The incidence and make up of ability grouped sets in the UK primary school

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The adoption of setting in the primary school (pupils ability grouped across classes for particular subjects) emerged during the 1990s as a means to raise standards. Recent research based on 8875 children in the Millennium Cohort Study showed that 25.8% of children in Year 2 were set for literacy and mathematics and a further 11.2% of children were set for mathematics or literacy alone. Logistic regression analysis showed that the best predictors of being in the top set for literacy or mathematics were whether the child was born in the Autumn or Winter and cognitive ability scores. Boys were significantly more likely than girls to be in the bottom literacy set. Family circumstances held less importance for setting placement compared with the child's own characteristics, although they were more important in relation to bottom set placement. Children in bottom sets were significantly more likely to be part of a long-term single parent household, have experienced poverty, and not to have a mother with qualifications at NVQ3 or higher levels. The findings are discussed in relation to earlier research and the implications for schools are set out.

Keywords: ability grouping; longitudinal studies; school policy; primary education

Introduction

Grouping pupils by ability within and between schools is controversial and has been the subject of research since the early 1900s. In the primary school, grouping can take several forms: streaming (children are placed in classes on the basis of their perceived general ability); setting (children are grouped across classes for particular subjects based on their perceived ability in that subject); and within class (the teacher organises small groups based on ability within the class). These are not mutually exclusive and children may be streamed, placed in sets and working in within class groupings at any one time.

The evidence from primary and secondary education suggests that, overall, structured ability grouping (streaming and setting), of itself, has no positive impact on average attainment, although, depending on the level of curriculum differentiation, can widen the gap between low and high attainers (e.g. Ireson et al. 2002; Kerckhoff 1986; Schofield 2010; Wiliam and Bartholomew 2004). It has personal consequences for pupils, particularly those in the middle and lower groups, as it

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can limit potential educational opportunities (e.g. Ball 1981; Boaler 1997; Lacey 1970), not only affecting expectations but in England setting very real limits on examination entry and possible attainment (Boaler, Wiliam, and Brown 2000; Ireson and Hallam 2001). Top ability groups are also viewed by students as offering a better education and more prestige (Hallam and Ireson 2006, 2007).

Structured ability grouping is also socially divisive in that those in the lower groups tend to be of lower socio-economic status and from particular ethnic groups (e.g. Kutnick et al. 2005; Muijs and Dunne 2010; Wiliam and Bartholomew 2004; Wright-Castro, Ramirez, and Duran 2003). Those pupils who find themselves in low ability groups tend to have less positive attitudes towards school (Boaler 1997; Ireson and Hallam 2001) and where whole peer groups feel alienated anti-school cultures can develop polarising students' attitudes into pro- and anti-school camps (Ball 1981; Lacey 1970).

The arguments supporting the practice of setting by ability for particular subjects in the primary school relate to ease of teaching. It is argued that teaching pupils who are perceived to be of similar ability makes the teachers' task easier as they are better able to meet student needs (Oakes 1985). The evidence from research with teachers tends to support this (Wright-Castro, Ramirez, and Duran 2003), although there are considerable differences between those teaching different subjects with mathematics teaching perceived as most benefiting from ability grouping (Hallam and Ireson 2003). Setting is viewed by some students as a means of enabling work to be matched to their own needs, although students in the higher sets tend to be more supportive than those in the lower sets (Hallam and Ireson 2006; Hallam, Ireson, and Davies 2002), although class size is an important mediator in the satisfaction of those in lower groups (Davidson 2001).

At a time when the political agenda in the UK purports to be focused on raising attainment and increasing social mobility and cohesion, the extent to which primary schools are adopting structured ability grouping is of particular interest. This paper aims to assess the extent to which children aged seven in the Millennium Cohort study are in schools which are adopting setting (the adoption of ability grouping across classes for particular subjects); the characteristics of those schools which are adopting setting; and the characteristics of the pupils who are placed in bottom, middle and top ability groups. The research is important because individual schools have the responsibility for taking decisions about the extent to which they adopt structured ability grouping. The creation of an educational market (Whitty, Power, and Halpin 1998) has led to schools competing to attract the children of middle-class parents who are known to favour setting (Ball, Bowe, and Gewirtz 1994). As schools compete in this way, there is the danger that their decisions about ability grouping have consequences not only for individual children but also for society as a whole as opportunities for social mobility are limited.

The historical perspective on ability grouping in the primary school

Historically, in England, at primary level, ability grouping was commonplace. Children were grouped in classes according to ability (streaming) to ensure effective selection for different types of schooling at secondary level. During the 1960s and 1970s, the introduction of comprehensive education, the demise of the 11+, research demonstrating no positive effects on average attainment and negative social consequences for pupils in the lower streams (Barker Lunn 1970; Jackson 1964) and an increasing

emphasis on equal opportunities led to a decline in streaming in the primary school (Bealing 1972). By the 1990s, the incidence of streaming was less than 3% and mixed ability classes were the norm, although there may have been within class groupings (Lee and Croll 1995). The Education Reform Act (1988) saw the implementation of the National Curriculum and an emphasis on raising standards. Ability grouping in the form of setting (pupils' ability grouped across classes for particular subjects) was perceived as a way to raise attainment and schools were encouraged to introduce it (Department for Education 1993). This was reinforced by the White Paper *Excellence in Schools*, which suggested that setting could be beneficial in raising standards and that 'setting should be the norm in secondary schools. In some cases, it is worth considering in primary schools' (Department for Education and Employment 1997, 38).

In 1998, Ofsted's Annual Report (1998a) indicated that the organisation of pupils into sets in primary schools was increasing. Four percent of all lessons observed were setted, compared with 2% in 1996/7 with most setting in Years 5 (children aged 10) and 6 (children aged 11) and for mathematics. A survey by Ofsted (1998b) supported these findings. Baines, Blatchford, and Kutnick (2003), in a study based on five Local Authorities, carried out in 1999 with 111 participant schools, focused on structured grouping in Year 2 (children aged seven) and Year 5 (children aged 10) and found that all reception and most Year 2 and Year 5 classes were mixed ability. Only a quarter adopted setting. Hallam et al. (2003) surveyed almost 800 randomly selected primary schools and found that setting was most common in mathematics, the incidence rising from 1% in reception classes to 14% in Year 6. There was less setting in English and very little in science or other subjects. Almost half (47%) of the sample of schools had mixed-age classes. In those schools, compared to those with same-age classes, there was a slightly higher incidence of cross-age setting (Hallam et al. 2003).

Does setting affect attainment in the primary school?

Early international reviews of ability grouping for specific subjects at primary level were positive. Adopting a best-evidence synthesis, Slavin (1987) demonstrated that where students were regrouped across age levels and given learning materials appropriate for their current level of performance, attainment could be improved. Joplin classes (a reading programme) achieved more than controls in 11 of the 14 comparisons made, the median effect sizes for reading improvement being about +.45. Kulik and Kulik (1992), in a meta-analysis of cross-age grouping, reviewed 14 studies and found that the most positive benefits were for the high-achieving students, although no negative effects were reported for the other children.

In the UK, there is limited evidence about the effects of setting at primary level. School self reports suggest that the effects are mixed (Hallam, Ireson, and Davies 2004b), while Whitburn (2001) studying the progress of over 1000 pupils at Key Stage 2 in mathematics found that when the same teaching materials were used the test results of pupils in mixed ability classes were significantly better than those taught in sets. Mixed ability classes benefited the less able pupils but attainment of the more able did not suffer. In case studies of 12 primary schools, Kutnick et al. (2006) found that where setting was adopted performance was rarely better at KS2 than local and national averages and value added was generally negative.

In the USA, some research has focused on smaller within class ability groupings. Fuchs et al. (1998) and Webb, Welner, and Zuniga (2001) found that ability grouping was more beneficial for middle and high ability students, while Linchevski

and Kutscher (1998) found that low and average ability students showed significant gains and high ability students did not suffer when mixed ability groupings were adopted. However, the quality of the group interactions was an important element in determining outcomes. Webb, Welner, and Zuniga (2001) found that high-ability students in small groups that were responsive to group members' need for help and did not engage in debilitating social behaviour performed well, whereas high-ability students in groups with poorer functioning did not. Whereas ability groups consistently showed beneficial group functioning only some mixed-ability groups exhibited such traits. Leonard (2001) showed that, in general, students achieved better undertaking group work in mixed-ability groups although the performance of high achievers was not significantly different in either setting. Overall, other factors, in addition to grouping structures, appear to play important mediating roles.

The personal and social consequences of structured ability grouping

Early research showed that the social adjustment, social attitudes and attitudes to peers of different ability groups tended to be 'healthier' among children in non-ability-grouped classes with lower ability groups having more negative attitudes (Barker Lunn 1970). Highly structured grouping legitimises the differential treatment of pupils and those in both the lower or higher sets can become the targets of teasing or bullying (Hallam, Ireson, and Davies 2002, 2004b; MacIntyre and Ireson 2002). Low ability groups tended to include disproportionate numbers of pupils of low socio-economic status, boys and those born in the summer (Barker Lunn 1970). Similarly, those identified with Special Educational Needs have an over-representation of summer born children and those from poor families (Anders et al. 2010).

The gradual decline of structured ability grouping in primary schools over the last 50 years served to change the focus of research. This led to a lack of evidence about the extent of ability grouping in primary schools and the characteristics of children in different ability groups. The current research will address this issue. The research reported here aimed to establish the extent to which pupils in the Millennium Cohort Study (MCS) were put into sets at age seven (Year 2), the characteristics of schools which adopted setting, their intakes and the family and personal characteristics of the children that were in different sets. The research is essentially opportunistic in that the sample is drawn from an existing data-set based on individuals, not schools. This means that it is difficult to make comparisons with previous findings on the incidence of setting in primary schools where data were collected at school level. The specific research questions addressed were:

- What is the incidence of setting amongst cohort children?
- What are the characteristics of the schools that adopt setting and what is the composition of their student intake?
- What are the personal characteristics of the cohort children who are in the top, middle and bottom sets?
- What are the family characteristics of cohort children who are in the top, middle and bottom sets?
- Are there differences in the aspirations of parents of cohort children in different sets?
- Are there differences in the home environment of cohort children in different sets

Method

The Millennium Cohort Study (MCS) follows the lives of around 19,000 children born in the UK in 2000/1. The MCS sample was selected from a random sample of electoral wards, disproportionately stratified to ensure adequate representation of all four UK countries, deprived areas and areas with high concentrations of black and Asian families. The sample population for the study was drawn from all live births in the UK over 12 months from 1 September 2000 in England and Wales and 1 December 2000 in Scotland and Northern Ireland.

Four surveys of cohort members have been carried out so far – at nine months, three, five and seven years. Over 13,800 families participated in the fourth survey (MCS4) when cohort members were aged seven – more than 8800 families in England, over 2000 in Wales, over 1600 in Scotland and 1300 in Northern Ireland. Ninety percent of families participating in the three previous MCS surveys also participated at age seven. In total, information was gathered on 14,043 children, from cohort members' parents or guardians, and the cohort members themselves in the form of cognitive assessment, physical measurements and a self-completion questionnaire about their likes, dislikes and how they felt about certain aspects of school and home life. Information was also gathered from their primary school teacher.

The teacher survey

The self-completion questionnaire asked teachers to rate some aspects of the study child's ability, attainment and behaviour and to profile their needs in school and how the child was taught. In total, 7235 teachers in 4969 schools were contacted to take part in the survey. Of these, 5364 teachers (74.1%) from 3981 schools (80.1%) completed and returned a questionnaire for 8875 children. A completed teacher questionnaire was therefore missing for just over a third of children. This was highest at 39% in Wales and lowest at 32% in Northern Ireland. Figures for England and Scotland were 36% and 33%, respectively. In comparison to the 14,043 children who took part in MCS4, boys and the more disadvantaged children were slightly under-represented among the 8875 children in the teacher survey (see Table 1 for analysis of response bias).

Given the varying probabilities of selection inherent in the MCS sample design, analysis of MCS data takes account of the design using sampling weights or using strata membership in statistical models. A further set of weights is typically applied to adjust for differential non-response across the various sweeps (for further details

Table 1. Analysis of response bias in teacher survey compared to MCS4 overall.

	MCS4	Teacher survey	% Bias[b]
% Boys	51.4	50.6	−1.56
% With both natural parents	67.1	68.6	+2.24
% Lone parent	22.2	21.1	−4.95
% Both parents in work	42.0	45.2	+7.62
% Non-working household	15.8	14.6	−7.59
% In poverty at age 5 or 7[a]	17.0	15.7	−7.65
% In poverty at age 5 and 7[b]	21.5	19.0	−11.63
% Own home (outright/mortgage)	62.4	65.2	+4.49

[a]OECD measure based on household income.
[b]% Bias = ((teacher survey% − MCS4%)/MCS4%) × 100.

see Ketende 2010; McDonald and Ketende 2010; Plewis 2007). All data analysis was carried out in the complex samples module of SPSS 18.

Sample and analysis strategy

The initial analysis was based on the majority of children who were in Year 2/Primary 3 (Scotland) at the time of (parental) interview (93.7%) with a completed teacher questionnaire[1] that included information on setting for literacy and maths[2] ($n = 7701$ children). After an initial examination of the prevalence of setting in schools, the paper profiles the school, family and child characteristics of the children who were set for literacy or maths compared to those who were not set for these competencies. Only statistically significant differences in the proportions with a particular characteristic are reported (see Tables A1–A4 in the Appendices for full details). Following this, the analyses concentrated solely on the children in Year 2 who were set for literacy (28.8%, $n = 2324$) or maths (34.0%, $n = 2625$). We initially discuss statistically significant bivariate results for children in 'top' 'middle' or 'bottom' literacy and maths sets in relation to school, family and child characteristics (see Tables A5 and A6 in the Appendices). These comparative analyses are followed by multivariate logistic regression analysis to assess the key differences in the personal and family characteristics of children in either the 'top' or 'bottom' sets.

Findings

Setting for literacy and maths

Teachers were asked about *setting* for literacy and maths in the study child's year. Setting is where children from different classes are grouped by ability for certain subjects only and they may be taught in different ability groups for different subjects. There was a strong relationship between literacy and maths setting in schools. Overall, 63.0% of children in Year 2 were neither set for literacy nor for maths, 25.8% of children were set for literacy and maths, 11.2% of children were set for maths (8.2%) or literacy (3.0%).

School, family and personal characteristics of children by whether they are set or not

A variety of measures were considered to establish the differences among children who were at a school that set pupils for literacy or maths against the majority who went to a school that did not set pupils by ability. Table 2 provides a summary of the measures considered. Significant associations at the bivariate level are presented in the following sections.

School characteristics

Children in the Teacher Survey who lived in Northern Ireland were significantly more likely (39.5%) to be set for literacy at school compared with children living in other parts of the UK, lowest at 23.6% in Scotland. A higher proportion of children living in Northern Ireland (35.3%) and England (35.0%) were set for maths, though the two very different sample sizes only yielded statistical signifi-

Table 2.   School, family and personal characteristics of children associated with setting.

School characteristics	Family characteristics	Personal characteristics
Country	Family structure	Gender
Mixed vs. single sex	Number of parents working	Ethnicity
Faith vs. non-faith	in household	Season of birth (autumn, winter, spring, summer born)
Mixed year classes vs. single year classes	Highest qualification of mother	Cognitive ability
Number of classes in a year	Housing tenure	School assessment results
	Poverty (family income)	Behaviour difficulties

cance in comparison with the lower proportion of children set for maths in Wales (28.5%) and Scotland (27.5%).

A small number of children (1.2%) went to a single sex primary school and 4.4% of children went to a fee-paying school. These children were significantly less likely to be set for maths, which was undoubtedly a reflection of the smaller class sizes in single sex and/or independent schools. Just over a quarter (26.5%) of children went to a faith school (17.5% Church of England (C of E), 8.1% Catholic and 0.9% other), with more children attending non-faith schools set for maths (35.5%). Children attending larger primary schools, those with two or three plus classes in their school year were also the most likely to be set for literacy or maths than those in smaller schools. Differences in proportions set were most apparent for maths, e.g. 21.7% one class and 43.9% three or more classes.

Family characteristics

Among the family characteristics considered, none were significantly related to a child being set for maths. However, the experience of poverty and being part of a workless family increased the proportion of children set for literacy. The highest qualification held by the child's mother was also significantly associated with a child being set for literacy. More children with a mother holding no qualifications, NVQ1, NVQ2 (or equivalent) or overseas qualifications were set for literacy. Most likely to be set were the relatively few children with a mother who only held overseas qualifications (33.1%).

Child characteristics

The personal characteristic of the child significantly associated with setting for literacy was ethnicity. More Pakistani, Bangladeshi and Indian children were set for literacy.

Summary of school, family and child characteristics associated with setting

Overall, a higher proportion of children were set for maths than literacy. Children in 'mainstream', larger, mixed sex, non-faith, non-fee-paying schools with a higher proportion of children receiving free school meals and scoring lower in Key Stage 1 assessments were significantly more likely to be set than children in small, independent, single-sex or faith schools. The smaller number of children in such schools

minimised the ability of a school to set children. A child's personal or family characteristics were not associated with setting for maths. In literacy, the data suggested that children in larger primary schools with a family originating from the Indian sub-continent, whose mother was relatively unqualified, who had experienced poverty – most likely as a result of their parent(s) being out of work – were more likely to be set for literacy at school. However, when all the measures significantly associated with either literacy or maths setting at the bivariate levels were entered into a multivariate logistic regression model, only country and number of classes in a school year retained a significant association with setting. Children at school in Year 2 in Northern Ireland were more likely to be set for literacy compared with children at school in England, Wales or Scotland; children at school in Scotland were significantly less likely to be set for maths compared with children at school in England or Northern Ireland.

Profile of children who were set for literacy and maths

The subsequent analyses focus on the relationship between setting placement and child, family and school characteristics. Only statistically significant differences in the proportions with a particular characteristic are reported. (A full set of results are included in Tables A5 and A6 in the Appendices). There was an even 50:50 gender split among the sample of children who were set for literacy (28.8%, $n = 2324$) or maths (34.0%, $n = 2625$), but the children were not split evenly across the 'top', 'middle' and 'bottom' sets. More children were in the top set for literacy or maths (40.6% literacy, 42.7% maths) than in the middle (34.9% literacy, 33.8% maths) or bottom (24.5% literacy, 23.4% maths) sets.

Child characteristics
Gender

Amongst the children set, neither boys nor girls were evenly split across the 'top', 'middle' and 'bottom' sets. Proportionally, more boys and girls were in the top set for literacy (36.9% boys, 44.4% girls) or maths (43.7% boys, 41.7% girls), although proportionally more boys were in the bottom set for literacy (30.6% boys, 18.2% girls). Boys made up 63.0% of all children in the bottom literacy set. Differences were less pronounced in maths sets, where boys made up 54.2% of the bottom set.

Ethnicity and language

There was no significant difference in the proportion of children in top, middle or bottom sets in relation to their ethnicity or language spoken.

Season of birth

Among the children set, 29% were Autumn born (September–November), 27% were Winter born (December–February), 18% were Spring born (March–May) and 26% were Summer born (June–August). Table 3 outlines the relationship between setting and the season of birth[3] and shows that older, Autumn born children are over-represented in the top set, making up more than four in 10 of all children in

Table 3.   Relationship between setting placement and season of birth.

	Literacy			Maths		
	Top set (%)	Middle set (%)	Bottom set (%)	Top set (%)	Middle set (%)	Bottom set (%)
Autumn	**38.6**	**23.2**	**21.0**	**40.0**	**23.8**	**20.9**
Winter	28.6	27.7	23.7	28.9	25.0	26.6
Spring	14.3	21.3	20.6	13.7	20.8	19.0
Summer	**18.4**	**27.9**	**34.6**	**17.4**	**30.4**	**33.5**
N (100%)=	*915*	*726*	*501*	*1099*	*801*	*526*

the top literacy or maths set compared with just over two in 10 of the children in the bottom sets. Younger, Summer born children are under represented in the top set (18.4% literacy, 17.4% maths) and over-represented in the bottom set (34.6% literacy, 33.5% maths).

Cognitive ability

Children in the survey sat a number of cognitive tests each time an interviewer visited them. At age five, a combined total score was constructed from age-adjusted performance in three assessments taken from *The British Ability Scales (BAS) II* (Elliott, 1996): BAS Pattern Construction, BAS Naming Vocabulary and BAS Picture Similarities. Scores ranged between 60 and 240. At age seven, a combined total score was made up from two age-adjusted BAS tests, Word Reading and a repeat of the pattern construction assessments, together with a raw score for the progress in maths test[4] (there is no age adjustment for this score). Scores ranged between 76 and 240. Figure 1 shows that the average scores in assessments at ages five and seven differed significantly by literacy set. A very similar set of average scores was recorded for children by maths set (further details of the cognitive assessments are provided in Table A7 in the Appendices).

    Children in the top set had the highest average scores; children in the bottom set had the lowest; those in the middle set scored between the two extremes. Although overall scores are not measured from performance on the same three tests
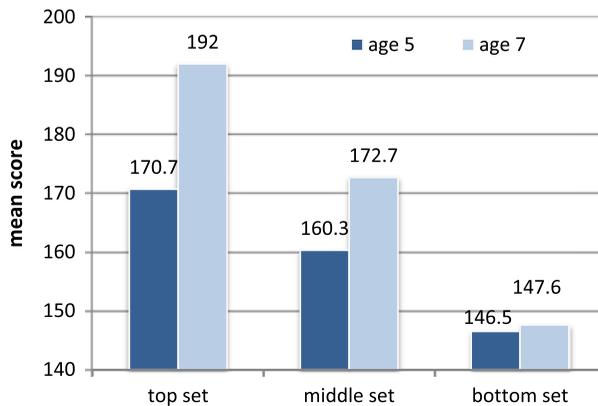
Figure 1.   Average cognitive score at age 5 and age 7 by literacy set.
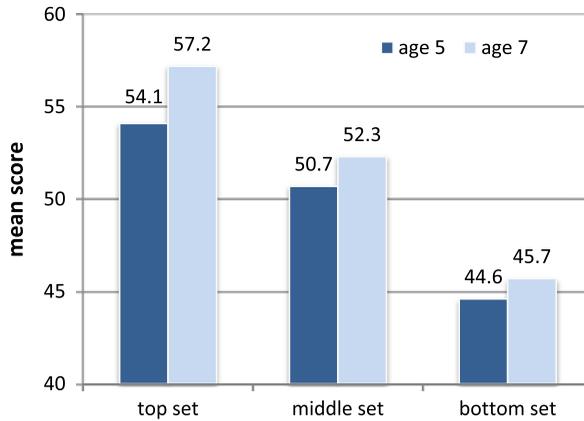
Figure 2.   Average score in the BAS Pattern construction test at age 5 and age 7 by maths set.

at the two different age points, the difference between average scores for children in the different sets increased between ages five and seven.

The pattern construction test, which is a test of non-verbal ability, was completed by children at both ages. Figure 2 shows that children in the top maths set had made the greatest increase in average scores between ages five and seven while children in the bottom maths set had made the lowest increase. Scores had a range of 20–80. At age five, the overall average score was 51.0 (standard error 0.21) and at age seven, the overall average score was 53.4 (standard error 0.22).

Behaviour

At the age five survey, the parent or guardian of the child completed the set of questions that make up the *Strengths and Difficulties Questionnaire* (Goodman,
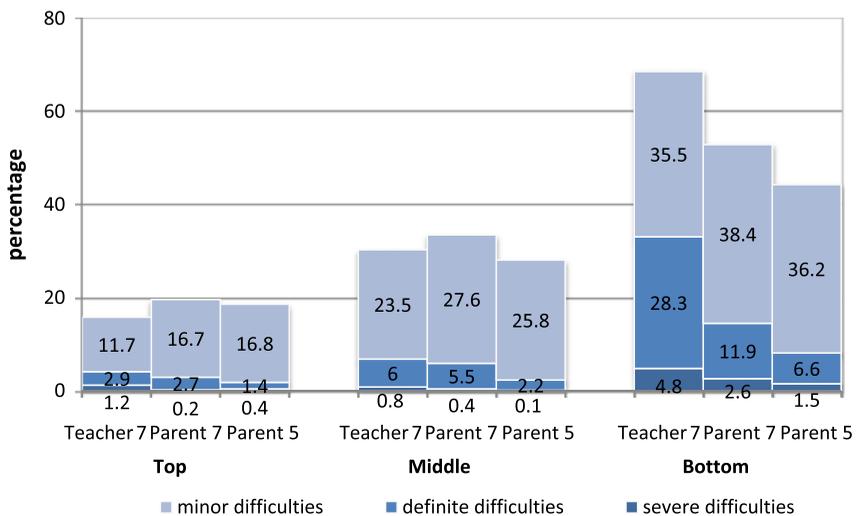
Figure 3.   Percentage of children rated with difficulties on the summary strengths and difficulties question by teacher and parent by literacy set.

1997). At the age seven survey, this was completed by both teachers and the parent or guardian. At the end of the set of questions, a summary question was also completed. Results were very similar across literacy and maths set. Figure 3 shows that, in summary, children in the top literacy set were the least likely to be rated with 'severe' or 'definite' difficulties by their parent or teacher, children in the bottom literacy set by far the most likely. More children in the bottom set were rated by their parent to have some level of difficulty at age seven than at age five; teachers were more likely than parents to rate children in the bottom set with some degree of difficulty at age seven. Less than a third of children in the bottom set were felt to have no difficulties at all.

Long-standing illness

Children in the bottom set were significantly more likely to be reported to have a long-standing illness by their parent than children in the top set: 25.7–16.8% literacy and 25.3–16.3% maths. Children in the middle set took a middle position (18.0% literacy and 19.1% maths). Parents of children in the bottom set were also far less likely to report that their child had excellent general health (48.4% literacy), in comparison with parents of children in the top (64.4%) or middle (63.5%) sets. Significantly more children in the bottom set (10.1% literacy and 9.2% maths) had also been absent from school in the last year compared with children in the middle (5.4% literacy or maths) or top set (3.5% literacy and 3.7% maths).

Family characteristics

Certain family characteristics were associated with whether a child was at a school that set children for literacy. Among the children who were set, a wider range of family characteristics were strongly associated with whether the child was in the 'top', 'middle' or 'bottom' set for literacy or mathematics. Children in the top set had more advantageous socio-economic family circumstances, children in the bottom set more disadvantages. Children in the middle set usually occupied the middle ground between the two.

Just over two-thirds (68.8%) of all children lived with two natural parents. This increased to over three-quarters for children in the top set (75.6% literacy and 75.0% maths) compared with just over half of children in the bottom set (54.3% literacy and 56.2% maths). Conversely, more than twice as many children in the bottom set had consistently lived in a lone parent household (17.3% literacy and 14.5% maths) compared with children in either the middle or top set (7.3% literacy and 6.2% maths).

Children in the top set were most likely to live in an owner occupied home (72.3% literacy and 74.3% maths) and children in the bottom set the least likely (48.0% literacy and 51.9% maths). A much higher proportion of children in the bottom set lived in rented local authority or housing association accommodation. They were also three times as likely as children in the top set to be part of a non-working household (27.9–9.4% literacy; 26.0–8.8% maths) and twice as likely to have experienced poverty[5] at ages five and seven compared with children in the top set (32.3–16.3% literacy and 29.2–15.4% maths).
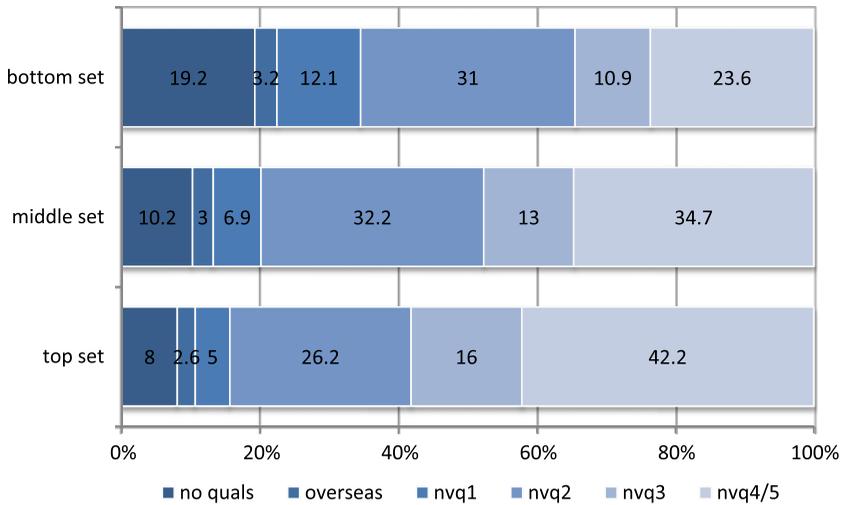
Figure 4.   Highest qualification of child's mother by literacy set.

Figure 4 shows that far more children in the bottom set for literacy (and maths) had a mother with no formal qualifications (19.2% compared to 8.0% top set for literacy) and far more children in the top set had a mother with a degree level or higher qualification (NVQ4 or 5 equivalent) (42.2% compared to 23.6% bottom set literacy).

School characteristics

Among the school characteristics available for all children, only the number of classes per academic year had a significant association with setting placement. Fewer children in the bottom literacy (20.9%) or maths (23.9%) set attended a school with three or more classes in a year, compared with children in the top literacy (27.2%) or maths (30.4%) set.

Which personal or family characteristics significantly impact on a child's placement in the top middle or bottom set?

The results reported above are based on bivariate analyses which focus on the differences between children who are in the top, middle or bottom set for literacy or maths. A series of multivariate logistic regression analyses were performed to assess whether the observed differences between groups were statistically significant after taking other characteristics into consideration. The results are discussed in terms of the 'odds ratio' (OR) or the relative odds of a particular characteristic, e.g. having behaviour difficulties or being part of a single parent household, being associated with setting placement against a 'reference category', i.e. having no behaviour difficulties or being part of an intact two parent family, once other measures in the model have been controlled for. The OR for the reference category is set as 1, thus an OR greater than 1 indicates a characteristic has a positive association with setting placement and an OR less than 1 indicates the characteristic has a negative association with setting placement.[6]

The analyses concentrated on determining the personal and family characteristics of children who were placed in the 'top' or 'bottom' sets for literacy or maths. The

child characteristics included in the model were their season of birth, gender and any prevailing long-standing illness, together with cognitive performance and behaviour at age five, the latest measure available before their current set placement. The family characteristics included were the highest qualification held by the child's mother, housing tenure and working status of the household when the child was age seven, together with a longer term view of both family type and experience of poverty in an attempt to capture the stability of their home and family life. Three separate models were produced for each analysis. The first model concentrates on a child's personal characteristics and the second model concentrates on their family socio-economic circumstances. The final model includes both sets of measures. The analysis is based on the children who have complete data, i.e. information for all measures included in the final model (1886 – 81% of the 2324 who were set for literacy and 2151 – 82% of the 2625 who were set for maths). The child and family measures included in the models are listed below. The categories, including the reference category (ref cat) for each measure, are given in Table 5.

The child-based variables in models 1 and 3:
• Sex of child
• Season born in
• Long-standing illness
• Parent-rated behaviour problems at age 5
• Age-adjusted cognitive ability score at age 5

The family variables in models 2 and 3:
• Family structure (parent figures child lives with)
• Mother's highest qualification
• Experience of poverty age 5 and age 7
• Current housing tenure
• Current working status of parent(s) in household

Table 4 provides a summary of the results, highlighting the measures in the models that are significantly related to 'top' or 'bottom' setting placement in each model. Table 5 gives the odds ratios and 95% confidence intervals for each alternate category against a reference category for each individual variable included in the final model predicting inclusion in the 'top' and 'bottom set. Significant results at the 95% level ($p < 0.05$), 99% ($p < 0.01$) and 99.9% ($p < 0.001$) are indicated.

What predicts a child being in the top or bottom set for literacy or maths?

Child characteristics

Results suggest that autumn or winter born children were significantly more likely to be placed in the top set for literacy or maths and significantly less likely to be in the bottom set for literacy or maths when compared to summer born children. Cognitive scores from the assessments when the children were age five were split into quintiles, and showed that children in each quintile above the lowest were progressively more likely to be in the top set and progressively less likely to be in the bottom set. For example, children with cognitive scores in the top quintile were more than seven times (OR 7.53) as likely as children with cognitive scores in the lowest

Table 4. Summary of significant associations between child characteristics and family circumstances and setting placement for children in Year 2.

	Literacy			Maths		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Top set vs. middle/bottom set						
Child characteristics						
Gender			*			
Season of birth	***		***	***		***
Cognitive ability (age 5)	***		***	***		***
Behaviour difficulties (age 5)	***		***	***		**
Long-standing illness						
Current family circumstances						
Mother's highest qualification		**				
Housing tenure						
Family structure						
Working household		*	*		**	*
Experience of poverty						
Bottom set vs. top/middle set						
Child characteristics						
Gender	***		***			
Season of birth	***		***	***		***
Cognitive ability (age 5)	***		***	***		***
Behaviour difficulties (age 5)	***		***	***		***
Long-standing illness						
Current family circumstances						
Mother's highest qualification		**			***	
Housing tenure						
Family structure			**		*	
Working household					**	*
Experience of poverty						*a

Significance level: $***p < 0.001$; $**p < 0.01$; $*p < 0.05$. [a]Relationship in opposite direction to that expected.

quintile to be part of the top set for maths and 10 times less likely to be part of the bottom set (OR 0.10). Boys were significantly more likely than girls to be in the bottom literacy set (OR 1.91) and significantly less likely than girls to be in the top literacy set (OR 0.77), but gender was not significantly associated with placement of children in maths sets. Children with behaviour difficulties were significantly more likely to be part of the bottom literacy or maths set (OR 2.01 literacy and OR 1.84 maths) and significantly less likely to be part of the top literacy or maths set (OR 0.61 literacy and OR 0.67 maths).

Family circumstances

Family circumstances held much less importance for setting placement compared with a child's own characteristics. However, family circumstances of children held relatively more importance for placement in the bottom than the top literacy or maths set.

Table 5. Multiple logistic regression predicting placement of children in Year 2 in top or bottom literacy or maths set (odds ratios and 95% confidence interval).

	Setting placement			
	Top set (vs. middle/bottom		Bottom vs. middle/top	
	Literacy	Maths	Literacy	Maths
Child characteristics				
Gender (ref cat: girl)	**0.77***	1.19	**1.91*****	1.16
	(0.60–1.00)	(0.94–1.49)	(1.43–2.56)	(0.89–1.50)
Season of birth (ref cat: summer)				
Autumn	**3.64*****	**4.67*****	**0.34*****	**0.34*****
	(2.55–5.20)	(3.33–6.55)	(0.23–0.50)	(0.23–0.51)
Winter	**2.31*****	**2.98*****	**0.42*****	**0.47*****
	(1.63–3.26)	(2.14–4.15)	(0.28–0.64)	(0.34–0.67)
Spring	1.18	1.48	0.73	**0.65***
	(0.81–1.71)	(0.99–2.19)	(0.49–1.08)	(0.43–0.98)
Cognitive ability (age 5) (ref cat: lowest quintile)				
Second	**2.66*****	**1.58***	**0.49*****	**0.50*****
	(1.51–4.68)	(1.03–2.43)	(0.33–0.71)	(0.34–0.74)
Third	**3.18*****	**2.80*****	**0.22*****	**0.27*****
	(1.81–5.59)	(1.92–4.09)	(0.14–0.35)	(0.18–0.39)
Fourth	**5.69*****	**4.53*****	**0.25*****	**0.20*****
	(3.07–10.52)	(2.89–7.08)	(0.15–0.43)	(0.13–0.33)
Fifth (highest)	**8.67*****	**7.53*****	**0.13*****	**0.10*****
	(4.81–15.62)	(4.89–11.59)	(0.08–0.23)	(0.06–0.16)
Behaviour difficulties (age 5) (ref cat: no difficulties)	**0.61*****	**0.67****	**2.01*****	**1.84*****
	(0.46–0.79)	(0.52–0.86)	(1.48–2.73)	(1.40–2.43)
Longstanding Illness (ref cat: no illness)	0.97	0.88	1.20	1.24
	(0.72–1.31)	(0.66–1.18)	(0.83–1.74)	(0.90–1.71)
Current family circumstances				
Mother's highest qualification (ref cat: no quals/nvq1)				
Nvq2	0.95	1.01	0.72	0.78
	(0.59–1.56)	(0.67–1.52)	(0.46–1.15)	(0.53–1.14)
Nvq3	1.47	1.04	0.60	**0.54***
	(0.84–2.58)	(0.68–1.60)	(0.36–1.02)	(0.34–0.84)
Nvq4/5	1.16	1.13	0.76	**0.62***
	(0.69–1.96)	(0.73–1.76)	(0.46–1.25)	(0.41–0.96)
Overseas quals only	1.43	1.25	**0.39***	0.64
	(0.70–2.92)	(0.60–2.63)	(0.17–0.90)	(0.29–1.40)
Housing tenure (ref cat: home owner)				
Rented	0.75	0.89	1.15	1.21
	(0.52–1.08)	(0.64–1.25)	(0.77–1.72)	(0.82–1.79)
Other	0.55	0.73	1.75	2.12
	(0.25–1.20)	(0.35–1.52)	(0.76–4.00)	(0.96–4.68)
Family structure (ref cat: two parents)				
Lone parent (consistent)	1.10	1.16	**1.98***	1.51
	(0.64–1.88)	(0.72–1.88)	(1.16–3.39)	(0.84–2.72)
Become lone parent	0.84	1.03	0.78	1.02
	(0.57–1.24)	(0.69–1.52)	(0.47–1.29)	(0.64–1.61)
Step family/other	**0.65***	0.67	**2.18***	**1.80***
	(0.41–1.03)	(0.44–1.02)	(1.31–3.63)	(1.13–2.86)

(*Continued*)

Table 5. (*Continued*).

	Setting placement			
	Top set (vs. middle/bottom		Bottom vs. middle/top	
	Literacy	Maths	Literacy	Maths
Non-working household (ref cat: working parent)	**0.56**[*] (0.32–0.98)	**0.57**[*] (0.37–0.88)	**1.61**[*] (0.94–2.76)	**1.80**[*] (1.12–2.90)
Experience of poverty (ref cat: not in poverty age 5 or 7)				
Poverty age 5 or 7	1.08 (0.76–1.56)	1.17 (0.78–1.74)	1.10 (0.73–1.68)	0.70 (0.48–1.01)
Poverty age 5 and 7	1.49 (0.91–2.46)	0.91 (0.66–1.25)	0.76 (0.44–1.32)	**0.58**[*] (0.35–0.96)
Nagelkerke pseudo R^2	0.25	0.25	0.28	0.26
n	*1886*	*2151*	*1886*	*2151*

Significance level: [***]$p < 0.001$; [**]$p < 0.01$; [*]$p < 0.05$.

Once the child's own characteristics were also controlled for in model 3, children who were living in a non-working household were significantly less likely to be in the top literacy (OR 0.56) or maths (OR 0.57) set and significantly more likely to be in the bottom literacy (OR 1.61) or maths (OR 1.80) set. Similarly, children living as part of a step family were also significantly less likely to be in the top literacy (OR 0.65) set and significantly more likely to be in the bottom literacy (OR 2.18) or maths (OR 1.80) set. Children in the bottom literacy set were also significantly more likely to be part of a long-term single parent household (OR 1.98); children in the bottom maths set were significantly less likely to have a mother with qualifications at NVQ3 or higher levels. A mother's qualification level held less significance for placement in the bottom literacy set, although children with a mother who had qualifications obtained overseas were less likely to be part of the bottom set.

Discussion

A significant proportion of Millennium Cohort Study children at age seven were in sets for mathematics and literacy (25.8%) and a further 11.2% for mathematics or literacy. While the source of the data makes comparison with earlier school surveys difficult, the findings suggest that setting may be increasing in UK primary schools for young children given that previous research had found that the incidence of setting was negligible in Years 1and 2 (Baines, Blatchford, and Kutnick 2003; Hallam et al. 2003; Ofsted 1998b). This is important in a context where there is pressure on schools to raise standards of attainment. While the negative consequences of setting on personal development may be less than those related to streaming there is still a likely impact on the attainment of those in the lower sets, recent evidence on secondary school performance indicating that working with those who are more capable is a key factor in raising attainment (Schofield 2010). There is also evidence that highly structured ability grouping leads to secondary school children losing belief in their ability to learn and developing 'learned helplessness' with a subsequent impact on their motivation (McManus 2010). While there may be benefits for teachers in teaching setted groups through ease of preparing work for a less heterogeneous group (Hallam and Ireson 2003) and students perceive that matching work to students' needs can have positive benefits, a substantial proportion of chil-

dren in setted groups report that work is either too easy or too difficult (Hallam and Ireson 2007; Hallam, Ireson, and Davies 2004b) and that they want to move to a different set usually a higher one (Hallam and Ireson 2007). Teachers typically prepare lessons for a hypothetical 'middle level' student in a class and this rarely meets the needs of all students even within ability grouped classes (Bennett et al. 1984). Setting also has an impact on teacher expectations with those in middle and lower sets insufficiently stretched while for some in top sets there are inaccurate assumptions about levels of understanding and the pace can be too fast for some students (Boaler 1997). In addition, there is typically little movement between sets so that changes in students' understanding and progress are frequently not met with a change in set (Ireson and Hallam 2001).

Schools adopting setting tended to be larger, non-faith schools with substantial proportions of children with high levels of deprivation, from families who are workless and of Pakistani, Bangladeshi or Indian origin where the main language spoken at home is not English. This raises interesting questions about the underlying rationale for schools with an intake with such characteristics adopting higher levels of ability grouping than other schools.

Schools are free to make their own decisions about the kinds of pupil grouping that they adopt. These tend not to be based on ideology but on raising attainment to meet government priorities, alongside managing practical issues in the school environment (Hallam, Ireson, and Davies 2002, 2004a). As there is no consistent evidence from the UK or internationally that structured ability grouping raises attainment and may reduce it for some groups (Schofield 2010), it seems perverse that structured ability grouping for very young children seems to be on the increase. There is a need for further research with schools to understand their rationales for adopting such practises.

More children were set for mathematics than literacy. This finding is well established at secondary level and may be related to teachers' perceptions that some subjects lend themselves more easily to differentiation by outcome while for others ability grouping is needed for effective teaching (Hallam and Ireson 2003). The existing research at primary level does not support this assumption (Whitburn 2001). Within class groupings where small groups can be organised flexibly in relation to different tasks and tailored to promote optimal group functioning may offer a more effective learning environment (Hallam, Ireson, and Davies 2002).

Children in the top mathematics set made the biggest increase in average scores in the Pattern Construction test between ages five and seven while children in the bottom mathematics set made the lowest increase. Given the close relationships between spatial reasoning and mathematical skills this suggests that the gap between those in the bottom and top sets is likely to widen in relation to mathematical attainment. This will need to be examined in relation to Key Stage 2 national assessments when the data about current ability grouping placement of the children is available. It would be premature to draw definitive conclusions on the basis of the present data.

Average cognitive and attainment scores at age seven indicated that most children were in the right set for their measured ability suggesting that teachers' assessments were accurate, a finding supported by research on children identified with Special Educational Needs (Anders et al. 2010). However, there were some 'outliers' (scores falling outside the 95% confidence interval range) which indicated that a few children were in an inappropriate set, reinforcing earlier findings that set placement can be based on factors other than current attainment. This is frequently behaviour (Davies, Hallam, and Ireson 2003). Schools clearly need to have systems in place to

address issues of poor behaviour. Placing children in low sets merely relocates the problem and may limit the academic opportunities that they have. While there is relatively little recent evidence demonstrating the academic impact of setting at primary level, the evidence at secondary level shows that being placed in a lower set can affect attainment by as much as half a General Certificate of Secondary Education grade (Wiliam and Bartholomew 2004).

Some groups of children are more likely to be placed in lower ability groups than others: summer born children and boys, those from families living in poverty, and in long-term single parent families and where mothers do not have high-level qualifications. These children are also more likely to be identified as having Special Educational Needs (SEN) (Anders et al. 2010). While, most of these factors do not seem to bias teachers' judgements in relation to identifying SEN, age-related development differences based on birth date are not sufficiently taken into account. Teachers' awareness of almost a year's difference in the age of the children in year groups needs to be raised.

Given current political priorities to raise standards, demonstrating whether setting lowers attainment for some groups of pupils at primary level is important. Historically, it was well established that streaming did so. Some of the Millennium Cohort children placed in sets were already in streamed classes (see Hallam and Parsons in press). The combination of being in a bottom stream and a bottom set may have particularly negative effects. Given the long tail of low achievement in the UK which appears particularly resistant to educational change (Rashid and Brooks 2010) this needs to be researched with some urgency as the effects may be cumulative as children progress through school.

Children living with high levels of deprivation and from some minority groups attain less well in school (e.g. Sammons et al. 2007). This appears to be exacerbated by structured ability grouping. Where early educational selection is practised, social segregation tends to be higher (Green, Preston, and Janmaat 2006; OECD 2011) and intergenerational mobility reduced (Brunello and Checchi 2006; Maurin and McNally 2007). If the coalition government is serious in its intent to address these issues it needs to take action to encourage schools to adopt practises more conducive to decreasing rather than increasing the attainment gap supporting social mobility.

Acknowledgements

Notes

1. 0.1% of teachers completed the questionnaire between January and May 2008, 42% of teachers completed the questionnaire towards the end of Year 1/Primary 2 (June–August 2008), 57.8% of teachers during Year 2/Primary 3 (September 2008–June 2009 and 0.1% between July and October 2009.
2. For 451 children, teachers reported they did not know if they were set or whether they were in the 'top', 'middle' or 'bottom' set for literacy and maths. For a further 185 children, teachers did not know if a child was set or whether they were in the 'top', 'middle' or 'bottom' set for literacy or maths. The children made up 6.3% of all children in the Teacher Survey and were excluded from the analysis.

3. Children in the Millennium cohort were born between 1 September 2000 and 31 August 2001 in England and Wales; between 1 November 2000 and 14 January 2002 in Scotland and Northern Ireland.
4. This assessment is part of a series of assessments developed by NFER primarily designed for use by teachers in a classroom setting. The questions assess levels 1–4 of the National Curriculum in England, Wales and Northern Ireland, and levels A to C in Scotland.
5. This is the standard OECD measure, accounting for weekly family income and related to the number of household members in work and the number of dependents. Note: there is a slight overestimation of the number of families experiencing poverty as the amount of housing benefit being received was not always recorded as this benefit does not come directly to the recipient.
6. Interpreting odds ratios (OR): for those who are not familiar with the interpretation of logistic regression models, it is important to clarify the meaning of the odds ratios reported. Using the example of the relative chances of boys being in the bottom literacy set we can see that 30.6% of all boys were in the bottom set compared with 18.2% of all girls. Expressing this in terms of odds rather than probabilities or percentages we obtain odds of 30.6:69.4 or 0.44:1 that boys would be in the bottom set and 18.2:81.8 or 0.22:1 that girls would be in the bottom set. The odds of boys being in the bottom set are therefore almost double that of girls; however, this does not mean that boys are twice as likely as girls to be in the bottom set.

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Appendices

Table A1. Percentage of children set by each category within each school measure.

		Literacy			Maths		
		Not set %	Set %	N (100%)	Not set %	Set %	N (100%)
Country	England	71.0	29.0	4640	65.0	35.0	4640
	Wales	74.4	25.6	1006	71.5	28.5	1006
	Scotland	76.4	23.6	955	72.5	27.5	955
	Northern Ireland	60.5	39.5	840	64.7	35.3	840
		Adjusted $F=(2.672, 1039.372)=6.53$; $P(F)=0.000$			Adjusted $F=(2.382, 926.676)=3.86$; $P(F)=0.015$		
Classes in year	One	78.0	22.0	2393	78.3	21.7	2393
	Two	68.6	31.4	2927	62.0	38.0	2927
	Three+	67.1	32.9	1507	56.1	43.9	1507
		Adjusted $F=(1.943, 755.997)=10.02$; $P(F)=0.000$			Adjusted $F=(1.918, 746.114)=30.51$; $P(F)=0.000$		
Mixed year Classes	Yes	72.3	27.7	1751	69.1	30.9	1751
	No	71.4	28.6	5227	65.6	34.4	5227
Single sex School	Single sex	75.3	24.7	92	80.6	19.4	92
	Mixed sex	71.1	28.9	7609	65.9	34.1	7609
					Adjusted $F=(1389)=6.73$; $P(F)=0.010$		
School fees	Yes	72.9	27.1	288	74.0	26.0	288
	No	71.1	28.9	7413	65.7	34.3	7413
					Adjusted $F=(1389)=6.52$; $P(F)=0.011$		
Faith school	None faith	70.5	29.5	5211	64.5	35.5	5211
	C of E	74.6	25.4	998	69.3	30.7	998
	Catholic	74.7	25.3	566	72.0	28.0	566
	Other	79.2	20.8	75	78.6	21.4	75
					Adjusted $F=(2.090, 812.970)=3.02$; $P(F)=0.047$		

Table A2.   Percentage of children set by each category within each family measure.

		Literacy			Maths		
		Not set %	Set %	N (100%)	Not set %	Set %	N (100%)
Family	2 natural parents	71.7	28.3	*5290*	66.2	33.8	*5290*
	Lone parent (0, 7)	68.0	32.0	*609*	67.4	32.6	*609*
	Lone parent (7)	70.3	29.7	*841*	66.1	33.9	*841*
	Step/other (0, 7)	72.0	28.0	*701*	64.4	35.6	*701*
Poverty	No poverty	72.7	27.3	*4800*	66.0	34.0	*4800*
	Poverty at 5 or 7	69.7	30.3	*1174*	64.1	35.9	*1174*
	Poverty at 5 and 7	67.3	32.7	*1447*	68.0	32.0	*1447*
	Adjusted $F = (1.742, 677.462) = 4.52$; $P(F) = 0.015$						
Work	Parent in work	71.8	28.2	*6672*	66.2	33.8	*6672*
	No parent in work	67.5	32.5	*1029*	65.1	34.9	*1029*
	Adjusted $F = (1389) = 4.30$; $P(F) = 0.039$						
Highest qualification (mother)	No quals/NVQ1	68.1	31.9	*1245*	66.0	34.0	*1245*
	NVQ2	69.8	30.2	*2068*	64.0	36.0	*2068*
	NVQ3	74.3	25.7	*1185*	67.3	32.7	*1185*
	NVQ4/5	72.6	27.4	*3011*	67.1	32.9	*3011*
	Overseas Quals only	66.9	33.1	*188*	65.2	34.8	*188*
	Adjusted $F = (4.716, 1834.700) = 2.70$; $P(F) = 0.022$						
Tenure	Home owner	72.1	27.9	*5299*	65.6	34.4	*5299*
	Rent (LA/HA)	69.2	30.8	*1585*	67.2	32.8	*1585*
	Rent (private)	70.9	29.1	*656*	67.7	32.3	*656*
	Other	65.9	34.1	*157*	61.5	38.5	*157*

Table A3.   Percentage of children set by each category within each child measure.

		Literacy			Maths		
		Not set %	Set %	N (100%)	Not Set %	Set %	N (100%)
Gender	Boy	71.2	28.8	3886	66.3	33.7	3886
	Girl	71.2	28.8	3815	65.8	34.2	3815
Ethnicity	White	71.9	28.1	6704	66.4	33.6	6704
	Mixed	69.0	31.0	195	66.7	33.3	195
	Indian	61.9	38.1	160	53.8	46.2	160
	Pakistani/Bangladeshi	56.7	43.3	360	59.7	40.3	360
	Black/ Black British	75.5	24.3	194	71.7	28.3	194
	Other (Chinese/other Asian)	71.9	28.1	84	59.3	40.7	84
	Adjusted $F=(3.803, 1479.299)=3.71$; $P(F)=0.006$						
Language	Only/Mainly English	71.7	28.3	7213	66.4	33.6	7213
	Only ½ English – No English	60.1	39.9	488	59.6	40.4	488
Season	Autumn born	72.7	27.3	2132	66.5	33.5	2132
	Winter born	71.7	28.3	2130	66.6	33.4	2130
	Spring born	70.6	29.4	1197	67.1	32.9	1197
	Summer born	69.0	31.0	1653	63.7	36.3	1653
Behaviour	No diffs at 5 (p)	72.0	28.0	5370	66.3	33.7	5370
	Difficulties at 5 (p)	69.6	30.4	1853	65.5	34.5	1853
	No diffs at 7 (p)	71.8	28.2	5201	66.6	33.4	5201
	Difficulties at 7 (p)	70.7	29.3	2319	65.5	34.5	2319
	No diffs at 7 (t)	72.0	28.0	5298	66.4	33.6	5298
	Difficulties at 7 (t)	69.6	30.4	2323	65.2	34.8	2323
LS illness	No illness	71.4	28.6	6267	66.3	33.7	6267
	Long standing illness	70.1	29.9	1429	64.9	35.1	1429

Table A4. Mean performance scores in assessments by whether child was set or not.

	Literacy		Maths		
	Not set%	Set %	Not set %	Set %	*N* (100%)
Cognitive ability score at 5	162.2	161.3	162.0	161.8	7316
Cognitive ability score at 7	175.9	174.6	175.8	174.9	7443

Table A5. Distribution of children across literacy sets by child and family characteristics.

		Top set %	Middle set %	Bottom set %	Overall *N* (100%)
Child characteristics					
Gender	Boy	36.9	32.5	30.6	*1199*
	Girl	44.4	37.3	18.2	*1125*
	Adjusted $F = (1.996, 776.252) = 17.59$; $P(F) = 0.000$				
Ethnicity	White	40.4	35.1	24.5	*1937*
	Mixed	43.2	36.5	20.3	*62*
	Indian	46.0	33.3	20.7	*69*
	Pakistani/Bangladeshi	37.7	36.6	25.6	*169*
	Black/ Black British	40.0	31.9	28.1	*61*
	Other (Chinese/other Asian)	48.5	16.1	35.3	*24*
					ns
Language	Only/Mainly English spoken	40.9	34.8	24.2	*2117*
	Only ½ English – No English spoken	36.5	35.8	27.7	*207*
					ns
Season	Autumn born	54.5	27.2	18.2	*610*
	Winter born	43.2	34.8	22.0	*632*
	Spring born	32.0	39.6	28.3	*370*
	Summer born	29.3	36.9	33.8	*530*
	Adjusted $F = (5.722, 2225.666) = 12.21$; $P(F) = 0.000$				
Cognitive ability	1st (lowest) quintile	15.3	34.7	50.0	*419*
	2nd quintile	33.4	36.4	31.2	*445*
	3rd quintile	37.8	46.1	16.1	*433*
	4th quintile	52.4	32.9	14.7	*450*
	5th (highest) quintile	62.1	28.8	9.1	*467*
	Adjusted $F = (6.992, 2719.860) = 27.91$; $P(F) = 0.000$				
Behaviour	No diffs at 5	46.7	35.3	18.0	*1568*
Parent rated	Difficulties at 5	27.4	35.6	37.0	*581*
	Adjusted $F = (1.929, 750.460) = 38.28$; $P(F) = 0.000$				
LS illness	No illness	41.9	35.5	22.6	*1891*
	Long standing illness	35.2	32.4	32.4	*433*
	Adjusted $F = (1.92, 770.957) = 5.94$; $P(F) = 0.003$				
Family characteristics					
Family type	Two natural parents	45.5	35.0	19.5	*1577*
	Lone parent (0, 7)	30.6	26.3	43.2	*205*
	Lone parent (7)	31.4	43.8	24.8	*255*
	Step/other (0, 7)	30.5	31.8	37.8	*201*
	Adjusted $F = (5.818, 2263.210) = 11.55$; $P(F) = 0.000$				
Poverty	No poverty	46.5	35.4	18.0	*1357*
	Poverty at 5 or 7	33.2	36.6	30.2	*386*

(*Continued*)

Table A5. (*Continued*).

		Top set %	Middle set %	Bottom set %	Overall N (100%)
	Poverty at 5 and 7	30.3	34.7	35.0	*494*
	Adjusted $F = (3.940, 1532.917) = 14.06$; $P(F) = 0.000$				
Work	Parent in work	44.0	34.9	21.2	*1969*
	No parent in work	23.3	35.0	41.7	*355*
	Adjusted $F = (1.819, 707.673) = 23.03$; $P(F) = 0.000$				
Highest	No quals/NVQ1	28.0	31.6	40.4	*428*
Qualification	NVQ2	36.1	38.1	25.8	*636*
(mother)	NVQ3	47.5	33.0	19.5	*321*
	NVQ4/5	48.9	34.6	16.5	*867*
	Overseas quals only	36.4	36.1	27.4	*71*
	Adjusted $F = (7.391, 2875.237) = 10.88$; $P(F) = 0.000$				
Tenure	Home owner	46.4	35.1	18.6	*1533*
	Rent	30.4	34.8	34.8	*726*
	Other	34.3	31.6	34.1	*63*
	Adjusted $F = (3.881, 1509.605) = 15.89$; $P(F) = 0.000$				

Table A6. Distribution of children across maths sets by child and family characteristics.

		Top set %	Middle set %	Bottom set %	Overall N (100%)
Child characteristics					
Gender	Boy	43.7	30.9	25.4	*1340*
	Girl	41.7	36.8	21.5	*1285*
	Adjusted $F = (1.999, 777.740) = 4.18$; $P(F) = 0.016$				
Ethnicity	White	43.2	33.6	23.2	*2212*
	Mixed	38.5	32.9	28.5	*71*
	Indian	45.7	33.4	20.9	*80*
	Pakistani/Bangladeshi	34.9	39.5	25.6	*159*
	Black/Black British	39.8	31.6	28.6	*66*
	Other (Chinese/other Asian)	42.0	37.7	20.3	*35*
					ns
Language	Only/Mainly English spoken	43.0	33.6	23.4	*2414*
	Only ½ English – No English spoken	38.7	37.1	24.2	*211*
					ns
Season	Autumn born	57.5	26.0	16.5	*717*
	Winter born	46.2	30.5	23.3	*705*
	Spring born	34.3	39.7	26.0	*401*
	Summer born	29.6	39.3	31.1	*603*
	Adjusted $F = (5.813, 2261.165) = 15.03$; $P(F) = 0.000$				
Cognitive	1st (lowest) quintile	18.6	30.7	50.7	*447*
ability	2nd quintile	31.2	38.2	30.6	*491*
	3rd quintile	41.8	40.5	17.6	*499*
	4th quintile	53.2	33.2	13.5	*537*
	5th (highest) quintile	63.4	29.1	7.5	*530*
	Adjusted $F = (7.128, 2772.780) = 35.01$; $P(F) = 0.000$				
Behaviour	No diffs. at 5	47.4	34.3	18.3	*1805*

(*Continued*)

Table A6. (*Continued*).

		Top set %	Middle set %	Bottom set %	Overall N (100%)
(parent rated)	Difficulties at 5	30.9	33.9	35.2	*640*
	Adjusted $F = (1.931, 751.128) = 32.64$; $P(F) = 0.000$				
LS illness	No illness	44.4	33.9	21.7	*2128*
	Long standing illness	35.9	33.4	30.7	*496*
	Adjusted $F = (1.976, 768.655) = 7.38$; $P(F) = 0.001$				
Family characteristics					
Family type	Two natural parents	46.9	34.0	19.1	*1799*
	Lone parent (0, 7)	31.5	28.2	40.3	*211*
	Lone parent (7)	35.4	36.3	28.3	*279*
	Step/other (0, 7)	35.2	33.3	31.5	*241*
	Adjusted $F = (5.771, 2245.103) = 7.78$; $P(F) = 0.000$				
Poverty	No poverty	48.1	33.3	18.5	*1605*
	Poverty at 5 or 7	33.7	36.5	29.8	*398*
	Poverty at 5 and 7	32.4	34.4	33.2	*530*
	Adjusted $F = (3.866, 1504.008) = 12.94$; $P(F) = 0.000$				
Work	Parent in work	45.8	33.8	20.4	*2253*
	No parent in work	25.3	33.9	40.8	*372*
	Adjusted $F = (1.950, 758.408) = 29.12$; $P(F) = 0.000$				
Highest qualification (mother)	No quals/NVQ1	31.1	29.8	39.1	*448*
	NVQ2	40.4	34.4	25.2	*725*
	NVQ3	45.2	35.2	19.6	*380*
	NVQ4/5	49.7	34.8	15.6	*994*
	Overseas quals. only	36.5	32.6	30.9	*77*
	Adjusted $F = (7.631, 2968.621) = 9.84$; $P(F) = 0.000$				
Tenure	Home owner	47.9	33.8	18.3	*1790*
	Rent	32.3	34.2	33.5	*767*
	Other	36.8	30.8	32.5	*65*
	Adjusted $F = (3.927, 1527.693) = 15.31$; $P(F) = 0.000$				

Table A7. Cognitive assessments carried out with MCS children at age 5 and age 7.

Assessment name	Assesses	Method
Age 5		
BAS – Picture Similarities	Non-verbal reasoning	Child is shown a row of 4 pictures and is given a card with a 5th picture. The child places the card under the picture which shares an element or concept with the card
BAS – Naming Vocabulary	A verbal task which concerns knowledge of names	Child is shown a picture and asked to say its name
BAS – Pattern Construction	Non-verbal reasoning and spatial visualisation	Child constructs a design by putting together flat squares or solid cubes with black and yellow patterns on each side

(*Continued*)

Table A7. (*Continued*).

Assessment name	Assesses	Method
Age 7		
BAS – Word Reading	Used to establish whether the child can recognise printed words	Child reads aloud words on a printed list
BAS – Pattern Construction	Non-verbal reasoning and spatial visualisation	Child constructs a design by putting together flat squares or solid cubes with black and yellow patterns on each side
Progress in Maths	Children complete various number based tasks, covering the topics of numbers, shape, space, measures and data handling	Child completes a series of mathematical problems