Mother's education is repeatedly identified as being strongly associated with the outcomes at age 5.

For the cognitive tests children with mothers educated to degree level or higher achieve on average between .2 and .4 of a standard deviation higher test scores than children with mothers who fail to achieve 5 A to C passes at GCSE level.
For the problem behaviour, mothers with the most education report between .1 and .3 of a standard deviation fewer problem behaviours than the least educated mothers.

Mother's ethnicity also plays a role in children's cognitive achievements but not their behavioural development. For all cognitive tests children with Pakistani and Bangladeshi mothers achieve lower scores than White children. For the Naming Vocabulary and Pattern Construction scores children with Black mothers also do less well than children with White mothers, as do children with mothers from Mixed or Other ethnic backgrounds.

Family income is associated with all outcomes, positively with cognitive outcomes and negatively with problem behaviour.

Mother's employment is positively associated with the outcomes in a number of models, as is having a **professional parent**.
Having a mother who has ever been **depressed** and living in **a lone parent** family are both negatively related to the Foundation Stage Profile and positively to the Problem Behaviour score.

Maternal depression is also negatively related to the Pattern Construction score in the full model, but neither maternal depression or lone parent families are important in the other models.

Parental decisions and other factors:

Reading to the child every day and having a mother who thinks it is **important to stimulate** young children are positively associated with all cognitive outcomes and negatively with problem behavior.

Non-maternal childcare use is associated with only 2 of the 5 outcomes examined – the Pattern Construction and the Foundation Stage Profile – even for these outcomes the association is reduced to statistical insignificance in the value added model which controls for previous achievement.

Living in social housing is negatively related to all cognitive outcomes (with the exception of the Picture Similarity score) and positively associated with problem behaviour.

Finally, **previous ability**, as measured by cognitive performance and behavioural development at age 3, is strongly associated with cognition and behaviour at age 5 in all outcomes and models.

2) The bottom 20 per cent:

The analysis so far has looked at the factors associated with outcomes at age 5 and from this we know, on average, which types of characteristics are related to increased (or decreased) achievement at age 5. However, policy makers are likely to be concerned about the children who are faring the worst.

Broad results:

A substantial percentage of children who were at the bottom of the distribution at age 3 are also at the bottom of the distribution at age 5. However, the majority of those who were in the bottom 20 per cent at age 3 are no longer at the bottom end of the distribution at age 5.

Poor achievement at age 5 is likely to be related to a range of other factors in addition to prior poor performance. We use a probit model to calculate the probability of being in the

bottom 20 per cent given certain characteristics, controlling for other factors which may affect the relationship.

Again the models are run separately for each of the age 5 outcomes and the control variables are the same as the previous models. However, this time the coefficients are interpreted as percentage point differences in the probability of being in the bottom 20 per cent.

Child characteristics:

The **child characteristics** are consistently associated with being in the bottom 20 per cent of achievers and the 20 per cent with the greatest problem behaviours. In general **older children, girls** and **heavier birth weight babies** are **less likely to be in the lowest performers. Girls** and **heavier birth weight** babies are also less likely to be in the 20 per cent of children with the most problematic behaviour, although older children and first borns are more likely to be in this latter group.

Family characteristics:

Mother's education is repeated identified as being strongly associated with the probability of being in the bottom 20 percent in all outcomes at age 5.

Mother's employment is negatively associated with 3 of the 4 cognitive outcomes (not with Pattern Construction).

Maternal depression is positively associated with being in the bottom 20 per cent on all cognitive tests and the 20 per cent of children with the most behavioural problems.

Unlike the previous models **mother's ethnicity** does explains the probability of being in the bottom 20 per cent of outcomes in only 2 of the 5 outcomes (Naming Vocabulary and Pattern Construction) at age 5 and **family income** is only (negatively) associated with 2 cognitive scores (Picture Similarity and Naming Vocabulary).

Parental choice and other factors:

Reading to the child every day reduces the probability of being in the bottom 20 per cent in the Naming Vocabulary, the Foundation Stage Profile and the Problem Behaviour score.

Having a mother who thinks it is **important to talk** to young children also reduces the probability of being amongst the lowest achievers for the Picture Similarity, Pattern Construction and Foundation Stage Profile scores.

Conclusions and policy implications:

This report has identified the factors associated with achievement at age 5. It has also highlighted the factors related to the probability of being amongst the poorest performers at age 5 and having the most problematic behaviour.

There are a number of factors which are associated with both analyses: the age, gender and birth weight of the child as well as the education level of the mother.

Policies aimed at these factors would affect both the performance at age 5 in general and target those at the bottom of the distribution.

If we are looking for policies aimed at raising cognitive achievement and behaviour at age 5 targeting ethnic minority groups (in particular Pakistani and Bangladeshi and Black groups); those with low family income; those in social housing could also potentially improve outcomes.

However, these factors are not consistently associated with the probability of being in the bottom 20 per cent at age 5. Encouraging parents to read to their children every day and value the importance of stimulation is likely to improve achievement but again this would have less effect on protecting children from ending up in the bottom 20 per cent.

If policy is interested in focusing on only the poorest achievers then policies could target mothers who suffer from depression as well as poorly educated mothers, boys, younger children and low birth weight babies.

These results show previous ability, measured at age 3, is associated with outcomes at 5, which supports a call for early intervention. However, this report has shown that not all children who perform badly at 3 also perform badly at 5 and vice versa.

Intervention therefore needs to follow children as they grow up and ensure that interventions do not label or stigmatise young children who may escape low performance anyway, nor miss children who start well but fall behind later in the education system.

Child Development in the first 3 sweeps of the Millennium Cohort Study

Executive Summary

Foundation Stage Profile (FSP) scores are provided by teachers on children's achievement at the end of the first year of school for children in state schools in England.

Based on a child production function model and using Ordinary Least Squares Regression techniques this report examines the factors associated with achievement at age 5 for children in the Millennium Cohort Study in the FSP and a number of survey administered cognitive tests as well as mothers reported behavioural development. Further, using Weighted Least Squares probit regression models, this report shows the factors associated with being in the bottom 20 per cent of the distribution in these indicators of cognitive and behavioural development.

The Department for Children, Schools and Families (DCSF), who collect a 10 per cent sample of all FSP scores, additionally collected the scores for over 7000 children who are being followed in Millennium Cohort Study (MCS).

This report shows that the teachers' scores (taken in summary) followed similar patterns of association with a standard set of predictors as other assessments administered to the MCS children at age 5 – Naming Vocabulary, Pattern Construction, Picture Similarity as well as a Behavioural Problem score. These included characteristics of the child and family as well as parental decisions which might affect the child.

The most robust predictors of child cognitive achievement and behavioural development were the characteristics of the child – with girls, older children and heavier birth weight children performing better than other children and having fewer behavioural problems (with the exception of age). These children were also less likely to be in the bottom 20 per cent when achievement and behavior are ranked. Maternal education was positively related to cognitive development and negatively to problem behaviour and the probability of being amongst the 20 per cent worst cognitive performers or the 20 per cent of children with the most problem behaviour.

Other factors related to cognitive development and problem behaviour in general include: family income and reading to the child every day (both related positively to cognition and negatively to problem behaviour) and ethnicity (particularly Pakistani and Bangladeshi groups) and living in social housing (both related negatively to the cognitive outcomes and positively to the problem behavioural outcome).

Maternal depression was shown to be related to the probability of being amongst the poorest cognitive performers and the most problematic behaviours, but only to 2 of the 5 outcomes when we look at development in general (the FSP and the Problem Behaviour scores, to which it is related negatively to the first and positively to the second).

These estimates were moderated by controlling, in the final model, for the level of development already attained at age 3.

Isolating the bottom fifth achievers on each outcome did not identify a stable and separate group, some were found at the bottom of each range and had stayed there between age 3 and 5, but there was also a lot of movement over time and between categories. Poor achievement at age 5 is shown to be related to a range of other factors in addition to prior poor performance. In particular, age, gender and birth weight are important as is mother's education.

This report now examines the data, methodology and results in detail before discussing the findings and policy implications of the research.

Introduction

Children's development in the early years has been shown to be related to their success in later life in a range of areas including education and employment. Determining why some children do better than others in the early years is a key issue for policy and is crucial in attempts to reduce inequalities. This report addresses this question by examining the factors associated with the cognitive and behavioral ability of children up to age 5 in the Millennium Cohort Study (MCS).

Data

The data used in this analysis are from the MCS which is a longitudinal survey of around 19,000 children born in the UK over a 12 month period and living in selected UK wards at age 9 months. The analysis uses data for England only from the first 3 sweeps of the MCS, which provide information on children and their families at 9 months, 3 years and 5 years of age.

The sample

There were 9,759 families interviewed in England at the third sweep of the MCS. For the analysis, only those families who participated in all 3 sweeps are included, which reduces the sample to 8,430 families. Selecting only singleton births and one child from each twin or triplet family reduces our sample by a further 228 cases, leaving 8,202 children.

Dropping main respondents who are not the cohort child's mother brings the sample down to 8,023 children. However, not all of these children have valid data for the cognitive and behavioural outcomes examined in this paper. Selecting only those who do means the final sample numbers vary by outcome examined.

Child outcomes at age 5

Cognitive abilities at age five were measured in the MCS using three subscales of the British Ability Scales Second Edition (BAS II). These are the Naming Vocabulary, Picture Similarities, and Pattern Construction. The three subscales capture core aspects of verbal, pictorial reasoning, and spatial abilities (Elliott, 1996; Hill, 2005). The assessments were administered using Computer Assisted Personal Interviewing (CAPI) by interviewers who were specially trained, but were not professional psychologists.

In addition to the assessments administered as part of the survey, Foundation Stage Profile (FSP) scores, teacher reported achievement recorded at the end of the first year of school, were collected by the DCFS for cohort members in state schools in England and linked to the survey data. The FSP score examined in this report sums six areas of learning: 1) personal, social and emotional development; 2) communication, language and literacy; 3) mathematical development; 4) knowledge and understanding of the world; 5) physical development; and 6) creative development.

The behavioural development of the children is measured with the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a behavioural screening questionnaire for 3 to 16-year-olds (Goodman, 1997, 2001; Goodman, Meltzer and Bailey, 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 items are assessed via parental report, normally by the mother, in the computer-assisted self-completion module of the questionnaire.[1] 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.

This report focuses on two aspects of achievement at age 5. The first part examines which factors are associated with the different age 5 outcomes, while the second focuses on children in the bottom 20 per cent of the distribution of scores. The report deals with each in turn.

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[1]As these data are produced by mothers' self report there is a question as to whether we are really identifying problem behaviour or just mothers' interpretation of problem behaviour. If factors like mothers' age, ethnicity or education are related to a mothers' propensity to interpret and report behaviour as problematic we may not be picking up true behaviours. However, Goodman (1997) administered the Strengths and Difficulties questionnaire along with the Rutter questionnaire to parents and teachers of 403 children. He found that, not only were the scores derived from the SDQ and Rutter questionnaires highly correlated but also, that parent self-report of the SDQ was highly correlated with the teacher report (which it could be argued offers a more subjective measure of behaviour than the information provided by the mother).

Part 1 Factors associated with age 5 outcomes

1a. Descriptive Statistics

Descriptive statistics on all the age 5 outcomes are presented in Table 1, which shows: unweighted sample size, the mean scores; the standard deviation; the minimum and maximum score achieved in each assessment within our sample; and the scores at various points of the distribution.

1b. Analysis and modelling

Having charted the basic descriptive details of the outcomes, we now turn to assessing differences in achievement by various characteristics of children and their families, to gain some insight into the variation of scores age 5. To do this we use regression analysis which allows us to look at the relationship between outcomes and a number of factors which theory and past empirical work inform us maybe related to achievement.

There are a number of advantages of using longitudinal data such as the MCS to do this type of analysis. Firstly, they are rich in background information, providing data not only on the cohort members themselves, but also the families and the environments in which the children grow up. Secondly, because they follow the same people over time, this allows us to model outcomes at later periods than the inputs which better enables us to think about the results in causal terms.

The analysis is based on a child production function model, which maps child outputs to inputs and where child outcomes not only depend on child characteristics but also other family characteristics. In its most basic form, it models child outcomes as a function of a vector of input variables:

$$S_{ijt} = \alpha_1 X_{ijt} + \varepsilon_{ijt}$$

(1)

Where

S_{ijt} Is the outcome or assessment score for child i of mother j at age t. It is often measured as percentiles or standardised scores.

X_{ijt} Is a vector of factors which might explain differences in outcomes.

ε_{ijt} Is the error term.

$$X_{ijt}$$

15

We can expand the vector in the equation to show the specific independent variables we examine in this report. When we do this our equation becomes:

$$S_{ijt} = \alpha_1 C_{ijt} + \alpha_2 F_{ijt} + \alpha_3 P_{ijt} + \alpha_4 VA_{ijt} + \varepsilon_{ijt} \tag{2}$$

Where

S_{ijt} is the outcome or assessment score for child *i* of mother *j* at age *t*. In this case the dependent variables are the five age 5 outcome measures which have been transformed into Z scores across our sample. This means that the coefficients can be interpreted as standard deviation differences.

$\alpha_1 C_{ijt}$ Is a set of independent variables which examine children's characteristics (age, birth weight, birth order and gender).

$\alpha_2 F_{ijt}$ is a set of family characteristics (language spoken at home, ethnicity of the mother, mother's highest educational qualification, maternal depression, maternal employment, family income, whether there is a father present, household SES).

$\alpha_3 P_{ijt}$ is a set of parental decision variables. This includes parenting variables: reading to the child, teaching the alphabet and counting; as well as watching TV and a number of dummy variables indicating whether a mother strongly agrees with the statements: 1) babies need to be stimulated if they are to develop well; and 2) talking, even to a young baby, is important ; and childcare (whether received non-maternal childcare).

$\alpha_4 VA_{ijt}$ the final set of independent variables are value added variables capturing achievement at age 3.

ε_{ijt} is the error term, which will include any factors associated with the outcomes that are unobservable and/or unmeasureable.

As the outcome measures are essentially continuous we run ordinary least squares regressions using 'survey' commands in STATA. The 'survey' commands have to be used because the data are clustered by ward. This clustering needs to be taken account of in the statistical analysis to ensure that the standard error of the reported estimates are not incorrect and the significance tests rendered invalid. There are a number of ways

to do this: 1) use survey commands; 2) use clustered robust standard errors in standard analysis; or 3) use a multi-level (hierarchical) model (Hansen and Hawkes, 2008). Due to the fact that in the MCS the correlation is produced as a direct result of the survey design the most appropriate method of dealing with the data is to use survey commands to run analyses (STATA library[2]).

1c. Results

Working from the equation above (2) each set of independent variables are entered into the model alone, then together in a full model. In the full model we also control for variables related to the environment the child lives in (social housing and satisfaction with area). A value added model makes a fifth and final model specification. The results of these ordinary least squares regressions are shown in Tables 2 to 6. The first column (1) is a regression of the outcome scores on child characteristics. The second column (2) focuses on family characteristics; the third (3) examines parental decisions; the fourth (4) controls for all the variables together plus conditionally controlling for area characteristics while the fifth (5) is the value added model which adds to the full model controls for achievement at age 3.

This value added model tries to control for the child's ability. If it does so successfully it is the preferred model as it controls for all factors together, allowing us to compare which of the factors are most associated with the outcomes. However, we need to bear in mind that it measures ability at age 3 by using survey administered tests, performance in which is likely to be associated with similar factors associated with age 5 achievement. For this reason the full model is the alternative model of choice and results from both models are highlighted in this report.

Table 2 shows the results for the BAS Picture Similarity, Table 3 the Naming Vocabulary score, Table 4 Pattern Construction, Table 5 the Foundation Stage Profile scores and Table 6 the SDQ problem behaviour scores.

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[2] https://www.ats.ucla.edu/stat/stata/library/cpsu.htm

Interpretation

As the outcomes have been transformed into Z scores the coefficients can be interpreted as standard deviation differences. If the coefficients on any of the control variables remain significant in the value added model then these factors are either positively or negatively associated with that particular outcome even after controlling for other factors which may influence the relationship.

1. Picture Similarity

This is a cognitive test in which children are shown a picture of an object and asked to identify a similar object amongst a number of pictures.

Key Results:

1) Factors significantly associated with the Picture Similarity Score in the full model:

- Gender (+)
- Age (+)
- Birth weight (+)
- First born (+)
- Mother's education (+)
- Mother's employment (+)
- Family income when the child is 9 months old (+)
- Children with a Bangladeshi or Pakistani mother (-)
- Children whose mothers think it is important to stimulate children (+)
- Children who are read to every day (+)
- Children taught the alphabet every day (+)

2) Factors significantly associated with the Picture Similarity Score in the value added model:

- Child's age (+)
- Family income when the child is 9 months old (+)
- Mother's employed at both previous surveys (+)
- Children taught the alphabet every day (+)
- Children whose mother's think stimulation is important (+)
- Child cognition at age 3 (+)
- Problem behaviour at age 3 (-)

Table 2 shows that all child characteristics are positively associated with the Picture Similarity scores. In terms of magnitude, being female and birth weight are the strongest of these predictors. Girls, on average, achieve 0.12 of a standard deviation higher scores than boys and a 1kg more in birth weight is associated with 0. 11 of a standard deviation higher scores. 6 months of age would be associated with an increase in standardised score of 0.12, and being the first born child appears to bring an advantage of about one twentieth of a standard deviation.

Of the family characteristics mother's education is most positively associated with the Picture Similarity scores. Children whose mothers are educated to at least degree level achieve, on average, 0.23 of a standard deviation higher scores than children whose mothers have only GCSEs grade D to E or less. In addition, children with mothers who were employed when their children were age 9 months and 3 years old have higher scores at age 5 than those with non-working mothers, as do children with at least one professional parent and children with higher household incomes. The coefficients on these variables are smaller in magnitude than mother's education. The coefficients on all minority ethnic groups attract negative signs compared to Whites, however only the negative sign for Pakistani and Bangladeshi mothers is statistically significant (-0.17).

In the parental choice model (column 3) children who received non-parental childcare, whose mothers thought it important to stimulate children at the first survey and those who were read to and taught the alphabet every day at the second survey, have on

average, higher scores on the Picture Similarity test than other children. Those children who watch 3 or more hours of TV a day at the the age 5 survey, on average, achieve 0.11 of a standard deviation lower scores on this test than children who watch less TV. However, it is important to bear in mind that these variables are likely to be highly correlated with parental education and income so it is hard to unpick where the relationships detected are really coming from. We therefore look at the variables all together in the full model.

In the full model, when we control for all observable factors, we think may explain differences in Picture Similarity test scores, parental behaviour variables are on the whole reduced to statistical insignificance with the inclusion of other variables. This said, children whose mothers think it is important to stimulate children and those who are read to and taught the alphabet regularly achieve higher scores, in families with a given level of the other resources. Mother's education and employment still attract positive and statistically significant coefficients in this full model as do all child characteristics (except birth order). In terms of magnitude, having a mother with a degree is most positively associated with the Picture Similarlity score (0.17) while having a Bangladeshi or Pakistani mothers is most negatively associated with children's test scores in this assessment (-0.16).

When we look at the value added model, which controls for the strongly significant association with three developmental scores at age 3, nearly all of these estimates are reduced to statistical insignificance. Only child's age, family income when the child is 9 months old, mother's employed at both previous surveys, children taught the alphabet every day and children whose mother's think stimulation is important remain as statistically significant predictors of developmental gain. Even in these cases the magnitude of the relationships are reduced massively. This perhaps indicates that the factors identified in the full model as being related to the Picture Similarity at age 5 are also the same factors which are associated with cognitive achievement at age 3. By putting all of these factors into the same model it becomes difficult to examine the association between any one variable and the outcome as some of the association may be being attributed to a third variable with which it is correlated. The fact that the size of the coefficients on all variables in the value added model are small and a number insignificant confirms this may a concern with this model.

All measures of previous development at age 3 are significant in the model. Children with higher cognitive test scores at age 3 do better at age 5. This is particularly true of the Bracken School Readiness assessment (0.17). Children who had more behavioural problems at age 3 score lower on the Picture Similarity assessment at 5 (-0.05).

2. Naming Vocabulary

This is a test where children are shown pictures of objects and asked to identify them.

Key Results:

1) Factors significantly associated with the Naming Vocabulary Score in the full model:

- Gender (+)
- Age (+)
- Birth weight (+)
- First born (+)
- English is not the only language spoken at home (-)
- Children with a Mixed, Bangladeshi or Pakistani, Black or other ethnic group mother (-)
- Mother's education (+)
- Mother's employment (+)
- Family income when the child is 9 months old (+)
- Having a parent in a professional or managerial job (+)
- Children whose mothers think it is important to stimulate children (+)
- Children who are read to every day (+)
- Living in social housing (-)

2) Factors significantly associated with the Naming Vocabulary Score in the value added model:

- Gender (+)
- Age (+)
- First born (+)
- English is not the only language spoken at home (-)
- Children with a Bangladeshi or Pakistani or Black mother (-)
- Mother's education (+)
- Family income when the child is 9 months old (+)
- Children who are read to every day (+)
- Child cognition at age 3 (+)
- Problem behaviour at age 3 (-)

Table 3 shows that all child characteristics are positively associated with the Naming Vocabulary scores. The apparent premium for , being the first born (0.22) stands out as unusually high for vocabulary. Birth weight has the second highest premium (0.17) in a model based solely on these four child characteristics. Both are positively associated with Naming Vocabulary scores. The age and gender effects are similar to those for Picture Similarities

Of the family characteristics mother's education is even more strongly associated vocabulary at age 5 than with Picture Similarities. Children whose mothers are educated to at least degree level achieve, on average, half a standard deviation higher scores than children whose mothers have only GCSE's grade D to E or less. In addition, children living in households where English is not the only language spoken have the same achievement gap in this vocabulary test than children in English only speaking homes.

Apart from children of Indian mothers, all other ethnic groups achieve lower vocabulary scores than children with White mothers. Children with Pakistani and Bangladeshi mothers and those with Black mothers (each -0.47) do particularly poorly compared to children with White mothers. Children with mothers who have ever suffered from

depression (-0.06) and those whose mothers have ever been lone parents achieve on average, lower vocabulary scores than other children (-0.07). Children with working mothers have raised scores of 0.08 or 0.13 depending on whether they were employed at both MCS1 and MCS2 or MCS2 only. Those with at least 1 parent in a professional or managerial position achieve higher vocabulary scores at age 5 (0.15) than other children.

In the parental decision model (column 3), children who receive childcare, whose mothers thought it important to stimulate children and those who were read to every day achieve, on average higher scores on the naming vocabulary test than other children. Those children who watch 3 or more hours of TV a day, on average, achieve 0.13 of a standard deviation lower scores on this assessment than children who view less.

In the full model, most of the variables in the first two models remain significantly associated with vocabulary at age 5, though their magnitudes are slightly reduced. All child characteristics, mother's education and ethnicity, language spoken at home, household income and having a professional or managerial parent are all associated with vocabulary scores of children. Most of the parental decision variables are reduced to statistical insignificance, as in the case of Picture Similarities, except for thinking stimulation is important, which attract positive coefficient of 0.12 (as it did in the Picture Similarities model). Reading to the child daily at 3 also raised the vocabulary score at 5 by 0.17 of a standard deviation. In this model living in social housing is negatively associated with vocabulary at age 5.

When we look at the value added model, which controls for development reached at age 3 child's age, there is general attenuation of all the estimates other than those on age 3 development, as expected. Almost all of the parental decision variables lose their independent influence, but reading to the child everyday at age 3 still shows a positive association (0.05) with the vocabulary score even when the score at age 3, and the family circumstances are taken into account. Also, children read to every day retain their positive and statistically significant coefficient in the value added model.

The coefficient on the age 3 cognitive tests are significant and larger in magnitude in this value added model than for Picture Similarities. Children with better scores on the Bracken School Readiness assessment at age 3 score a fifth of a standard deviation

higher scores on the BAS Naming Vocabulary test at age 5. Those who score higher on the vocabulary test at age 3 score a quarter of a standard deviation higher vocabulary scores at age 5. Children with more problem behavior at age 3 have marginally lower vocabulary scores at age 5 (-0.02) than other children.

3. Pattern Construction

This test required children to reproduce patterns shown to them in a book and by the interviewer out of coloured blocks.

Key Results:

1) Factors significantly associated with the Pattern Construction Score in the full model:

- Gender (+)
- Age (+)
- Birth weight (+)
- English is not the only language spoken at home (-)
- Children with a Mixed, Bangladeshi or Pakistani, Black or other ethnic group mother (-)
- Mother's education (+)
- Mother ever depressed (-)
- Family income when the child is 9 months old (+)
- Having a parent in a professional or managerial job (+)
- Children who ever received childcare (+)
- Children whose mothers think it is important to stimulate children (+)
- Children whose mothers think it is important to talk to children (+)
- Children who are read to every day (+)
- Children who are taught the alphabet every day (+)
- Living in social housing (-)

2) Factors significantly associated with the Pattern Construction Score in the value added model:

- Gender (+)
- Age (+)
- Birth weight (+)
- First born (+)
- Children with a Mixed. Bangladeshi or Pakistani or Black or other ethnic group mother (-)
- Mother's education (+)
- Family income when the child is 9 months old (+)
- Having a parent in a professional or managerial job (+)
- Children whose mothers think it is important to stimulate children (+)
- Child cognition at age 3 (+)
- Problem behaviour at age 3 (-)

As with the other cognitive outcomes, all child characteristics included are positively associated with the Pattern Construction scores (Table 4). In terms of magnitude, birth weight and being female are the most associated with Pattern Construction of the child characteristics. A 1kg increase in birth weight is associated with 0.22 of a standard deviation higher scores, and girls, on average, achieve 0.20 of a standard deviation higher scores than boys.

Again mother's education is highly associated with this assessment at age 5, with children whose mothers are educated to degree level achieving, on average, 0.41 of a standard deviation higher Pattern Construction scores than children whose mothers failed to achieve 5 grade A to C passes at GCSE level. Ethnic background is also important for Pattern Construction scores, with children with non-White mothers achieving significantly lower scores than children with White mothers. Only children with Indian mothers achieve scores insignificantly different from children with White mothers. Living in a household where English is not the only language spoken (-0.11) and having a mother who has ever suffered from depression (-0.06) are both significantly negatively associated with Pattern Construction scores. Having at least one professional parent

(0.12) and having higher household incomes are positively associated with this age 5 outcome.

In the parental choice model children who experience childcare, whose mothers think it is important to stimulate children (0.03) and those who are read to (0.18) and taught the alphabet every day (0.09) achieve, on average higher scores on the Pattern Construction test than other children. Those children who watch 3 or more hours of TV a day, on average, achieve 0.10 of a standard deviation lower scores on this test than children who watch less TV.

In the full model, mother's education and ethnicity remain the most associated with Pattern Construction scores in terms of magnitude – the first attracting a positive sign the second a negative one. Children whose mothers are educated to degree level achieve, on average, higher scores than those children whose mothers failed to achieve 5 grade A to C passes at GCSE (0.35). Children whose mothers are educated to A-level do less well than those with a degree but still do better than the comparison group (0.28) as do children whose mother's achieved 5 grade A to C passes at GCSE (0.24). Children whose mothers are of mixed ethnicity (-0.45), Black (-0.31) or are Pakistani or Bangladeshi (-0.23) achieve lower scores, on average, than children with White mothers in this full model.

When we look at the value added model, which controls for cognitive achievement at age 3, mother's education remains most strongly associated with Pattern Construction scores. It is just the initial level of income at MCS1 which is associated with higher value added. Child effects are not affected by controlling for development to age 3, gender, birth weight and birth order continue to have a somewhat attenuated effect on the outcome The only parenting variable to have an independent association in this value added model is agreeing (at 9 months) that it is 'Important to stimulate the child'

In this model previous achievement in the vocabulary test at age 3 and the problem behaviour score at 3 are not associated with Pattern Construction scores at age 5. However, children with higher Bracken School Readiness scores at age 3 score nearly a quarter of a standard deviation higher, on average, in this age 5 test than other children.

4. The Foundation Stage Profile scores

The scores considered to date are those administered as part of the MCS survey. However, at age 5 in England we also have the teacher assessments of the child during the first year of school in the Foundation Stage Profile scores. FSP scores are teacher reported achievement recorded at the end of the first year of school. The score sums six areas of learning: 1) personal, social and emotional development; 2) communication, language and literacy; 3) mathematical development; 4) knowledge and understanding of the world; 5) physical development; and 6) creative development. As these scores are teacher-assessed we may find that they are associated with slightly different factors than the survey administered assessments. However, examining Table 5 this appears not to be the case, the variables associated with the Foundation Stage Scores are those we have already seen associated with the other age 5 outcomes.

Key Results:

1) Factors significantly associated with the Foundation Stage Profile Score in the full model:

- Gender (+)
- Age (+)
- Birth weight (+)
- Children with a Bangladeshi or Pakistani mother (-)
- Mother's education (+)
- Mother ever depressed (-)
- Lone parent family (-)
- Mother's employment (+)
- Family income when the child is 9 months and 3 years old (+)
- Having a parent in a professional or managerial job (+)
- Child received childcare (+)
- Children who are read to every day (+)
- Children who are taught the alphabet every day (+)
- Children whose mothers think it is important to stimulate children (+)
- Living in social housing (-)
- Dissatisfied with the area (-)

2) Factors significantly associated with the Foundation Stage Profile Score in the value added model:

- Gender (+)
- Age (+)
- Birth weight (+)
- Mother's education (+)
- Mother ever depressed (-)
- Family income when the child is 9 months and 3 years old (+)
- Living in social housing (-)
- Child cognition at age 3 (+)
- Problem behaviour at age 3 (-)

All of the child characteristics are similarly positively associated with the Foundation Stage Profile scores. The teacher rated Foundation Stage score has the greatest sensitivity to age (0.07 of a standard deviation per month) than any of the survey based scores considered so far, and has the highest premium for female gender (0.29). This outcome has a roughly similar association with birth weight (0.21) as other age 5 outcomes and around the middle of the varying range of premia for being the first born.

Of the family characteristics mother's education is strongly associated with the Foundation Stage Profile Scores at age 5. Children whose mothers are educated to at least degree level achieve, on average, half a standard deviation higher scores than children whose mothers have only GCSE's grade D to E or less. Those with mothers with A-level qualification and 5 A to C grades at GCSEs also do better than the comparison group (0.42 and 0.29 of a standard deviation respectively).

Children with Pakistani and Bangladeshi mothers (-0.31) do worse than children with White mothers but the coefficients on all other ethnic groups are statistically insignificant, indicating they do no better or worse than children with White mothers.

Children with mothers who have ever suffered from depression (-0.10) and those whose mothers have ever been lone parents achieve on average, lower vocabulary scores than

other children (-0.17). Children with working mothers (0.12), those with at least 1 parent in a professional or managerial position (0.13) and children living in households with higher income achieve higher Foundation Stage Profile scores at age 5 than other children.

In the parental choice model children who experience childcare (0.34), whose mothers think it is important to stimulate children (0.29), those who are read to every day (0.32) and those who are taught the alphabet every day (0.07) achieve, on average higher Foundation Stage Profile scores than other children. Those children who watch 3 or more hours of TV a day, on average achieve 0.20 of a standard deviation lower scores on this test than children who watch less TV.

In the full model, having a mother with a degree, having a Pakistani or Bangladeshi mother, being a female child and living in social housing are the factors which, in terms of magnitude, are most associated with the Foundation Stage Profile scores. In the value added model, which controls for cognitive achievement at age 3 mother's education remains most associated with Foundation Stage Profile scores in terms of magnitude. Other factors attracting significant and sizeable coefficients in this model are living in social housing (-0.15) and being a female child (0.16). Previous achievement in all age 3 outcomes are significantly related to Foundation Stage Profile scores at age 5. The coefficient on the Bracken School Readiness assessment is the largest in terms of magnitude (0.28), followed by the BAS Naming Vocabulary (0.10) and the problem behaviour (-0.07). In the value added model for FSP there is no residual explanatory power for any of the parental choice variables, but there are some vestiges of positive association with maternal education and a negative association with maternal depression.

5. Problem Behaviour Score
This score is established by summing the mothers' response to a series of questions relating to their child's behaviour concerning: emotions; conduct; hyperactivity and peer interactions.

Key Results:

1) Factors significantly associated with the Problem Behaviour Score in the full model:

- Gender (-)
- Age (-)
- Birth weight (-)
- First born (+)
- Mother's education (-)
- Mother ever depressed (+)
- Family income when the child is 9 months old (-)
- Mother's employment (-)
- Lone Parent (+)
- Children whose mothers think it is important to stimulate children (-)
- Children who are read to every day (-)
- Children who watch tv 3 or more hours per day (+)
- Living in social housing (+)
- Dissatisfied with the area (+)

2) Factors significantly associated with the Problem Behaviour Score in the value added model:

- Gender (-)
- Age (-)
- Birth weight (-)
- First born (+)
- Mother's education (-)
- Mother ever depressed (+)
- Family income when the child is 9 months old (-)
- Lone Parent (+)
- Children who are read to every day (-)
- Children who watch tv 3 or more hours per day (+)
- Living in social housing (+)
- Dissatisfied with the area (+)
- Child cognition at age 3 (-)
- Problem behaviour at age 3 (+)

Table 6 allows us to examine whether the characteristics that are associated with the cognitive outcomes at age 5 are also associated with child behavioural development at the same age as measured by the problem behaviour score. When interpreting this table we need to remember that a higher score indicates more behavioural problems.

The child characteristics in Table 6 are all significantly associated with behaviour. Girls are less likely to be identified by their mothers are showing signs of problem behaviour than boys (-0.22) and a 1kg increased in birth weight is also associated with lower problem behavioural scores (-0.19). Older children are less likely to be identified as having behavioural problems (-0.01) than younger children and children who are first born are more likely to score highly on the problem behaviour score.

Of the family characteristics mother's education is highly associated with problem behaviour. Children whose mothers are more educated have lower problem behavioural scores on average, than children whose mothers are less educated. Always allowing for the other included factors, children with mothers who are employed when their children were age 9 months and 3 years have fewer behavioural problems at age 5 than those with non-working mothers, as do children with at least one professional parent and children with higher household incomes. Pakistani and Bangladeshi mothers report more problem behaviour in their children than White mothers as do mothers who have ever been depressed and mothers who had any spell as lone mother of the cohort child.

In the parental choice model children who have experienced childcare, whose mothers think it is important to stimulate children and those who are read to every day have, on average, lower problem behaviour scores than other children. Those children who watch 3 or more hours of TV a day, on average, have 0.30 of a standard deviation higher problem behaviour scores than children who watch less TV.

In the full model, when we control for all observable factors we think may explain differences in problem behaviour scores, all child characteristics remain statistically significant. Girls have 0.20 of a standard deviation lower behavioural scores than boys, and the first born have more problematic behaviour than those with older siblings. The other factors most associated with problem behaviour are: having a Pakistani or Bangladeshi mother; having a poorly educated mother; having a mother who has ever suffered from depression or ever been a lone parent; living in social housing and

watching 3 or more hours of TV a day. Reading to the child appears to lower behavioural problems in the full model, and marginally so in the value-added model. Of these variables mother's education remains the most significant in the value added model. Of the age 3 outcomes having more behavioural problems is most associated with the problem behaviour score at age 5, attracting a large coefficient of 0.55.

1d. Discussion

This analysis has shown the factors most associated with the different cognitive and behavioural outcome at age 5. Despite the fact that each test measures slightly different aspects of a child's development at age 5 and some are measured directly from the child's performance, others by the teacher and mother, on the whole similar characteristics are associated with all the outcomes.

The child characteristics are consistently associated with the outcomes across all models. In general older children, girls, heavier birth weight babies and first born children achieve higher cognitive test scores than other children. With the exception of first borns they also have fewer behavioural problems.

Of the family characteristics, mother's education is repeatedly identified as being strongly associated with the outcomes at age 5. For the cognitive tests children with mothers educated to degree level or higher achieve on average between .2 and .4 of a standard deviation higher test scores than children with mothers who fail to achieve 5 A to C passes at GCSE level. For the problem behaviour, mothers with the most education report between .1 and .3 of a standard deviation fewer problem behaviours than the least educated mothers.

Mother's ethnicity also plays a role in children's cognitive achievements but not their behavioural development. For all cognitive tests children with Pakistani and Bangladeshi mothers achieve lower scores than White children. For the Naming Vocabulary and Pattern Construction scores children with Black mothers also do less well than children with White mothers, as do children with mothers from Mixed or Other ethnic backgrounds.

Family income is associated with all outcomes, positively with cognitive outcomes and negatively with problem behaviour. Mother's employment is positively associated with

the outcomes in a number of models, as is having a professional parent. Having a mother who has ever been depressed and living in a lone parent family are both negatively related to the Foundation Stage Profile and positively to the Problem Behaviour score. Maternal depression is also negatively related to the Pattern Construction score in the full model, but neither maternal depression or lone parent families are important in the other models.

Reading to the child every day and having a mother who thinks it is important to stimulate young children are positively associated with all cognitive outcomes and negatively with problem behavior. Non-maternal childcare use is associated with only 2 of the 5 outcomes examined – the Pattern Construction and the Foundation Stage Profile – even for these outcomes the association is reduced to statistical insignificance in the value added model which controls for previous achievement. Living in social housing is negatively related to all cognitive outcomes (with the exception of the Picture Similarity score) and positively associated with problem behaviour.

Finally, previous ability, as measured by cognitive performance and behavioural development at age 3, is strongly associated with cognition and behaviour at age 5 in all outcomes and models.

PART 2. Children in the bottom 20 per cent of the achievement distribution

The analysis so far has looked at the factors associated with outcomes at age 5 and from this we know, on average, which types of characteristics are related to increased (or decreased) achievement at age 5. However, policy makers are likely to be concerned about the children who are faring the worst. For this reason the rest of the report focuses on children at the bottom of the achievement distribution (those in the bottom 20 per cent).

2a. Descriptive Statistics

Appendix 2 shows descriptive statistics on the characteristics of children in the bottom 20 per cent of the distribution in the various outcomes measured at age 5 compared to children higher up the distribution. On the whole those in the bottom 20 per cent are more likely to be:

- Males
- Not first born
- Non-White
- Living in households where English is not the only language spoken
- Have less educated mothers
- Have non-working mothers
- Have mothers who have suffered from depression
- Live in lone-parent families
- Have non-professional or managerial parents
- Not received childcare
- Not read to or taught the alphabet daily
- Watch more tv
- Have parents who think stimulating and talking to young children is not important
- Live in social housing
- Have mothers who are dissatisfied with the area they live in

But as we will later see once other factors are controlled for in the regression analysis many of these binary relationships are reduced to statistical insignificance.

Using MCS data it is also possible to look at the bottom achievers longitudinally. Figures 1 and 2 chart the position at age 5 of those children who were in the bottom of the distribution in the cognitive tests at age 3.

Figure 1. The percentage of children in the bottom 20 per cent at each 5 assessment of those who were in the bottom 20 per cent of the BAS Naming Vocabulary test at age 3

```
                    ┌──────────────────────┐
                    │  Bottom 20 per cent  │
                    │   in BAS Naming      │
                    │  Vocabulary at age   │
                    │          3           │
                    │                      │
                    │        (2139)        │
                    └──────────────────────┘
```

Bottom 20 Per cent In BAS Naming Vocabulary at age 5	Bottom 20 Per cent In BAS Pattern Construction at age 5	Bottom 20 Per cent In BAS Picture Problems at age 5	Bottom 20 Per cent In the Foundation Stage Profile Scores at age 5	Highest 20 Per cent In SDQ Problem Behaviour Score at age 5
36.9%	32.5%	32.2%	35.4%	29.9%
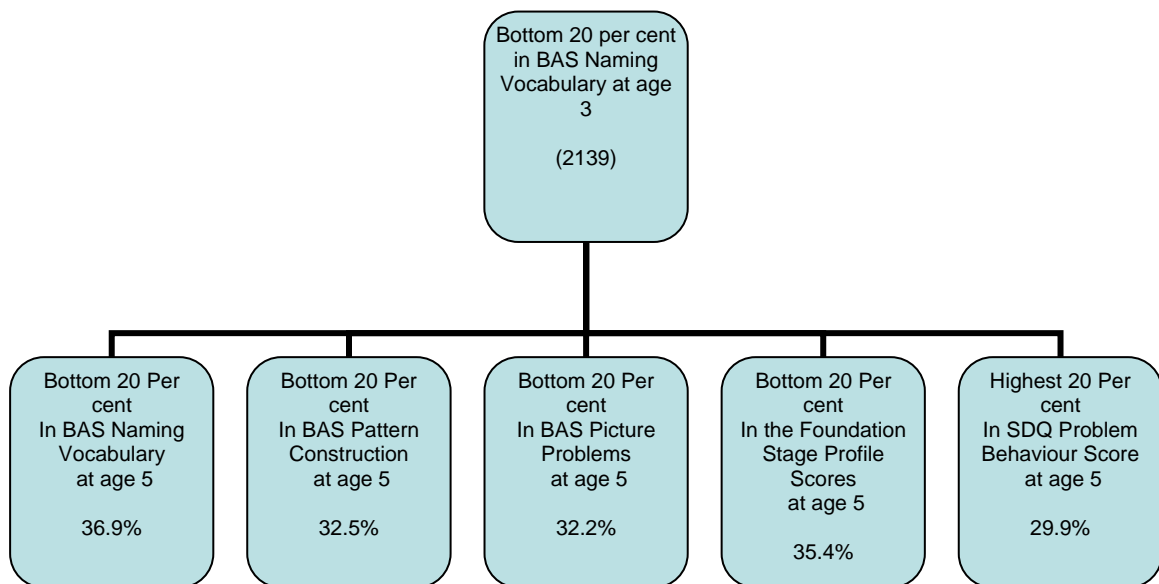
Figure 2. The percentage of children in the bottom 20 per cent at each 5 assessment of those who were in the bottom 20 per cent of the Bracken School Readiness test at age 3

```
                    ┌─────────────────────┐
                    │ Bottom 20 per cent  │
                    │ in Bracken School   │
                    │ Readiness           │
                    │ Assessment at age   │
                    │ 3                   │
                    │                     │
                    │ (1606)              │
                    └─────────────────────┘
```

Bottom 20 Per cent In BAS Naming Vocabulary at age 5	Bottom 20 Per cent In BAS Pattern Construction at age 5	Bottom 20 Per cent In BAS Picture Problems at age 5	Bottom 20 Per cent In the Foundation Stage Profile Scores at age 5	Highest 20 Per cent In SDQ Problem Behaviour Score at age 5
40.4%	39.5%	35.1%	42.8%	35.2%
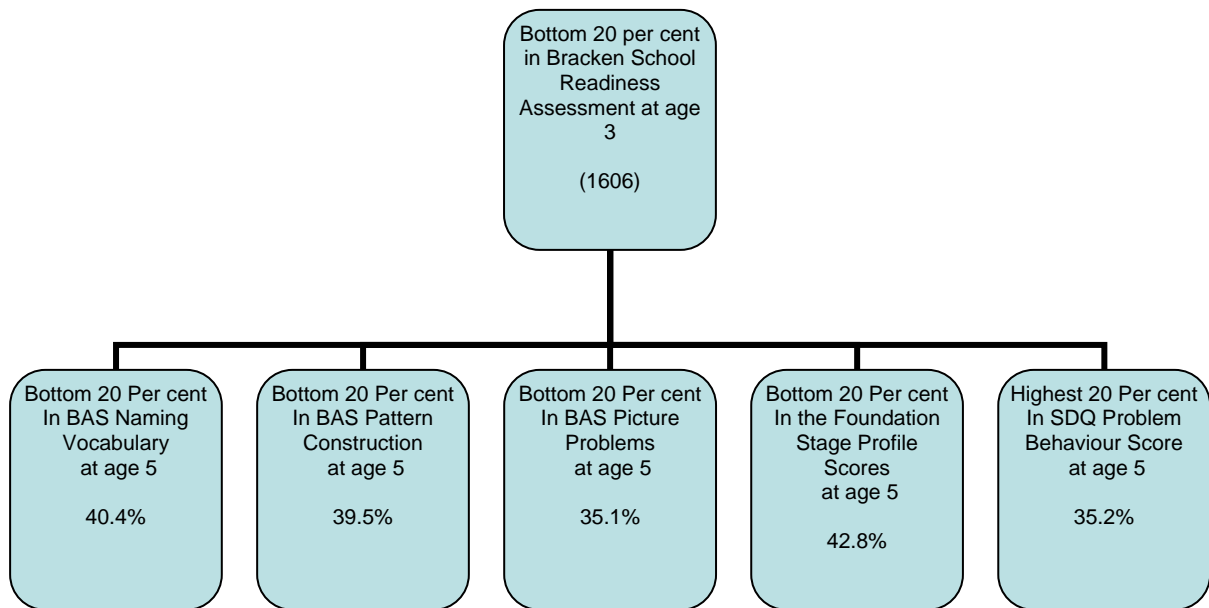
The results above show a substantial percentage of children who were at the bottom of the distribution at age 3 are also at the bottom of the distribution at age 5. However, the majority of those who were in the bottom 20 per cent at age 3 are no longer at the bottom end of the distribution at age 5. We can see from Figures 1 and 2 that while between 30 and 36 per cent of those who were in the bottom 20 per cent at age 3 in the BAS Naming Vocabulary test are also at the bottom of the distribution in the age 5 assessments, between 64 and 70 per cent of the low achievers at age 3 were no longer low achievers (thus defined) at age 5. Likewise for low achievers in the Bracken School Readiness assessment at age 3, 35 to 43 per cent are still low achievers in the age 5 tests, but between 57 and 65 per cent are no longer low achievers by age 5.

2b. Analysis and modelling

The Figures above show that being at the bottom of the distribution at age 5 is likely to be associated with low achievement at age 3, but this is only part of the story. There are likely to be a range of other factors which are associated with a child's position in the

distribution at age 5. To allow us to examine this we use regression models to look at the probability that a child is either in the bottom 20 per cent of the achievement distribution at age 5 or they are not. The appropriate model to use is a maximum likelihood probit estimation model where the outcome variable takes on a value of 1 (if a child is in the bottom 20 per cent of the distribution) or 0 (if they are higher up the distribution). The probit model will then calculate the probability of being in the bottom 20 per cent given certain characteristics, controlling for other factors which may affect the relationship. The models are run separately for each of the age 5 outcomes and the control variables are the same as the previous models. This time the coefficients are interpreted as percentage point differences in the probability of being in the bottom 20 per cent.

2c. Results

1. Picture Similarity

Key Results:

1) Factors significantly associated with the Picture Similarity Score in the full model:

- Gender (-)
- Age (-)
- Birth weight (-)
- Mother's education (-)
- Mother's employment (-)
- Family income when the child is 9 months old (-)
- Children whose mothers think it is important to stimulate children (-)
- Children whose mothers think it is important to talk to children (-)
- Children who are read to every day (-)
- Children taught the alphabet every day (-)
- Children who watch 3+ hours of tv per day (+)

2) Factors significantly associated with the Picture Similarity Score in the value added model:

- Gender (-)
- Age (-)
- Birth weight (-)
- Mother's education (-)
- Mother's employment (-)
- Family income when the child is 9 months old (-)
- Children whose mothers think it is important to talk to children (-)
- Children taught the alphabet every day (-)
- Being in the bottom 20 per cent of cognitive scorers at age 3 (+)
- Being in the 20 per cent with the most behavioural problems at age 3 (+)

Table 7 shows that all child characteristics are negatively related to the probability of being in the bottom 20 per cent of the distribution of the Picture Similarity scores. Female children are less likely to be in the bottom 20 per cent than boys (-0.04); heavier birth weight children less likely than lighter babies (-0.04); first born less likely than subsequent birth order children (-0.02); and older children less likely to be in the bottom twenty per cent than other children.

Of the family characteristics, as in the previous models, the factor most associated with the probability of being in the bottom 20 per cent of the Picture Similarity scores is mother's education. Children of more educated mothers are less likely to be in the bottom 20 per cent than children with less educated mothers: the higher their qualification the lower the likelihood of their child being in the bottom 20 per cent. Children whose mothers worked when they were younger also have a lower likelihood of being in the bottom 20 per cent than children with non-working mothers.

In the parental choice model children who experience childcare, whose mothers think it is important to stimulate and talk to children and those who are read to and taught the alphabet every day are less likely to be in the bottom 20 per cent on the Picture Similarity test than other children. Those children who watch 3 or more hours of TVa

day, are more likely to be in the bottom 20 per cent on this test than those who watch less.

All these characteristics remain associated with the likelihood of being at the bottom of the distribution of Picture Similarity test scores in the full model when we look at all the independent variables together. But in the value added model many associations are reduced to statistical insignificance. Child's age, gender and birth weight, having a mother educated to degree level, having mother employed at earlier sweeps of the survey, being taught the alphabet daily and having a mother who agrees that it is important to talk to a child at 9 months old statistically reduce the likelihood of being in the bottom 20 per cent of the distribution of Picture Similarity test scores in this value added model. In terms of magnitude the factor most associated with being in the bottom 20 per cent at this age 5 outcome is being in the bottom 20 per cent of the age 3 cognitive assessments.

2. Naming Vocabulary

Key Results:

1) Factors significantly associated with the Naming Vocabulary Score in the full model:

- Gender (-)
- Age (-)
- Birth weight (-)
- First born (-)
- English is not the only language spoken at home (+)
- Children with a Bangladeshi or Pakistani, Black or other ethnic group mother (+)
- Mother's education (-)
- Mother's employment (-)
- Mother ever depressed (+)
- Family income when the child is 9 months old (-)
- Having a parent in a professional or managerial job (-)
- Children who are read to every day (-)
- Living in social housing (+)

2) Factors significantly associated with the Naming Vocabulary Score in the value added model:

- Age (-)
- First born (-)
- English is not the only language spoken at home (+)
- Children with a Bangladeshi or Pakistani, Black mother (+)
- Mother's education (-)
- Mother's employment (-)
- Mother ever depressed (+)
- Family income when the child is 9 months old (-)
- Having a parent in a professional or managerial job (-)
- Children who are read to every day (-)

Examining Table 8 we can see that all child characteristics are negatively associated with the probability of being in the bottom 20 per cent of the Naming Vocabulary scores. In terms of magnitude, being the first born (-0.06), having a 1kg greater birth weight (-0.06) and being female (-0.04) are the most important child characteristics.

Of the family characteristics living in a household where English is not the only language spoken is associated with a 17 percentage point increase in the probability of being in the bottom 20 per cent of the Naming Vocabulary distribution. Having a Black mother and a Pakistani or Bangladeshi mother increases the probability of being at the bottom of the distribution by 17 and 19 percentage points respectively. Having a mother who has ever suffered from depression and one who has ever been a lone parent also increases a child's probability of being in the bottom 20 per cent but by a smaller magnitude (2 percentage points).

The family characteristics associated with a reduced likelihood of being in the bottom 20 per cent of the distribution include: having a more highly educated mother – the higher her qualifications the lower the probability of being at the bottom end of the distribution; having a mother who was employed as the child was growing up; and having at least one parent in a professional or managerial position.

In the parental choice model children who experience childcare, whose mothers think it is important to stimulate and talk to young children; those who are read to and taught counting every day are less likely to be in the bottom 20 percent than other children. On the other hand a watching 3 or more hours of TV a day raises the probability of a child being at the bottom of the distribution .

In the full model, the factors most associated with the probability of being in the bottom 20 per cent of the Naming Vocabulary score distribution are: having a Pakistani or Bangladeshi mother (which is associated with an 18 percentage point higher probability of being at the bottom end of the distribution); having a Black mother (13 percentage points); living in a household where English is not the only language spoken (15 percentage points) and not having a mother with a degree (which is associated with a 10 percentage point lower probability of being at the bottom end of the distribution).

In the value added model, which controls for quintiles of cognitive achievement at age 3, the factors which remain most associated with the probability of being in the bottom 20 per cent of the Naming Vocabulary score distribution are: living in households where English is not the only language spoken, mothers of Pakistani or Bangladeshi and Black ethnic origins and mother's education. However, as with the previous model the coefficients on the value added variables (being in the bottom 20 per cent in the age 3 cognitive assessments) are of greater magnitude. Children who were in the bottom 20 per cent in the Bracken School Readiness test are 13 percentage points more likely to be in the bottom 20 per cent in the age 5 vocabulary assessment. And children who were in the bottom of the distribution in the vocabulary assessment at age 3 are 15 percentage points more likely to be at the bottom of the distribution in the vocabulary assessment at age 5. The parental choice variables are mostly reduced to insignificance in the value added model , with the exception of a much attenuated estimate on reading to the child.

3. Pattern Construction

Key Results:

1) Factors significantly associated with the Pattern Construction Score in the full model:

- Gender (-)
- Age (-)
- Birth weight (-)
- Children with a Mixed, Bangladeshi or Pakistani, Black or other ethnic group mother (+)
- Mother's education (-)
- Mother ever depressed (+)
- Family income when the child is 9 months old (-)
- Having a parent in a professional or managerial job (-)
- Children whose mothers think it is important to talk to children (-)
- Children who are taught the alphabet every day (-)

2) Factors significantly associated with the Pattern Construction Score in the value added model:

- Gender (-)
- Age (-)
- Birth weight (-)
- Children with a Mixed, Black or other ethnic group mother (+)
- Mother's education (-)
- Mother ever depressed (+)
- Having a parent in a professional or managerial job (-)
- Children whose mothers think it is important to talk to children (-)
- Children whose mothers think it is important to stimulate (-)
- Children who are taught the alphabet every day (-)
- Being in the bottom 20 per cent of cognitive scorers at age 3 (+)
- Being in the 20 per cent with the most behavioural problems at age 3 (+)

With the exception of birth order, all child characteristics are negatively associated with the probability of being in the bottom 20 per cent of the Pattern Construction scores. In terms of magnitude, birth weight and being female are the most important child

characteristics. A 1kg increase in birth weight is associated with a 7 percentage point greater chance of escaping from the bottom of the distribution and girls have an 8 percentage point better prospect than boys.

Like the previous models, mother's ethnicity and education are most associated with the probability of being in the bottom 20 per cent of the Pattern Construction scores within the family characteristics. Children whose mothers are Black are 13 percentage points more likely to be at the bottom of the distribution while children with Pakistani or Bangladeshi mothers are 10 percentage points more likely to be in the bottom 20 per cent than children with White mothers.

Children with more educated mothers are less likely to be in the bottom 20 per cent than children with less educated mothers. The higher their mother's qualification the lower the likelihood of being in the bottom 20 per cent. Children living in households with higher family income are also less likely to be at the bottom end of the distribution as are children with at least 1 parent in a professional or managerial parent.

In the parental choice model children who experience childcare, whose mothers think it is important to talk to children and those who are read to and taught the alphabet every day are less likely to be in the bottom 20 per cent on the Pattern Construction test than other children. Those children who watch 3 or more hours of TV a day, are more likely to be in the bottom 20 per cent on this test than children who watch less TV.

Apart from the parental choice variables all these characteristics remain associated with the likelihood of being in the bottom of the distribution of Pattern Construction test scores in the full model. Mother's ethnicity and education remain the most associated with the probability of being in the bottom 20 per cent when all independent variables are examined together.

In the value added model being in the bottom 20 per cent at age 3 in the Bracken School Readiness test increases the probability of being at the bottom of the distribution in the Pattern Construction test at age 5 by 14 percentage points. Being in the bottom 20 per cent in the BAS Naming Vocabulary at age 3 increases the probability of being at the bottom of the distribution in the Pattern Construction test at age 5 by 7 percentage

points. Apart from prior cognitive achievement having a Black mother (0.10), mothers education (-0.05 to -0.10), birth weight (-0.05) and gender (-0.06 for girls) are the most associated with being at the bottom of the distribution in this test. One parental choice variable has an independent effect on Pattern Construction when all else ,including grouped cognitive scores at 3, are controlled; teaching the alphabet.

4. The Foundation Stage Profile scores

Key Results:

1) Factors significantly associated with the Foundation Stage Profile Score in the full model:

- Gender (-)
- Age (-)
- Birth weight (-)
- Children with a Bangladeshi or Pakistani mother (+)
- Mother's education (-)
- Mother ever depressed (+)
- Mother's employment (-)
- Children who are read to every day (-)
- Children who are taught the alphabet every day (-)
- Children whose mothers think it is important to stimulate children (-)
- Children whose mothers think it is important to talk to children (-)
- Living in social housing (+)

2) Factors significantly associated with the Foundation Stage Profile Score in the value added model:

- Gender (-)
- Age (-)
- Birth weight (-)
- Mother's education (-)
- Mother ever depressed (+)
- Mother's employment (-)
- Children who are read to every day (-)

- Children who are taught the alphabet every day (-)
- Children whose mothers think it is important to stimulate children (-)
- Children whose mothers think it is important to talk to children (-)
- Living in social housing (+)
- Being in the bottom 20 per cent of cognitive scorers at age 3 (+)
- Being in the 20 per cent with the most behavioural problems at age 3 (+)

The child characteristics (age, gender, birth weight and first born) are negatively associated with the probability of being in the bottom 20 per cent of the Foundation Stage Profile scores in much the same way as the previous models. However, in this teacher assessed distribution the coefficients on mother's education are greater in magnitude than for the previous assessments indicating that mother's education is more associated with the probability of being in the bottom 20 per cent of the Foundation Stage Profile than any of the BAS assessments. A child whose mother is educated to degree level is 15 percentage points less likely to be at the bottom of the distribution than a child whose mother failed to achieve 5 passes at GCSE grades A to C. Having a mother with A-level qualification is associated with a 10 percentage point lower probability, and having a mother with 5 GCSEs grades A to C an 8 percentage point reduced probability, of being in the bottom 20 per cent of the Foundation Stage Profile scores. After mother's education, mothers ethnicity is the most associated with being in the bottom 20 per cent of the Foundation Stage Profile Scores. Having a Black, Pakistani or Bangladeshi mother increases the probability of being at the bottom of the distribution by 9 and 8 percentage points respectively.

In the parental choice model children who experience childcare (-0.13), whose mothers think it is important to stimulate children (-0.13) and those who are read to every day (-0.11) are less likely to be in the bottom 20 per cent of the Foundation Stage Profile distribution at age 5 than other children. While those children who watch 3 or more hours of TV a day are 6 percentage points more likely to be at the bottom of the distribution.

In the full model, having a mother with a degree and having a Pakistani or Bangladeshi mother are the factors which, in terms of magnitude, are most associated with the probability of being in the bottom 20 per cent of the Foundation Stage Profile scores. In

the value added model, the factor that is most associated with the probability of being in the bottom 20 per cent of the Foundation Stage Profile scores is being in the bottom 20 per cent of the cognitive tests at age 3. Being at the bottom of the distribution in the Bracken School Readiness test at age 3 increases the probability of being at the bottom of the distribution of the Foundation Stage Profile scores at age 5 by 16 percentage points. Being in the bottom 20 per cent in the BAS Naming Vocabulary at age 3 increases the probability of being at the bottom of the distribution in the Foundation Stage Profile scores at age 5 by 11 percentage points.

5. Problem Behaviour Score

Key Results:

1) Factors significantly associated with the Problem Behaviour Score in the full model:

- Gender (-)
- Age (+)
- Birth weight (-)
- First born (+)
- Children with an Indian or Bangladeshi or Pakistani mother (+)
- Mother's education (-)
- Mother ever depressed (+)
- Family income when the child is 3 years old (-)
- Lone Parent (+)
- Children whose mothers think it is important to stimulate children (-)
- Children who are read to every day (-)
- Children who watch tv 3 or more hours per day (+)
- Living in social housing (+)
- Dissatisfied with the area (+)

2) Factors significantly associated with the Problem Behaviour Score in the value added model:

- Gender (-)
- Age (+)
- Birth weight (-)
- First born (+)
- Children with a Bangladeshi or Pakistani mother (+)
- Mother's education (-)
- Mother ever depressed (+)
- Lone Parent (+)
- Children who are read to every day (-)
- Children who watch tv 3 or more hours per day (+)
- Living in social housing (+)
- Being in the bottom 20 per cent of cognitive scorers at age 3 (+)
- Being in the 20 per cent with the most behavioural problems at age 3 (+)

The factors associated with being amongst the 20 per cent of children with the most problem behaviour (which in this case is the top of the distribution rather than the bottom) is shown in Table 11. Of the child characteristics girls are less likely to be in the top 20 per cent than boys; and those who were heavier at birth are also less likely to be amongst the 20 per cent of children with the worst behavioural scores. First born children, on the other hand, are more likely to be amongst the top 20 per cent in this measure of problem behaviour.

Of the family characteristics mother's education is highly associated with the probability of being in the 20 per cent highest problem behaviour scores. Children whose mothers are educated to degree level are 11 percentage points less likely to be in the bottom 20 per cent than children whose mothers have failed to achieve 5 grade A to C passes at GCSE level. Children with mothers with A-levels are 7, and children whose mothers have 5 grade A to C passes at GCSE 6, percentage points less likely to be in the top 20 per cent of problem behaviours that the comparison group. On the other hand children with Pakistani and Bangladeshi mothers and Indian mothers are more likely to be in the

top 20 per cent of the problem behaviour distribution than White children. In addition children whose mothers have ever been depressed and children who have ever lived with a lone mother also have a greater probability of being at the top of the distribution than other children.

In the parental choice model children who have experienced childcare, whose mothers think it is important to stimulate children and those who are read to every day have, have a lower probability of being in the top 20 per cent of the problem behaviour score than other children. Those children who watch 3 or more hours of TV a day are 10 percentage points more likely to be at the top of the problem behaviour distribution.

In the full model, when we control for all observable factors we think may explain differences in problem behaviour scores the factors which are most associated with being at the worst end of the distribution are: mothers education and ethnicity. Children whose mothers are educated to degree level are 8 percentage points less likely than children whose mothers have failed to achieve 5 grade A to C passes at GCSE level. Children with Pakistani or Bangladeshi mothers and those with Indian mothers are 7 percentage points more likely to be in the top 20 per cent of the problem behaviour distribution than White children.

In the value added model being in the highest 20 per cent problem behaviour score at age 3 is by far the most associated with being at the top end of the problem behaviour distribution at age 5. Children with the most problem behaviour at age 3 are 34 percentage points more likely to have the most problem behavior at age 5. Even controlling for this, the value added model detects some additional impact of being in: the lowest maternal education; some ethic groups; social housing; maternal depression and lone motherhood. Two variables about parental behaviour are also associated with this outcome: reading to the child appears protective; while a lot of TV has the opposite association.

2d. Discussion

This analysis has shown the factors associated with the probability of being in the 20 per cent lowest achiever or 20 per cent highest problem behavior scores at age 5. In general prior achievement and behaviour has been identified as the factor which, in terms of magnitude, is most associated with the outcomes at age 5. However, we have also seen that prior achievement does not solely dictate a child's position at 5. In fact, the majority of children who were at the bottom of the distribution at age 3 are no longer there at age 5. The other factors most associated with the probability of being amongst the persistently worst performers at age 5 are mother's education and ethnicity.

This analysis has shown the factors most associated with the different cognitive and behavioural outcome at age 5. Despite the fact that each test measures slightly different aspects of a child's development at age 5 and some are measured directly from the child's performance, others by the teacher and mother, on the whole similar characteristics are associated with all the outcomes.

The child characteristics are consistently associated with being in the bottom 20 per cent of achievers and the 20 per cent with the greatest problem behaviours. In general older children, girls and heavier birth weight babies are less likely to be in the lowest performers. Girls and heavier birth weight babies are also less likely to be in the 20 per cent of children with the most problematic behaviour, although older children and first borns are more likely to be in this latter group.

Of the family characteristics mother's education is repeated identified as being strongly associated with the probability of being in the bottom 20 percent in all outcomes at age 5. Mother's employment is negatively associated with 3 of the 4 cognitive outcomes (not with Pattern Construction). Maternal depression is positively associated with being in the bottom 20 per cent on all cognitive tests and the 20 per cent of children with the most behavioural problems. Unlike the previous models mother's ethnicity does explains the probability of being in the bottom 20 per cent of outcomes in only 2 of the 5 outcomes (Naming Vocabulary and Pattern Construction) at age 5 and family income is only (negatively) associated with 2 cognitive scores (Picture Similarity and Naming Vocabulary).

Reading to the child every day reduces the probability of being in the bottom 20 per cent in the Naming Vocabulary, the Foundation Stage Profile and the Problem Behaviour score. Having a mother who thinks it is important to talk to young children also reduces the probability of being amongst the lowest achievers, this time for the Picture Similarity, Pattern Construction and Foundation Stage Profile scores.

3. Conclusions and Policy Implications

This report has identified the factors associated with achievement at age 5. It has also highlighted the factors related to the probability of being amongst the poorest performers at age 5 and having the most problematic behaviour.

There are a number of factors which are associated with both analyses presented in this paper: the age, gender and birth weight of the child as well as the education level of the mother. Policies aimed at these factors would affect both the performance at age 5 in general and target those at the bottom of the distribution.

If policy is interested in raising cognitive achievement and behaviour at age 5 policies targeted at ethnic minority groups (in particular Pakistani and Bangladeshi and Black groups), those with low family income and those in social housing could also potentially improve outcomes. However, these factors are not consistently associated with the probability of being in the bottom 20 per cent at age 5. Encouraging parents to read to their children every day and value the importance of stimulation is likely to improve achievement but again this would have less effect on protecting children from ending up in the bottom 20 per cent. If policy is interested in focusing on only the poorest achievers then policies could target mothers who suffer from depression as well as poorly educated mothers, boys, younger children and low birth weight babies.

These results show previous ability, measured at age 3, is associated with outcomes at 5, which supports a call for early intervention. However, this report has shown that not all children who perform badly at 3 also perform badly at 5 and vice versa. Intervention therefore needs to follow children as they grow up and ensure that interventions do not label or stigmatise young children who may escape low performance anyway, nor miss children who start well but fall behind later in the education system.

References

Bernal, R. and Keane, M. (2007), 'Childcare choices and children's cognitive achievement: The case of single mothers', Mimeo.

Elliott, C. D. (1996). *The British Ability Scales II*. Windsor, Berkshire: NFER Nelson Publishing Company.

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.

Goodman, R., Meltzer, H. and Bailey, V. (1998), 'The Strengths and Difficulties Questionnaire: A pilot study on the validity of the self-report version', *European Child and Adolescent Psychiatry,* 7: 125-130.

Hansen, K. and Hawkes, D. (2008), "Childcare and Child Development", *Journal of Social Policy*, forthcoming 2008.

Hill, V. (2005). Through the past darkly: A review of the British Ability Scales Second Edition. *Child and Adolescent Mental Health, 10*, 87-98.

Table 1 - Age 5 outcomes

	Foundation Stage Profile score	BAS Picture Similarity score	BAS Naming Vocabulary score	BAS Pattern Construction score	Problem Behaviour score
Observations	7,210	8,023	8,023	8,023	7,638
Mean	86.8	15.5	14.00	18.14	7.3
Standard deviation	18.5	3.8	3.86	8.08	4.9
Min and max	0-117	0-23	0-25	0-53	0-32.5
25th percentile	76	14	12	13	4
50th percentile	90	16	14	18	6
75th percentile	101	18	16	23	10

Table 2 –   Regression of relationship between Picture Similarity scores and child, family, parental choice and value added factors

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	0.02(0.00)***			0.02(0.00)***	0.02(0.00)***
Child gender (Male)					
Female	0.12(0.03)***			0.11(0.03)***	0.02(0.03)
Cohort child birth weight (kg)	0.11(0.02)***			0.07(0.02)***	0.03(0.02)
Cohort child is first born (Not)					
First born	0.05(0.02)**			0.05(0.02)**	-0.03(0.02)
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		-0.03(0.05)		-0.02(0.05)	0.12(0.07)
Mother's ethnicity (White)					
Mixed		-0.23(0.17)		-0.21(0.16)	-0.12(0.14)
Indian		-0.00(0.07)		-0.00(0.07)	-0.00(0.09)
Bangladeshi/Pakistani		-0.17(0.06)**		-0.16(0.06)**	-0.07(0.08)
Black		-0.07(0.07)		-0.04(0.07)	0.06(0.08)
Mother's education (GCSE D to G and below)					
GCSE A to C		0.10(0.05)*		0.07(0.06)	0.03(0.06)
A-levels		0.17(0.06)**		0.11(0.06)*	0.04(0.07)
Degree or higher		0.23(0.06)***		0.17(0.06)***	0.08(0.06)
MCS 2 family income (£100 per month)		0.02(0.01)**		0.02(0.01)	0.01(0.01)

MCS 1 Family income (£100 per month)		0.05(0.01)***		0.05(0.01)***	0.03(0.01)***
Mother's depression (Never)					
Ever		-0.03(0.02)		-0.03(0.02)	-0.00(0.02)
Mother's working (No)					
Working at MCS 1 and 2		0.10(0.03)***		0.09(0.03)***	0.08(0.03)***
Working at MCS 2 only		0.11(0.03)***		0.09(0.04)**	0.06(0.04)
Lone parent (Never)					
Ever		-0.03(0.04)		-0.01(0.04)	0.00(0.04)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		0.05(0.03)*		0.04(0.03)	0.01(0.03)
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			0.16(0.06)**	0.02(0.06)	-0.05(0.06)
Child read to every day (at age 3) (No)					
Yes			0.13(02)***	0.05(02)**	0.02(02)
Child taught alphabet everyday (at age 3) (No)					
Yes			0.07(0.03)**	0.06(0.03)*	0.06(0.03)*
Child taught counting everyday (at age 3) (No)					
Yes			-0.00(0.03)	-0.00(0.03)	-0.02(0.02)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			-0.11(0.03)***	-0.02(0.03)	-0.04(0.03)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			0.22(0.06)***	0.12(0.06)**	0.11(0.06)*
Important to talk to child (at 9 months)					
Strongly agrees/agrees			0.14(0.10)	0.10(0.09)	0.11(0.10)

Housing tenure at MCS 2 Social Housing				-0.06(0.04)	-0.01(0.04)
Satisfaction with area live in Dissatisfied				-0.05(0.05)	-0.03(0.05)
Added value variables					
Bracken score at age 3					0.17(0.02)***
Bas Naming Vocabulary score at age 3					0.08(0.02)***
Problem Behaviour score at 3					-0.05(0.01)***
Number of observations	8,021	8,021	8,021	8,020	6,570
Adjusted R-squared	0.0158	0.0489	0.0264	0.0597	0.0992
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. The outcome has been converted to a standardised Z-score so coefficients can be interpreted as standard deviation differences. Coefficients reported with standard errors in parentheses.

2. All regressions have a constant included but are unreported in this table.

3. The results have been weighted to take account of the survey design.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Table 3 – Regression of relationship between BAS Naming Vocabulary scores and child, family, parental choice and value added factors

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	0.02(0.00)***			0.02(0.00)***	0.02(0.00)***
Child gender (Male)					
Female	0.10(0.02)***			0.07(0.02)***	-0.04(0.02)**
Cohort child birth weight (kg)	0.17(0.02)***			0.05(0.02)***	0.00(0.02)
Cohort child is first born (Not)					
First born	0.22(0.02)***			0.11(0.02)***	0.05(0.02)**
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		-0.50(0.06)***		-0.45(0.06)***	-0.20(0.06)***
Mother's ethnicity (White)					
Mixed		-0.34(0.16)**		-0.31(0.15)**	-0.20(0.13)
Indian		-0.05(0.07)		-0.03(0.07)	0.02(0.08)
Bangladeshi/Pakistani		-0.47(0.08)***		-0.44(0.08)***	-0.25(0.08)***
Black		-0.47(0.06)***		-0.37(0.06)***	-0.20(0.06)***
Other		-0.29(0.10)**		0.27(0.10)**	-0.14(0.10)
Mother's education (GCSE D to G and below)					
GCSE A to C		0.29(0.05)***		0.23(0.05)	0.13(0.04)***
A-levels		0.37(0.05)***		0.27(0.05)***	0.12(0.05)**
Degree or higher		0.50(0.05)***		0.40(0.05)***	0.22(0.04)***
MCS 2 family income (£100 per month)		0.01(0.01)		0.01(0.01)	0.00(0.01)

MCS 1 Family income (£100 per month)		0.08(0.01)***		0.06(0.01)***	0.03(0.01)**
Mother's depression (Never)					
Ever		-0.06(0.02)**		-0.05(0.02)**	-0.03(0.02)
Mother's working (No)					
Working at MCS 1 and 2		0.08(0.02)***		0.04(0.02)	0.02(0.02)
Working at MCS 2 only		0.13(0.03)***		0.10(0.03)***	0.05(0.03)
Lone parent (Never)					
Ever		-0.07(0.03)**		-0.05(0.04)	-0.01(0.03)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		0.15(0.02)***		0.12(0.03)***	0.07(0.02)***
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			0.31(0.05)***	0.05(0.05)	-0.01(0.04)
Child read to every day (at age 3) (No)					
Yes			0.37(03)***	0.17(0.02)***	0.05(0.02)**
Child taught alphabet everyday (at age 3) (No)					
Yes			0.00(0.03)	0.03(0.03)	0.03(0.02)
Child taught counting everyday (at age 3) (No)					
Yes			-0.05(0.02)*	0.01(0.02)	-0.03(0.02)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			-0.13(0.03)***	0.01(0.02)	0.01(0.02)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			0.28(0.05)***	0.12(0.06)**	0.13(0.05)**
Important to talk to child (at 9 months)					
Strongly agrees/agrees			0.44(0.09)***	0.05(0.07)	0.05(0.07)

Housing tenure at MCS 2 Social Housing				-0.14(0.03)***	-0.04(0.03)
Satisfaction with area live in Dissatisfied				-0.00(0.04)	0.04(0.04)
Added value variables					
Bracken score at age 3					0.21(0.01)***
Bas Naming Vocabulary score at age 3					0.25(0.01)***
Problem Behaviour score at 3					-0.02(0.01)*
Number of observations	8,021	8,021	8,021	8,020	6,570
Adjusted R-squared	0.0329	0.1899	0.0878	0.2140	0.3322
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. The outcome has been converted to a standardised Z-score so coefficients can be interpreted as standard deviation differences. Coefficients reported with standard errors in parentheses.

2. All regressions have a constant included but are unreported in this table.

3. The results have been weighted to take account of the survey design.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Table 4 – Regression of relationship between Pattern Construction scores and child, family, parental choice and value added factors

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	0.03(0.00)***			0.03(0.02)***	0.03(0.00)***
Child gender (Male)					
Female	0.20(0.02)***			0.19(0.02)***	0.10(0.02)***
Cohort child birth weight (kg)	0.22(0.02)***			0.15(0.02)***	0.13(0.02)***
Cohort child is first born (Not)					
First born	0.05(0.02)*			0.02(0.02)	0.06(0.02)**
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		-0.11(0.05)**		-0.07(0.05)	0.06(0.06)
Mother's ethnicity (White)					
Mixed		-0.48(0.12)***		-0.45(0.12)***	-0.29(0.12)**
Indian		0.03(0.09)		0.05(0.09)	0.03(0.11)
Bangladeshi/Pakistani		-0.25(0.06)***		-0.23(0.06)***	-0.06(0.08)
Black		-0.36(0.07)***		-0.31(0.08)***	-0.21(0.09)**
Other		0.18(0.08)**		0.18(0.08)**	0.29(0.11)***
Mother's education (GCSE D to G and below)					
GCSE A to C		0.27(0.05)***		0.24(0.05)***	0.20(0.06)***
A-levels		0.33(0.05)***		0.28(0.05)***	0.20(0.06)***
Degree or higher		0.41(0.06)***		0.35(0.06)***	0.25(0.06)***
MCS 2 family income (£100 per month)		0.03(0.01)*		0.03(0.01)*	0.08(0.01)
MCS 1 Family income (£100 per month)		0.05(0.01)***		0.04(0.01)***	0.03(0.01)*

Mother's depression (Never)					
Ever		-0.06(0.02)**		-0.05(0.02)**	-0.04(0.02)
Mother working (No)					
Working at MCS 1 and 2		0.00(0.03)		-0.02(0.03)	-0.05(0.03)
Working at MCS 2 only		0.04(0.04)		0.02(0.03)	0.02(0.04)
Lone parent (Never)					
Ever		-0.06(0.04)		-0.02(0.04)	0.01(0.04)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		0.12(0.03)***		0.10(0.03)***	0.06(0.03)**
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			0.28(0.05)***	0.13(0.05)**	0.07(0.06)
Child read to every day (at age 3) (No)					
Yes			0.18(03)***	0.05(0.03)*	-0.03(0.03)
Child taught alphabet everyday (at age 3) (No)					
Yes			0.09(0.04)**	0.09(0.03)**	0.05(0.03)
Child taught counting everyday (at age 3) (No)					
Yes			-0.01(0.02)	0.01(0.02)	0.01(0.03)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			-0.10(0.03)***	0.01(0.03)	-0.00(0.03)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			0.03(0.07)	-0.11(0.07)*	-0.14(0.07)**
Important to talk to child (at 9 months)					
Strongly agrees/agrees			0.34(0.09)***	0.22(0.08)**	0.14(0.10)
Housing tenure at MCS 2					
Social Housing				-0.10(0.03)***	-0.05(0.04)

Satisfaction with area live in Dissatisfied				-0.04(0.04)	-0.01(0.05)
Added value variables					
Bracken score at age 3					0.24(0.02)***
Bas Naming Vocabulary score at age 3					0.08(0.02)***
Problem Behaviour score at 3					-0.05(0.01)***
Number of observations	8,021	8,021	8,021	8,020	6,570
Adjusted R-squared	0.0469	0.0905	0.0449	0.1129	0.1695
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. The outcome has been converted to a standardised Z-score so coefficients can be interpreted as standard deviation differences. Coefficients reported with standard errors in parentheses.

2. All regressions have a constant included but are unreported in this table.

3. The results have been weighted to take account of the survey design.

4. Asterisks denote the level of significance, * $p<=10\%$; ** $p<=5\%$, *** $p<=1\%$.

Table 5 – Regression of relationship between Foundation Stage Profile scores and child, family, parental choice and value added factors

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	0.07(0.04)***			0.07(0.0)***	0.08(0.00)***
Child gender (Male)					
Female	0.29(0.02)***			0.27(0.02)***	0.16(0.02)***
Cohort child birth weight (kg)	0.21(0.03)***			0.12(0.02)***	0.06(0.02)***
Cohort child is first born (Not)					
First born	0.11(0.03)***			0.03(0.02)	-0.01(0.02)
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		-0.08(0.06)		-0.01(0.06)	0.02(0.06)
Mother's ethnicity (White)					
Mixed		-0.21(0.14)		-0.14(0.12)	0.08(0.08)
Indian		-0.02(0.06)		-0.01(0.06)	0.04(0.11)
Bangladeshi/Pakistani		-0.31(0.09)***		-0.32(0.09)***	-0.04(0.10)
Black		-0.16(0.10)		-0.05(0.10)	0.02(0.10)
Mother's education (GCSE D to G and below)					
GCSE A to C		0.29(0.05)***		0.23(0.05)***	0.16(0.05)***
A-levels		0.42(0.05)***		0.32(0.05)***	0.20(0.05)***
Degree or higher		0.53(0.05)***		0.41(0.05)***	0.26(0.05)***
MCS 2 family income (£100 per month)		0.04(0.01)***		0.03(0.01)***	0.03(0.01)**

MCS 1 Family income (£100 per month)		0.07(0.01)***		0.06(0.01)***	0.02(0.01)*
Mother's depression (Never)					
Ever		-0.10(0.02)***		-0.09(0.02)***	-0.05(0.02)**
Mother's working (No)					
Working at MCS 1 and 2		0.12(0.03)***		0.07(0.03)**	0.03(0.03)
Working at MCS 2 only		0.12(0.04)***		0.09(0.04)**	0.03(0.03)
Lone parent (Never)					
Ever		-0.17(0.04)***		-0.10(0.04)**	-0.06(0.04)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		0.13(0.03)***		0.09(0.03)***	0.03(0.02)
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			0.34(0.05)***	0.08(0.05)*	0.00(0.05)
Child read to every day (at age 3) (No)					
Yes			0.32(0.03)***	0.16(0.03)***	0.03(0.02)
Child taught alphabet everyday (at age 3) (No)					
Yes			0.07(0.03)*	0.07(0.03)**	0.02(0.03)
Child taught counting everyday (at age 3) (No)					
Yes			0.04(0.03)	0.04(0.03)	0.02(0.03)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			-0.20(0.03)***	-0.04(0.03)	-0.05(0.03)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			0.29(0.06)***	0.11(0.05)*	0.07(0.05)
Important to talk to child (at 9 months)					
Strongly agrees/agrees			0.10(0.12)	-0.03(0.10)	-0.02(0.09)

Housing tenure at MCS 2					
Social Housing				-0.23(0.03)***	-0.15(0.04)***
Satisfaction with area live in					
Dissatisfied				-0.09(0.04)*	-0.04(0.04)
Added value variables					
Bracken score at age 3					0.28(0.01)***
Bas Naming Vocabulary score at age 3					0.10(0.01)***
Problem Behaviour score at 3					-0.07(0.01)***
Number of observations	7,065	7,065	7,065	7,064	5813
Adjusted R-squared	0.1013	0.2029	0.1303	0.2499	0.3546
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. The outcome has been converted to a standardised Z-score so coefficients can be interpreted as standard deviation differences. Coefficients reported with standard errors in parentheses.

2. All regressions have a constant included but are unreported in this table.

3. The results have been weighted to take account of the survey design.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Table 6 – Regression of relationship between Problem Behaviour scores and child, family, parental choice and value added factors					
Child variables					
Child's age (in months)	-0.01(0.00)***			-0.01(0.00)***	-0.01(0.00)***
Child gender (Male)					
Female	-0.22(0.02)***			-0.20(0.02)***	-0.09(0.02)***
Cohort child birth weight (kg)	-0.19(0.02)***			-0.11(0.02)***	-0.06(0.02)***
Cohort child is first born (Not)					
First born	0.07(0.02)***			0.12(0.02)***	0.06(0.02)***
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		-0.01(0.00)		0.01(0.05)	-0.06(0.05)
Mother's ethnicity (White)					
Mixed		0.07(0.09)		0.02(0.08)	-0.03(0.11)
Indian		0.13(0.07)		0.11(0.08)	0.00(0.08)
Bangladeshi/Pakistani		0.29(0.08)***		0.31(0.08)***	0.07(0.08)
Black		0.05(0.07)		-0.03(0.08)	-0.08(0.06)
Other		0.00(0.10)		-0.03(0.10)	-0.01(0.10)
Mother's education (GCSE D to G and below)					
GCSE A to C		-0.23(0.05)***		-0.17(0.05)***	-0.11(0.05)**
A-levels		-0.31(0.06)***		-0.22(0.06)***	-0.12(0.06)**
Degree or higher		-0.40(0.05)***		-0.27(0.05)***	-0.12(0.05)**
MCS 2 family income (£100 per month)		-0.04(0.01)***		-0.03(0.01)***	-0.01(0.01)*
MCS 1 Family income (£100 per month)		-0.04(0.01)**		-0.03(0.01)***	0.00(0.01)

Mother's depression (Never)					
Ever		0.22(0.02)***		0.21(0.02)***	0.08(0.02)***
Mother working (No)					
Working at MCS 1 and 2		-0.07(0.03)**		-0.05(0.03)*	-0.01(0.02)
Working at MCS 2 only		-0.09(0.04)**		-0.06(0.04)	-0.06(0.04)
Lone parent (Never)					
Ever		0.24(0.04)***		0.16(0.04)***	0.11(0.04)***
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		-0.07(0.03)**		-0.03(0.03)	-0.00(0.03)
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			-0.27(0.07)***	-0.06(0.07)	-0.06(0.06)
Child read to every day (at age 3) (No)					
Yes			-0.27(02)***	-0.15(02)***	-0.04(02)*
Child taught alphabet everyday (at age 3) (No)					
Yes			-0.01(0.03)	-0.01(0.03)	-0.02(0.03)
Child taught counting everyday (at age 3) (No)					
Yes			-0.00(0.03)	-0.01(0.03)	-0.02(0.02)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			0.30(0.03)***	0.17(0.03)***	0.05(0.03)*
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			-0.28(0.06)***	-0.14(0.06)**	-0.01(0.05)
Important to talk to child (at 9 months)					
Strongly agrees/agrees			-0.01(0.09)	0.06(0.09)	0.06(0.08)
Housing tenure at MCS 2					
Social Housing				0.18(0.04)***	0.08(0.03)**

Satisfaction with area live in Dissatisfied				0.13(0.05)**	0.04(0.04)
Added value variables					
Bracken score at age 3					-0.05(0.01)***
Bas Naming Vocabulary score at age 3					-0.03(0.01)***
Problem Behaviour score at 3					0.55(0.01)***
Number of observations	7,637	7,637	7,637	7,636	6,418
Adjusted R-squared	0.0276	0.1013	0.0510	0.1407	0.4068
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. The outcome has been converted to a standardised Z-score so coefficients can be interpreted as standard deviation differences. Coefficients reported with standard errors in parentheses.

2. All regressions have a constant included but are unreported in this table.

3. The results have been weighted to take account of the survey design.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Table 7 – Probit model of relationship between Picture Similarity scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of the Picture Similarity scores

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	-0.01(0.00)***			-0.01(0.00)***	-0.01(0.00)***
Child gender (Male)					
Female	-0.04(0.01)***			-0.04(0.01)***	-0.02(0.01)**
Cohort child birth weight (kg)	-0.04(0.01)***			-0.02(0.01)**	-0.02(0.01)*
Cohort child is first born (Not)					
First born	-0.02(0.01)*			0.01(0.01)	0.01(0.01)
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		0.02(0.02)		0.00(0.02)	-0.03(0.02)
Mother's ethnicity (White)					
Mixed		0.04(0.06)		0.03(0.06)	0.01(0.05)
Indian		0.01(0.03)		0.01(0.03)	0.00(0.03)
Bangladeshi/Pakistani		0.04(0.03)		0.03(0.03)	0.00(0.03)
Black		0.02(0.03)		0.01(0.03)	-0.01(0.03)
Other		-0.03(0.04)		-0.04(0.04)	-0.06(0.03)
Mother's education (GCSE D to G and below)					
GCSE A to C		-0.05(0.02)**		-0.04(0.02)*	-0.03(0.02)
A-levels		-0.04(0.02)**		-0.03(0.02)	-0.01(0.02)
Degree or higher		-0.09(0.02)***		-0.07(0.02)***	-0.05(0.02)**
MCS 2 family income (£100 per month)		-0.01(0.01)		-0.01(0.01)	-0.01(0.01)

MCS 1 Family income (£100 per month)		-0.03(0.01)***		-0.03(0.01)***	-0.02(0.01)***
Mother's depression (Never)					
Ever		0.00(0.01)		0.00(0.01)	-0.01(0.01)
Mother's working (No)					
Working at MCS 1 and 2		-0.05(0.01)***		-0.05(0.01)***	-0.04(0.01)***
Working at MCS 2 only		-0.05(0.01)***		-0.04(0.01)***	-0.03(0.01)**
Lone parent (Never)					
Ever		0.02(0.02)		0.01(0.02)	0.01(0.02)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		-0.02(0.01)		-0.01(0.01)	0.00(0.01)
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			-0.05(0.02)**	0.01(0.02)	0.02(0.02)
Child read to every day (at age 3) (No)					
Yes			-0.06(0.01)***	-0.02(0.01)**	-0.01(0.01)
Child taught alphabet everyday (at age 3) (No)					
Yes			-0.03(0.01)**	-0.03(0.01)**	-0.03(0.01)**
Child taught counting everyday (at age 3) (No)					
Yes			0.00(0.01)	0.00(0.01)	0.01(0.01)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			0.06(0.01)***	0.02(0.01)*	0.02(0.01)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			-0.08(0.03)***	-0.04(0.02)*	-0.04(0.03)
Important to talk to child (at 9 months)					
Strongly agrees/agrees			-0.09(0.04)**	-0.08(0.04)*	-0.07(0.04)*

Housing tenure at MCS 2 Social Housing				0.02(0.01)	0.01(0.01)
Satisfaction with area live in Dissatisfied				0.02(0.02)	0.01(0.02)
Added value variables					
Lowest 20% in Bracken score at age 3					0.09(0.02)***
Lowest 20% in Bas Naming Vocabulary score at age 3					0.09(0.01)***
Lowest 20% in Difficulties score at age 3					0.02(0.01)*
Number of observations	8,023	8,023	8,023	8,022	8,022
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. Reported coefficients with standard errors in parentheses. Coefficients can be interpreted as percentage point differences.

2. The results have been weighted to take account of the survey design.

3. Child age (in months) included in all models but not reported for the family and parental decisions models.

4. Asterisks denote the level of significance, * $p<=10\%$; ** $p<=5\%$, *** $p<=1\%$.

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Table 8 – Probit model of relationship between BAS Naming Vocabulary scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of BAS Naming Vocabulary scores					
Child variables					
Child's age (in months)	-0.01(0.00)***			-0.01(0.00)***	-0.01(0.00)***
Child gender (Male)					
Female	-0.04(0.01)***			-0.03(0.01)***	0.00(0.01)
Cohort child birth weight (kg)	-0.06(0.01)***			-0.02(0.01)**	0.00(0.01)
Cohort child is first born (Not)					
First born	-0.06(0.01)***			-0.03(0.01)***	-0.02(0.01)**
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		0.17(0.03)***		0.15(0.03)***	0.10(0.03)***
Mother's ethnicity (White)					
Mixed		0.07(0.05)		0.06(0.04)	0.03(0.04)
Indian		0.05(0.03)*		0.05(0.03)	0.03(0.03)
Bangladeshi/Pakistani		0.19(0.04)***		0.18(0.04)***	0.12(0.03)***
Black		0.17(0.03)***		0.13(0.03)***	0.10(0.03)***
Other		0.12(0.05)**		0.11(0.05)**	0.07(0.05)
Mother's education (GCSE D to G and below)					
GCSE A to C		-0.07(0.01)***		-0.06(0.01)***	-0.04(0.01)***
A-levels		-0.08(0.01)***		-0.07(0.01)***	-0.05(0.01)***
Degree or higher		-0.13(0.01)***		-0.10(0.01)***	-0.07(0.01)***
MCS 2 family income (£100 per month)		0.00(0.00)		0.00(0.00)	0.00(0.00)

MCS 1 Family income (£100 per month)		0.00(0.00)***		0.00(0.00)***	0.00(0.00)***
Mother's depression (Never)					
Ever		0.02(0.01)**		0.01(0.01)*	0.02(0.01)**
Mother's working (No)					
Working at MCS 1 and 2		0.00(0.01)		0.00(0.01)	0.01(0.00)
Working at MCS 2 only		-0.03(0.01)***		-0.02(0.01)***	-0.02(0.01)***
Lone parent (Never)					
Ever		0.02(0.01)*		0.02(0.01)	0.01(0.01)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		-0.04(0.01)***		-0.04(0.01)***	-0.03(0.01)***
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			-0.07(0.02)***	0.00(0.02)	0.01(0.02)
Child read to every day (at age 3) (No)					
Yes			-0.11(0.01)***	-0.04(0.01)***	-0.02(0.01)**
Child taught alphabet everyday (at age 3) (No)					
Yes			0.00(0.01)	-0.01(0.01)	-0.02(0.01)
Child taught counting everyday (at age 3) (No)					
Yes			-0.02(0.01)**	-0.01(0.01)	0.00(0.01)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			0.04(0.01)***	0.00(0.01)	-0.01(0.01)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			-0.08(0.03)***	-0.02(0.02)	-0.02(0.02)
Important to talk to child (at 9 months)					
Strongly agrees/agrees			-0.21(0.05)***	-0.04(0.03)	-0.02(0.03)

Housing tenure at MCS 2 Social Housing				0.03(0.01)**	0.02(0.01)
Satisfaction with area live in Dissatisfied				0.02(0.01)	0.01(0.01)
Added value variables					
Lowest 20% in Bracken score at age 3					0.13(0.02)***
Lowest 20% in Bas Naming Vocabulary score at age 3					0.15(0.01)***
Lowest 20% in Difficulties score at age 3					-0.02(0.01)
Number of observations	8,023	8,023	8,023	8,022	8,022
Prob > F	31.76	0.0000	0.0000	0.0000	0.0000

Notes:

1. Reported coefficients with standard errors in parentheses. Coefficients can be interpreted as percentage point differences.

2. The results have been weighted to take account of the survey design.

3. Child age (in months) included in all models but not reported for the family and parental decisions models.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Table 9 – Probit model of relationship between Pattern Construction scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of Pattern Construction scores.					
Child variables					
Child's age (in months)	-0.01(0.00)***			-0.01(0.00)***	-0.01(0.00)***
Child gender (Male)					
Female	-0.08(0.01)***			-0.08(0.01)***	-0.06(0.01)***
Cohort child birth weight (kg)	-0.07(0.01)***			-0.05(0.01)***	-0.05(0.01)***
Cohort child is first born (Not)					
First born	-0.01(0.01)			0.01(0.01)	0.02(0.01)
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		0.02(0.02)		0.01(0.02)	-0.02(0.02)
Mother's ethnicity (White)					
Mixed		0.19(0.06)		0.18(0.06)***	0.16(0.06)**
Indian		-0.01(0.03)		-0.02(0.03)	-0.02(0.03)
Bangladeshi/Pakistani		0.10(0.03)***		0.09(0.03)***	0.05(0.03)
Black		0.13(0.04)***		0.12(0.04)***	0.10(0.03)**
Other		-0.05(0.03)*		-0.05(0.03)**	-0.07(0.02)***
Mother's education (GCSE D to G and below)					
GCSE A to C		-0.06(0.02)***		-0.06(0.02)***	-0.05(0.02)**
A-levels		-0.07(0.02)***		-0.06(0.02)***	-0.04(0.02)**
Degree or higher		-0.10(0.02)***		-0.09(0.02)***	-0.07(0.02)***
MCS 2 family income (£100 per month)		-0.03(0.02)		-0.01(0.01)	-0.00(0.01)

MCS 1 Family income (£100 per month)		-0.07(0.02)***		-0.02(0.01)***	-0.01(0.01)
Mother's depression (Never)					
Ever		0.03(0.01)***		0.03(0.01)**	0.02(0.01)**
Mother working (No)					
Working at MCS 1 and 2		-0.01(0.01)		-0.01(0.01)	0.00(0.01)
Working at MCS 2 only		-0.02(0.01)		-0.02(0.01)	0.00(0.01)
Lone parent (Never)					
Ever		0.02(0.02)		0.01(0.02)	0.01(0.02)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		-0.04(0.01)***		-0.03(0.01)**	-0.02(0.01)*
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			-0.06(0.02)**	-0.01(0.02)	0.00(0.02)
Child read to every day (at age 3) (No)					
Yes			-0.06(0.01)***	-0.01(0.01)	0.00(0.01)
Child taught alphabet everyday (at age 3) (No)					
Yes			-0.04(0.01)***	-0.04(0.01)***	-0.04(0.01)***
Child taught counting everyday (at age 3) (No)					
Yes			0.00(0.01)	0.00(0.01)	0.00(0.01)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			0.05(0.01)***	0.01(0.01)	0.00(0.01)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			-0.01(0.03)	-0.03(0.02)	-0.04(0.02)*
Important to talk to child (at 9 months)					
Strongly agrees/agrees			-0.12(0.04)**	-0.07(0.04)*	-0.06(0.04)

Housing tenure at MCS 2					
Social Housing				0.02(0.01)	0.01(0.01)
Satisfaction with area live in					
Fairly/very dissatisfied				0.02(0.02)	0.01(0.02)
Added value variables					
Lowest 20% in Bracken score at age 3					0.14(0.02)***
Lowest 20% in Bas Naming Vocabulary score at age 3					0.07(0.01)***
Lowest 20% in Difficulties score at age 3					0.05(0.01)***
Number of observations	8,023	8,023	8,023	8,022	8,022
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. Reported coefficients with standard errors in parentheses. Coefficients can be interpreted as percentage point differences.

2. The results have been weighted to take account of the survey design.

3. Child age (in months) included in all models but not reported for the family and parental decisions models.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Table 10 – Probit model of relationship between Foundation Stage Profile scores and child, family, parental choice and value added factors for children in the lowest 20 per cent of the Foundation Stage Profile scores

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	-0.02(0.00)***			-0.02(0.00)***	-0.02(0.00)***
Child gender (Male)					
Female	-0.09(0.01)***			-0.08(0.01)***	-0.06(0.01)***
Cohort child birth weight (kg)	-0.07(0.01)***			-0.04(0.01)***	-0.02(0.01)**
Cohort child is first born (Not)					
First born	-0.04(0.01)***			-0.01(0.01)	0.00(0.01)
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		0.02(0.00)***		0.00(0.02)	-0.03(0.02)
Mother's ethnicity (White)					
Mixed		0.08(0.06)		0.05(0.05)	0.03(0.04)
Indian		-0.01(0.03)		-0.01(0.03)	-0.02(0.03)
Bangladeshi/Pakistani		0.08(0.04)**		0.09(0.04)**	0.04(0.04)
Black		0.09(0.04)**		0.04(0.03)	0.01(0.03)
Other		-0.00(0.04)		0.00(0.04)	-0.03(0.03)
Mother's education (GCSE D to G and below)					
GCSE A to C		-0.07(0.01)***		-0.06(0.01)***	-0.04(0.01)***
A-levels		-0.10(0.01)***		-0.08(0.01)***	-0.06(0.01)***
Degree or higher		-0.15(0.02)***		-0.12(0.02)***	-0.09(0.01)***
MCS 2 family income (£100 per month)		0.02(0.01)**		0.01(0.01)	0.01(0.01)

MCS 1 Family income (£100 per month)		0.01(0.01)***		0.01(0.01)	0.00(0.01)***
Mother's depression (Never)					
Ever		0.03(0.01)***		0.03(0.01)***	0.03(0.01)***
Mother's working (No)					
Working at MCS 1 and 2		-0.01(0.01)		-0.01(0.01)	-0.01(0.01)
Working at MCS 2 only		-0.03(0.01)***		-0.03(0.01)***	-0.02(0.01)**
Lone parent (Never)					
Ever		0.03(0.02)*		0.01(0.02)	0.01(0.02)
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		-0.03(0.01)**		-0.02(0.01)	0.00(0.01)
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			-0.13(0.02)***	-0.04(0.02)*	-0.02(0.02)
Child read to every day (at age 3) (No)					
Yes			-0.11(0.01)***	-0.06(0.01)***	-0.04(0.01)***
Child taught alphabet everyday (at age 3) (No)					
Yes			-0.02(0.01)	-0.02(0.01)	-0.02(0.01)*
Child taught counting everyday (at age 3) (No)					
Yes			-0.02(0.01)	-0.01(0.01)	-0.01(0.01)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			0.06(0.01)***	0.01(0.01)	0.01(0.01)
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			-0.13(0.03)***	-0.06(0.03)**	-0.06(0.03)**
Important to talk to child (at 9 months)					
Strongly agrees/agrees			0.02(0.04)	-0.05(0.03)*	-0.06(0.02)**

Housing tenure at MCS 2 Social Housing				0.07(0.01)***	0.06(0.01)***
Satisfaction with area live in Dissatisfied				0.02(0.02)	0.01(0.01)
Added value variables					
Lowest 20% in Bracken score at age 3					0.16(0.02)***
Lowest 20% in Bas Naming Vocabulary score at age 3					0.11(0.01)***
Lowest 20% in Difficulties score at age 3					0.03(0.01)***
Number of observations	7,065	7,065	7,065	7,064	7,064
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. Reported coefficients with standard errors in parentheses. Coefficients can be interpreted as percentage point differences.

2. The results have been weighted to take account of the survey design.

3. Child age (in months) included in all models but not reported for the family and parental decisions models.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

Table 11 – Probit model of relationship between Problem Behaviour scores and child, family, parental choice and value added factors for children in the top 20 per cent of behavioural difficulties

Independent variables (reference category)	Child characteristics model (1)	Family characteristics model (2)	Parental decisions model (3)	Full model (4)	Value added characteristics model (5)
Child variables					
Child's age (in months)	0.00(0.00)**			0.00(0.00)***	0.00(0.00)***
Child gender (Male)					
Female	-0.08(0.01)***			-0.07(0.01)***	-0.05(0.01)***
Cohort child birth weight (kg)	-0.06(0.01)***			-0.03(0.01)***	-0.02(0.01)**
Cohort child is first born (Not)					
First born	0.03(0.01)***			0.05(0.01)***	0.04(0.01)***
Family variables					
English language only spoken at home at MCS 2 (Yes)					
No		-0.01(0.02)		-0.02(0.02)	-0.02(0.02)
Mother's ethnicity (White)					
Mixed		0.11(0.04)		0.01(0.04)	0.01(0.04)
Indian		0.09(0.04)**		0.09(0.04)**	0.07(0.04)
Bangladeshi/Pakistani		0.11(0.03)***		0.13(0.04)***	0.07(0.03)**
Black		0.03(0.03)		0.01(0.03)	0.02(0.03)
Other		0.03(0.04)		0.02(0.04)	0.02(0.04)
Mother's education (GCSE D to G and below)					
GCSE A to C		-0.06(0.02)**		-0.05(0.02)**	-0.04(0.02)**
A-levels		-0.07(0.02)***		-0.05(0.02)**	-0.03(0.02)
Degree or higher		-0.11(0.02)***		-0.08(0.02)***	-0.05(0.02)**
MCS 2 family income (£100 per month)		0.00(0.00)**		0.00(0.00)**	0.00(0.00)

MCS 1 Family income (£100 per month)		0.00(0.00)		0.00(0.00)	0.00(0.00)
Mother's depression (Never)					
Ever		0.06(0.01)***		0.06(0.01)***	0.04(0.01)***
Mother working (No)					
Working at MCS 1 and 2		-0.02(0.01)**		-0.01(0.01)	-0.01(0.01)
Working at MCS 2 only		0.01(0.01)		-0.01(0.01)	0.00(0.01)
Lone parent (Never)					
Ever		0.08(0.02)***		0.05(0.02)**	0.04(0.02)**
Highest NSSEC of mother/father at MCS 2					
Professional & managerial		-0.01(0.01)		0.00(0.01)	0.01(0.01)
Parental decisions variables					
Cohort child ever received childcare (no childcare)					
Received childcare			-0.09(0.03)***	-0.01(0.02)	-0.01(0.02)
Child read to every day (at age 3) (No)					
Yes			-0.08(01)***	-0.04(01)***	-0.02(01)**
Child taught alphabet everyday (at age 3) (No)					
Yes			-0.01(0.01)	-0.01(0.01)	-0.01(0.01)
Child taught counting everyday (at age 3) (No)					
Yes			0.02(0.01)	0.01(0.01)	0.02(0.01)
Child watches TV 3 or more hrs per day (at age 3) (No)					
Yes			0.10(0.01)***	0.05(0.01)***	0.03(0.01)***
Important to stimulate child (at 9 months)					
Strongly agrees/agrees			-0.10(0.03)***	-0.05(0.02)**	-0.02(0.02)
Important to talk to child (at 9 months)					
Strongly agrees/agrees			0.01(0.03)	0.02(0.03)	0.03(0.03)

Housing tenure at MCS 2					
Social Housing				0.05(0.02)***	0.03(0.01)**
Satisfaction with area live in					
Dissatisfied				0.04(0.02)**	0.02(0.02)
Added value variables					
Lowest 20% in Bracken score at age 3					0.06(0.01)***
Lowest 20% in Bas Naming Vocabulary score at age 3					0.03(0.01)**
Lowest 20% in Difficulties score at age 3					0.34(0.02)***
Number of observations	7,638	7,638	7,638	7,637	7,637
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:

1. Reported coefficients with standard errors in parentheses. Coefficients can be interpreted as percentage point differences.

2. The results have been weighted to take account of the survey design.

3. Child age (in months) included in all models but not reported for the family and parental decisions models.

4. Asterisks denote the level of significance, * p<=10%; ** p<=5%, *** p<=1%.

5. It should be remembered that for the Problem Behaviour scores, the top 20% have the most behavioural difficulties. Therefore, in the Difficulties analysis, the 'lowest 20%' actually represents children with the most difficulties.

Appendix 1 – Descriptive analysis of relationship between Age 5 MCS children's developmental outcomes and child, family and parental decision characteristics

		Foundation Stage Profile		Picture similarity		Naming Vocabulary		Pattern Construction		Problem Behaviour	
		Obs	Per cent	Obs	Per cent	Obs	Per cent	Obs	Per cent	Obs	Per cent
Independent variables (reference category) Child variables	**Variable categories**										
Child gender	Male	3,670	50.9	4,083	50.9	4,083	50.9	4,083	50.9	3,879	50.8
	Female	3,540	49.1	3,940	49.1	3,940	49.1	3,940	49.1	3,759	49.2
Child is first born	Not first born	3,704	50.4	4,105	50.1	4,105	50.1	4,105	50.1	3,856	49.8
	First born	3,506	49.6	3,918	49.9	3,918	49.9	3,918	49.9	3,782	50.2
Family characteristics											
Mother's ethnicity	White	5,763	89.7	6,363	89.4	6,363	89.4	6,363	89.4	6,265	90.5
	Mixed	87	0.9	92	0.9	92	0.9	92	0.9	89	0.8
	Indian	264	1.9	304	2.1	304	2.1	304	2.1	280	2.0
	Bangladeshi/ Pakistani	614	3.7	720	3.7	720	3.7	720	3.7	534	3.0
	Black	297	2.2	343	2.3	343	2.3	343	2.3	298	2.2
English language only spoken at home at MCS 2	Yes	6,040	92.1	6,681	91.9	6,681	91.9	6,681	91.9	6572	93.0
	No	1,170	7.9	1,342	8.1	1,342	8.1	1,342	8.1	1,066	7
Mother's education MCS 2	GCSE D to G and below	595	5.7	651	5.6	651	5.6	651	5.6	531	5.1
	GCE O-levels A to C	1,414	20.0	1,514	19.2	1,514	19.2	1,514	19.2	1,474	19.4
	A-levels	1094	16.1	1,184	15.6	1,184	15.6	1,184	15.6	1,153	15.7
	Degree or higher	2516	40.5	2,892	42.0	2,892	42.0	2,892	42.0	2,848	42.7

Mother working	Not working at MCS 1 or 2	2,876	34.5	3,251	34.9	3,251	34.9	3,251	34.9	2,953	34.0
	Working at MCS 1 and 2	3,512	54.0	3,883	53.8	3,883	53.8	3,883	53.8	3,824	54.6
	Working at MCS 2 only	822	11.6	889	11.3	889	11.3	889	11.3	861	11.4
Mother's depression	Not at MCS 1 or 2	4,757	65.4	5,372	66.5	5,372	66.5	5,372	66.5	5,082	66.4
	Was at MCS 1 or 2	2,416	34.1	2,646	33.4	2,646	33.4	2,646	33.4	2,553	33.5
Lone parent	Not at MCS 1 or 2	6,125	86.7	6,819	86.9	6,819	86.9	6,819	86.9	6,499	87.0
	Was at MCS 1 or 2	1,085	13.3	1,204	13.1	1,204	13.1	1,204	13.1	1,139	13.0
Highest NSSEC of mother/father at MCS 2	Not professional & managerial	4,481	56.1	4,910	54.7	4,910	54.7	4,910	54.7	4,566	54.0
	Professional & managerial	2,729	43.9	3,113	45.3	3,113	45.3	3,113	45.3	3,072	46.0
Parental decisions											
Cohort child ever received childcare	No childcare	386	4.4	425	4.3	425	4.3	425	4.3	375	4.0
	Childcare	6,824	95.6	7,567	95.5	7,567	95.5	7,567	95.5	7,263	96.0
Child read to every day (at age 3)	Not read to	3,103	38.2	3,398	37.4	3,398	37.4	3,398	37.4	3,135	36.7
	Yes	4,064	61.2	4,625	62.6	4,625	62.6	4,625	62.6	4,503	63.3
Child taught alphabet everyday (at age 3)	Not taught alphabet	4,467	62.4	5,017	62.8	5,017	62.8	5,017	62.8	4,809	62.9
	Taught alphabet	1,478	19.7	1,650	19.9	1,650	19.9	1,650	19.9	1,567	19.9
Child taught counting everyday (at age 3)	Not taught counting	3,435	47.0	3,847	47.4	3,847	47.4	3,847	47.4	3,648	47.3
	Taught counting	3,462	49.7	3,877	49.9	3,877	49.9	3,877	49.9	3,750	50.2
Child watches TV 3 or	No	5,826	83	6,582	84.3	6,582	84.3	6,582	84.3	6,307	84.6

	Yes	1,341	16.4	1,441	15.7	1,441	15.7	1,441	15.7	1,331	15.4
Importance of stimulation (at 9 months)	Disagrees/ neither agrees nor disagrees/can't say/missing	570	5.7	618	5.5	618	5.5	618	5.5	524	5.2
	Strongly agrees/agrees	6,640	94.3	7,405	94.5	7,405	94.5	7,405	94.5	7,114	94.8
Importance of talking to child (at 9 months)	Disagrees/ neither agrees nor disagrees/can't say/missing	289	2.1	316	2.0	316	2.0	316	2.0	230	1.7
	Strongly agrees/agrees	6,921	97.9	7,707	98.0	7,707	98.0	7,707	98.0	7,408	98.3
Housing tenure at age 3	Not social Housing	5,406	79.6	6,118	80.5	6,118	80.5	6,118	80.5	5,880	81.0
	Social Housing	1,760	20.4	1,904	19.5	1,904	19.5	1,904	19.5	1,757	19.0
Satisfaction with area live in	Very/ fairly satisfied or neither/nor dissatisfied	6,401	91.5	7,181	91.7	7,181	91.7	7,181	91.7	6,847	91.8
	Fairly/very dissatisfied	765	8.5	841	8.3	841	8.3	841	8.3	790	8.2
Total		7,210	100	8,023	100%	8,023	100	8,023	100	7,638	100

Notes: To take account of the survey design, the percentages have been weighted. Observations have not been weighted.

Appendix 2 – Descriptive analysis of relationship between Age 5 MCS children's developmental outcomes and child, family and parental decision characteristics for children in the lowest 20% of the developmental outcomes.

			Developmental dependent variables									
			Foundation Stage Profile		Picture similarity		Naming Vocabulary		Pattern Construction		Problem Behaviour	
			Obs	Percent or mean	Obs	Percent or mean	Obs	Percent or mean	Obs	Percent or mean	Obs	Percent or mean
Independent variables (reference category) Child variables	Lowest 20% in outcome indicator	Variable categories										
Child age (months)	Rest of sample		5,540	63.9	6,210	63.7	6,252	63.8	6,159	63.8	5,961	63.6
	Lowest 20%		1,525	62.3	1,813	63.1	1,771	63.0	1,864	63.0	1,677	63.4
Child gender	Rest of sample	Male	2,663	77.4	3,071	77.3	3,132	82.3	2,966	76.0	2,898	77.2
		Female	2,877	85.7	3,139	81.2	3,120	85.2	3,193	83.6	3,063	84.2
	Lowest 20%	Male	931	22.6	1,012	22.7	951	17.7	1,117	24.0	981	22.8
		Female	594	14.3	801	18.8	820	14.8	747	16.4	696	15.8
Child is first born	Rest of sample	Not first born	2,777	80.0	3,147	78.6	3,047	81.1	3,125	79.8	3,075	82.4
		First born	2,763	83.0	3,063	79.9	3,205	86.4	3,034	79.7	2,886	78.8
	Lowest 20%	Not first born	842	20.0	958	21.4	1.058	18.9	980	20.2	781	17.6

		First born	683	17.0	855	20.1	713	13.6	884	20.3	896	21.2
Birth weight (Kg)	Rest of sample			5,540	3.55	6,210	3.6	6,252	3.5	6,159	3.5	5,961	3.6
	Lowest 20%			1,525	3.44	1,813	3.4	1,771	3.7	1,864	3.8	1,677	3.5
Family characteristics												
Mother's ethnicity	Rest of sample	White	4,597	82.8	5,031	79.9	5,463	87.1	5,067	81.0	5,001	81.4
		Mixed	58	70.0	66	72.7	62	72.4	56	59.0	64	74.8
		Indian	202	81.7	233	78.3	201	69.4	232	81.0	201	75.3
		Bangladeshi/ Pakistani	357	59.2	472	65.9	235	36.3	436	61.0	342	64.3
		Black	192	69.4	251	75.3	185	60.8	213	64.6	223	75.5
	Lowest 20%	White	1,086	17.2	1,332	20.1	900	12.9	1,296	19.0	1,264	18.6
		Mixed	26	30.0	26	27.3	30	27.6	36	41.0	25	25.2
		Indian	52	18.3	71	21.7	103	30.6	72	19.0	79	24.7
		Bangladeshi/ Pakistani	228	40.8	248	34.1	485	63.7	284	39.0	192	35.7
		Black	91	30.6	92	24.7	158	39.2	130	35.4	75	24.5
English language only spoken at home at MCS 2	Rest of sample	Yes	4,784	82.5	5,277	79.9	5,698	86.8	5,273	80.6	5,219	81.2
		No	756	68.9	933	71.9	554	49.0	886	69.7	742	73.2

	Lowest 20%	Yes	1,166	17.5	1,404	20.1	983	13.2	1,408	19.4	1,353	18.8
		No	359	31.1	409	28.1	788	51.0	456	30.3	324	26.8
Mother's education MCS 2	Rest of sample	GCSE D to G and below	326	58.4	415	65.1	325	59.1	405	64.5	332	65.6
		GCE O-levels A to C	1,044	76.9	1,145	76.4	1,212	82.5	1,144	77.7	1,136	78.4
		A-levels	881	83.5	921	77.8	992	86.0	937	80.2	920	81.2
		Degree or higher	2,219	90.4	2,446	85.0	2,575	91.5	2,454	85.9	2,467	87.6
	Lowest 20%	GCSE D to G and below	242	41.6	236	34.9	326	40.9	246	35.5	199	34.4
		GCE O-levels A to C	346	23.1	369	23.6	302	17.5	370	22.3	338	21.6
		A-levels	195	16.5	263	22.2	192	14.0	247	19.8	233	18.8
		Degree or higher	263	9.6	446	15.0	317	8.5	438	14.1	379	12.4
Mother working	Rest of sample	Not working at MCS 1 or 2	1,968	73.2	2,313	72.7	2,147	75.6	2,296	74.9	2,087	74.1
		Working at MCS 1 and 2	2,923	86.4	3,196	83.2	3,351	88.2	3,172	82.8	3,189	84.6
		Working at MCS 2 only	649	83.6	701	80.3	754	87.3	691	80.2	685	80.7
	Lowest 20%	Not working at MCS 1 or 2	859	26.8	938	27.3	1,104	24.4	955	25.1	866	25.9
		Working at MCS 1 and 2	525	13.6	687	16.8	532	11.8	711	17.2	635	15.4

		Working at MCS 2 only	141	16.4	188	19.7	135	12.7	198	19.8	176	19.3
Mother's depression	Rest of sample	Not at MCS 1 or 2	3,784	83.9	4,206	80.2	4,192	84.8	4,212	81.6	4,134	84.0
		Was at MCS 1 or 2	1,753	76.8	2,000	77.4	2,059	81.6	1944	76.0	1,825	74.0
	Lowest 20%	Not at MCS 1 or 2	903	16.1	1,166	19.8	1,180	15.2	1,160	18.4	948	16.0
		Was at MCS 1 or 2	621	23.2	646	22.6	587	18.4	702	24.0	728	26.0
Lone parent	Rest of sample	Not at MCS 1 or 2	4801	83.3	5,362	80.3	5,405	85.0	5,353	81.0	5,229	82.9
		Was at MCS 1 or 2	739	70.3	848	72.1	847	75.0	824	71.1	732	65.6
	Lowest 20%	Not at MCS 1 or 2	1,179	16.7	1,457	19.7	1,414	15.0	1,484	19.0	1,270	17.1
		Was at MCS 1 or 2	346	29.7	356	27.9	357	25.0	380	28.9	407	34.4
Highest NSSEC of mother/father at MCS 2	Rest of sample	Not professional & managerial	3,153	75.1	3,585	74.8	3,469	77.4	3,521	74.8	3,315	75.3
		Professional & managerial	2,287	89.6	2,625	84.6	2,783	91.4	2,638	85.7	2,646	86.8
	Lowest 20%	Not professional & managerial	1,219	24.9	1,325	25.2	1,441	22.6	1,389	25.2	1,251	24.7
		Professional & managerial	306	10.4	488	15.4	330	8.6	475	14.3	426	13.2
Cohort child ever received childcare	Rest of sample	No childcare	240	64.7	300	70.7	256	70.0	282	68.6	252	68.8

		Childcare	5,300	82.3	5,892	79.6	5,980	84.4	5,865	80.4	5,709	81.1
	Lowest 20%	No childcare	141	35.3	125	29.3	169	30.0	143	31.4	123	31.2
		Childcare	1,384	17.7	1,675	20.5	1,587	15.6	1,702	19.6	1,554	18.9
Child read to every day (at age 3)	Rest of sample	Not read to	2,150	73.3	2,461	74.6	2,302	75.6	2,450	75.4	2,254	74.4
		Yes	3,390	86.6	3,749	82.0	3,950	88.6	3,709	82.3	3,707	84.2
	Lowest 20%	Not read to	887	26.7	937	25.4	1,096	24.4	948	24.6	881	25.6
		Yes	638	13.4	876	18.0	675	11.4	916	17.7	796	15.8
Child taught alphabet everyday (at age 3)	Rest of sample	Not taught alphabet	3,480	81.6	3,892	79.0	3,939	84.0	3,833	78.9	3,786	81.1
		Taught alphabet	1,193	85.4	1,320	82.4	1,324	86.3	1,314	83.3	1,247	82.4
	Lowest 20%	Not taught alphabet	931	18.4	1,125	21.0	1,078	16.0	1,184	21.1	1,023	18.9
		Taught alphabet	258	14.6	330	17.6	326	13.7	336	16.7	320	17.6
Child taught counting everyday (at age 3)	Rest of sample	Not taught counting	2,613	80.2	2,957	78.6	2,924	82.3	2,921	78.9	2,852	80.9
		Taught counting	2,767	83.5	3,057	80.3	3,166	86.0	3,040	81.0	2,945	80.9
	Lowest 20%	Not taught counting	775	19.8	890	21.4	923	17.7	926	21.1	796	19.1
		Taught counting	648	16.5	820	19.7	711	14.0	837	19.0	805	19.1
Child watches TV	Rest of sample	No	4,589	82.7	5,170	80.3	5,226	84.7	5,121	80.5	5,051	82.4

		Yes	951	75.5	1040	73.5	1.026	78.5	1,038	75.5	910	70.7
	Lowest 20%	No	1,167	17.3	1412	19.7	1,356	15.3	1,461	19.5	1,256	17.6
		Yes	358	24.5	401	26.5	415	21.5	403	24.5	421	29.3
Importance of stimulation (at 9 months)	Rest of sample	Disagrees/ neither agrees nor disagrees/can't say/missing	360	65.2	402	65.2	338	64.4	427	72.3	340	68.2
		Strongly agrees/agrees	5,180	82.5	5,808	80.0	5,914	84.8	5,732	80.2	5,621	81.3
	Lowest 20%	Disagrees/ neither agrees nor disagrees/can't say/missing	191	34.8	216	34.8	280	35.6	191	27.7	184	31.8
		Strongly agrees/agrees	1,334	17.5	1,597	20.0	1,491	15.2	1,673	19.8	1,493	18.7
Importance of talking to child (at 9 months)	Rest of sample	Disagrees/ neither agrees nor disagrees/can't say/missing	181	65.2	193	57.8	119	47.9	200	63.5	152	69.2
		Strongly agrees/agrees	5,359	81.8	6,017	79.9	6,133	84.5	5,959	80.1	5,809	80.8
	Lowest 20%	Disagrees/ neither agrees nor disagrees/can't say/missing	94	34.8	123	42.2	197	52.1	116	36.5	78	30.8
		Strongly	1,431	18.2	1,690	20.3	1,574	15.5	1,748	19.9	1,599	19.2

Housing tenure at age 3	Rest of sample	Not social housing	4,426	85.7	4,892	81.4	4,985	86.6	4,868	82.1	4,816	84.0
		Social housing	1,113	65.0	1,317	70.1	1,266	71.9	1,290	70.0	1,144	66.1
	Lowest 20%	Not social housing	909	14.3	1,226	18.6	1,133	13.4	1,250	17.9	1,064	16.0
		Social housing	616	35.0	587	29.9	638	28.1	614	30.0	613	33.9
Satisfaction with area live in	Rest of sample	Very/ fairly satisfied or neither/nor dissatisfied	5,010	82.4	5,599	79.9	5,658	84.5	5,561	80.4	5,434	81.7
		Fairly/very dissatisfied	529	71.3	610	72.1	593	75.4	597	72.2	526	68.4
	Lowest 20%	Very/ fairly satisfied or neither/nor dissatisfied	1,308	17.6	1,582	20.1	1,523	15.5	1,620	19.6	1,413	18.3
		Fairly/very dissatisfied	217	28.7	231	27.9	248	24.6	244	27.8	264	31.6
Total			7,065	100	8,023	100	8,023	100	8,023	100	7,637	100
Mean values for age 3 outcomes												
Mean Bracken score at age 3	Rest of sample		5,540	62.8	6,210	61.2	6,252	63.7	6,159	62.1	5,961	62.3
	Lowest 20%		1,525	34.6	1,813	43.6	1,771	31.6	1,864	40.9	1,677	44.8
Mean Bas score at age 3	Rest of sample		5,540	51.5	6,210	50.3	6,252	53.5	6,159	50.9	5,961	51.1
	Lowest 20%		1,525	29.3	1,813	35.2	1,771	20.4	1,864	33.5	1,677	37.6

Mean Difficulties score at age 3	Rest of sample		5,540	9.1	6,210	9.3	6,252	9.1	6,159	9.2	5,961	8.3
	Lowest 20%		1,525	12.0	1,813	11.1	1,771	11.8	1,864	11.3	1,677	14.4

Notes:

1. To take account of the MCS survey design, the percentages have been weighted. Observations are not been weighted.

2. Each percentage figure represents the proportion of the total of that particular category across both the 'Rest of the sample' and 'Lowest 20%' groups.

3. It should be remembered that for Problem Behaviour score the top 20% have the most behavioural difficulties.

4. In this table family equivalised income for MCS1 and MCS2 is presented in UK pounds per month.

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