The Impact of Streaming on Attainment at Age Seven: Evidence from the Millennium Cohort Study

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Abstract

This paper investigates the relationship between stream placement and the academic progress made by children in England in Year 2 of primary school drawing on data from the longitudinal Millennium Cohort Study (MCS), which originally sampled nearly 19,000 children and their families born across the UK around the turn of the century. Based on an analytic sample of 2,544 cohort members, academic progress was compared between children at school in Year 2 in England in the 'top' middle' or 'bottom' streams and among the majority of non-streamed children. Multiple linear regressions took into account child, family and school characteristics and showed that stream placement significantly impacted on the academic progress made by children. Children in the 'top' stream achieved more and made significantly more academic progress than children attending schools that did not stream while children in the 'middle' or 'bottom' streams achieved less and made significantly less academic progress. The reasons for this and the educational implications are discussed.

Introduction

Recent evidence showing an increase in structured ability grouping in children aged 7 in the primary school in the UK (Hallam and Parsons, 2013a, 2013b), at a time when there is political pressure to raise educational standards, indicated a need for research to assess the relationship between stream placement and the academic progress of young children. In this study, Millennium Cohort Study (MCS) data relating to children born in the year 2000/1 were used to investigate the relationship between stream placement in Year 2 in primary school and children's academic progress during Key Stage 1 when children are aged 5 to 7 years taking account of other key child, family and school characteristics.

Grouping pupils by ability within schools has been the subject of research for over a hundred years. Most of the research has focused on secondary education and suggests that, overall, ability grouping, 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. Kerckhoff 1986; Ireson et al. 2002; Wiliam and Bartholomew 2004; Schofield 2010). International reviews of the impact of ability grouping on attainment at secondary level have had mixed results. This is in part because of the different contexts in which schools operate and also because there are many confounding factors including teacher attitudes, decisions and practices (Hallam and Ireson, 2003; 2005) and child characteristics. Particularly important in this respect are the way that group placements tend to lead to those of lower socio-economic status, from minority ethnic groups, boys and children born in the Summer being placed in low ability groups (Barker Lunn 1970; Hallam and Parsons, 2013a; 2013b; Commission for Racial equality, 1992; Troyna & Siraj-Blatchford, 1993; Gillborn and Youdell, 2000). Being in a class with high attaining peers has a positive impact on the attainment of all pupils, high

(Opdenakker and Van Damme, 2001; Opdendakker et al., 2002) and low attaining (Duru-Bellat and Mingat, 1998; De Fraine, et al., 2003; Zimmer and Toma, 2000) so these children are particularly disadvantaged.

Also important are the substantial differences in the curriculum taught between high and low groups (Schofield, 2010) which, in the UK, contribute to differential rates of entry to tiered examinations placing a cap on levels of achievement (Strand, 2012). Some research has suggested that the curriculum content taught in ability groups is what differentiates achievement (Carbonaro and Gamoran, 2002; Gamoran, 1986; Lee et al., 1993; Rumberger and Palardy, 2005). In most studies ability grouping and curriculum differentiation are inter-related and it is not possible to separate out the impact of each. The combination of these consistently widens the gap between initially high and low achievers as the high achievers work at a faster pace and cover more material in greater depth (Gamoran and Berends, 1987; Hallinan and Kubitschek, 1999; Oakes et al., 1992). These factors combined enhance the attainment of high achieving pupils (e.g. Callahan, 2005; Carbonaro and Gamoran, 2002).

Other factors which have been suggested as being important in the way that ability grouping affects attainment are the expectations which placement in a particular ability group can engender. Early research in primary schools suggested that parental expectations were important (Barker Lunn, 1970), although, recently, Hallam and Parsons (2013a; 2013b) showed that the educational involvement and aspirations of parents for their offspring at age 7 was high across all ability groups. However, there were differences in the level of support offered in relation to reading at home or enjoying listening to or doing things with their child. Those parents with children in the bottom ability groups were much less likely to engage with these

activities. These families were also significantly less likely to have access to a computer or internet at home although the children were more likely to have a TV in their bedroom.

Pupils may also have low expectations of themselves if they are in a low ability group (Gamoran, 1986). At primary school there is evidence that pupils assess their prospects based on their placement demonstrating understanding and acceptance of the rationale for grouping adopted by their school particularly in relation to the provision of work at an appropriate level (Hallam et al., 2002; Hallam et al., 2004b).

Ability grouping also impacts on the expectations held by teachers for their students. This in turn affects the way that they teach and the content of what is taught even within the context of a National Curriculum (Hallam and Ireson, 2003; 2005). Teachers believe that they are matching instruction to the level of the students' ability but pupils frequently perceive mismatches (Hallam et al., 2002; 2004b).

The impact on aspirations is exacerbated by the lack of movement between groups. While recent evidence suggests that in the UK, most pupils may be initially placed in ability groups in primary schools on their current performance on cognitive tests (Hallam and Parsons, 2012a; 2012b), there are exceptions where many different factors influence grouping placements including social relationships between pupils, gender, behaviour, the physical aspects of the classroom and class size (Davies et al., 2003; Hallam et al. 2002). This can lead to group allocation that is inappropriate in terms of the child's academic attainment (MacIntyre and Ireson, 2002). Once in a particular ability group it can be difficult to move out of it even when performance is regularly assessed. For instance, Barker Lunn (1970) showed that 15% of children

were in the wrong stream at the end of the school year on the basis of English and arithmetic performance but only a quarter of these were moved into the correct group.

Research on the impact of ability grouping on attainment in the United Kingdom

Early research in the United Kingdom, where curriculum differentiation occurred alongside ability grouping tended to support a divergence hypothesis suggesting that homogeneous ability grouped systems (streaming) in schools produced greater differences between lower and higher ability pupils while heterogeneous systems (mixed ability) reduced differences (Kerckhoff, 1986; Lacey, 1970; 1974; Newbold, 1977; Postlethwaite and Denton, 1978; Linchevski and Kutscher, 1998). More recent research, undertaken at a time when all pupils in England followed a National Curriculum, reducing the impact of curriculum differentiation, and also when students were typically in mixed ability classes with ability grouping for some subjects (known as setting) has produced mixed findings depending on the sampling, methodology and focus adopted. At Key Stage 3 (age 11-14), Venkatakrishnan and Wiliam (2003) studied 'tracked' grouping in a mathematics department in a co-educational comprehensive school in Greater London and showed that placement in mixed ability groupings was advantageous for low attaining pupils with relatively little disadvantage to higher attaining pupils. At Key Stage 4 (age 14-16), based on data from 955 students in 42 classes in six schools in London, over a 4-year period, Wiliam and Bartholomew (2004) explored the impact of setting on General Certificate of Secondary Education (GCSE) performance and supported a divergence hypothesis, while Ireson et al. (2005) in a study involving 45 schools found that students of similar ability achieved higher GCSE grades when they were placed in higher sets. Overall, this suggests that other factors mediate the impact of ability grouping on student attainment, for instance, the curriculum, teachers' attitudes,

pedagogy, student motivation and the misplacement of students in sets (Dunne et al., 2007; Hallam and Ireson, 2005; 2007).

Studies of the impact of ability grouping in the primary school

At primary level, there has been much less research focusing on the relationship between ability grouping and attainment and such as there has been has tended to be based on small samples. Early research focused on streaming (where pupils are placed in a class based on general ability and are taught in that class for the whole time) had mixed results. Daniels (1961) found a higher average level of attainment in non-streamed schools which was accompanied by a gathering of scores around the mean. This appeared to be caused by an increase in standards of the less able rather than the holding back of the more able. Blandford (1958) found similar results with a greater spread of scores in streamed schools. Douglas (1964) examining pupils' progress in streamed schools found that children in the lower streams made much less progress relative to the top streams, while the most comprehensive study (Barker-Lunn, 1970) comparing pupils in 36 streamed and 36 non-streamed primary schools found no difference in the average academic performance of children of comparable ability and social class in streamed or non-streamed schools. A follow up study two years later, showed no difference in performance at secondary school in relation to prior streaming in the primary school (Ferri, 1971). International reviews at primary level (Slavin, 1987; Kulik and Kulik, 1987, 1992; Kulik 1991) have also indicated that streaming has little impact on average pupil attainment. The inconsistencies in the research findings can be explained in relation to the extent to which the curriculum was differentiated between streams; teacher expectations, the quality of the teaching; and the predominance of those of low socio-economic status in the lower streams.

There has been some research in the UK on the effects of setting on attainment (where pupils are taught in mixed ability classes but ability grouped for some subjects). Self reports from six primary schools suggested that the effects were mixed (Hallam et al. 2004a), 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 benefitted the less able pupils but attainment of the more able did not suffer. In case studies of 12 primary schools, Kutnick et al. (2006) compared KS2 (aged 7-11) outcomes in relation to local authority and national levels. The schools varied in their performance. The authors concluded that 'case schools that used setting rarely performed at KS2 levels higher than their local education authority or national averages in those subjects; these schools were generally associated with negative value-added and subject scores locally and nationally. Case schools that used mixed ability to organise class grouping were generally associated with positive value-added, but this was not consistent across all of the case schools' (pp 45). Taken together, the findings suggest that setting does not consistently raise attainment.

The incidence of ability grouping in the primary school in the UK

There has been no recent research with a specific focus on the impact of streaming on attainment in the primary school since streaming (or tracking as it is sometimes known) is rare in primary schools internationally (Koerselman, 2011). In the UK, it declined during the 1960s and by the 1970s, only about 20% of schools chose to stream (Bealing, 1972; DES 1978). With the demise of the 11+ examination and the spread of comprehensive secondary education, mixed ability classes became the norm in primary schools. By the 1990s, the incidence of streaming had declined to less than 3 per cent (Lee and Croll, 1995) and during the 1990s, as schools were encouraged to adopt setting (DfE Report, 16/93; DfE, 1997) a study of 2000 primary schools showed streaming remained at a relatively low level (Hallam et al., 2003).

However, recent research based on the Millennium Cohort Study (MCS) when the children were aged 7 found that streaming appeared to be on the increase. The findings showed that 11.2% of cohort children in Northern Ireland were streamed, 19.5% in Wales, 16.8% in England and 15.6% in Scotland (Hallam and Parsons, 2013a). This increase in streaming indicated a need to establish the impact of this on attainment in the current educational context.

The current study

Using the MCS data this study aimed to establish the impact of streaming on Key Stage 1 (KS1) attainment at age 7 with a particular focus on the impact on pupils in different ability groups. It was expected that there would be a divergence in performance with greater improvement in those children in the higher ability groups in comparison with those in the lower groups. The range of data about individual children and their family backgrounds included in the MCS also enabled a range of risk and protective factors not taken account of in previous research to be included in the analysis, for instance, prior education attainment, health, behaviour, the child's school experiences, parental level of education and interest in their child's education, in addition to those already identified, for instance, socio-economic status, gender, season of birth and ethnicity. The specific research questions addressed were:

— Does being placed in a high, middle or bottom stream impact on children's KS1 attainment at age 7? If so which children are disadvantaged or advantaged by their placement?

— What are the risk and protective factors related to attainment at KS1?

Data and methods

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.

Five surveys of cohort members have been carried out so far – at nine months, three, five, seven and 11 years. The next round of date collection will take place in 2015 when the children will be 14. In the fourth survey (MCS4) when cohort members were aged seven, information was collected on 14,043 children from 13,857 families of which more than 8,800 families lived in England. Ninety percent of families participating in the three previous MCS surveys also participated at age seven. Information was gathered 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. This research focused on children in families in England where information on streaming had been provided by their primary school teacher and administratively linked Foundations Stage Profile scores and Key Stage 1 results from the National Pupil Database (NPD) were available.

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. Teachers were asked about streaming and setting in the study child's year. The definition provided for teachers was as follows: 'We are interested to know about groupings **between** and **within** classes in this child's year. Some schools group children in the same year

by general ability and they are taught in these groups for most or all lessons. We refer to this as **streaming.** Some schools group children from different classes by ability for certain subjects only and they may be taught in different ability groups for different subjects. We refer to this as **setting**. Other schools do not group children by ability **between** classes. Sometimes this may be because there are not multiple classes in the year.' Three follow on questions asked if the child was streamed, how many streams there were and whether the child was in the top, middle or bottom streams.

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; specifically 64% of children in England had a questionnaire returned by their teacher. Parents were asked about characteristics of the school in terms of single or mixed sex, fee-paying and faith. For further details of this profile see Hallam & Parsons (2013a).

Administrative data

Administrative data from the National Pupil Database (NPD) were merged with the MCS data providing records of individual achievement for children at school in England up to the National Curriculum Key Stage 1 (aged 7). Foundation Stage Profile scores and Key Stage 1 results were available for 6,411children in England (for details see below). School intake characteristics were also available, specifically the percentage of students in a school with special education needs (SEN) or in receipt of free school meals (FSM).

Foundation Stage Profile

For children at school in England these assessments are made on the basis of the teacher's accumulating observations and knowledge of the whole child. By the end of the final year of the foundation stage, the Foundation Stage Profile (FSP) provides a way of summing up that

knowledge. It captures the early learning goals as a set of 13 assessment sub-scales, each of which has a scale of 0 to 9 points (for further details see Foundation Stage Handbook, QCA, 2003). These scores have been administratively linked from the NPD. The scores from all scales were summed and then standardised to have a mean of zero and a standard deviation of 1.

Key stage 1 assessments

The national curriculum is a set of subjects and standards used by schools to ensure that children are taught the same curriculum. It covers what subjects are taught and the standards children should reach in each subject. The national curriculum is organised into blocks of years called 'key stages' (KS). At the end of each key stage, a child's teacher formally assesses their performance to measure a child's progress. At the end of Key Stage 1 (Year 2, aged 7) children at school in England are assessed by their teacher, with the help of informal tests, in reading, writing, maths and science. Points are allocated to a child based on their performance, or the 'level' they achieve. Assessments at 'key stages' are used to measure a child's progress compared with other pupils of the same age across the country. Key Stage 1 average point scores range from three (working towards level 1) through to 27 (level 4 or higher).

Sample and analysis strategy

The analysis was based on children in England who were in Year 2 at school at the time of (parental) interview with a completed teacher questionnaire that included information on streaming (n = 4,770 children). It was further restricted to those for whom Foundation Stage Profile and Key Stage 1 assessment scores were available (n=3,917) and by non-response at the item (individual question) level in the longitudinal dataset and the availability of school characteristics administratively linked from the NPD (n=2,544). Of these children, 83%

(n=2,098) were not streamed, 8% (n=222) were in the 'top' stream, 5% (n=130 in the 'middle'

stream and 4% (n=94) in the 'bottom' stream. The 446 'streamed' children were in 307

different primary schools across England.

The data were analysed using descriptive statistics and linear multiple regression models on

KS1 reading and maths scores and an overall score based on performance in the four KS1

assessments: reading, writing, maths and science. The descriptive statistics allowed us to

assess the strength of the direct association between stream placement and performance in the

KS1 assessments, before controlling for a wide range of child, family and school characteristics

to assess whether this association was largely due to, for example, the child's earlier academic

ability[1], their gender, parental education level or school intake. The measures selected into the

models have been previously shown to be associated with either stream placement or child

cognitive outcomes (e.g. Hallam and Parsons 2013a; Schoon et al, 2012).

As performance in individual KS1 assessments (e.g. reading and maths) is categorical rather

than being truly linear, for robustness we estimated an ordered logit regression model and

found that the same set of factors were significantly associated with KS1 scores. We present

the linear multiple regression results for ease of interpretation. In total, eight separate

regression models were run for each of the KS1 outcome scores. The modelling strategy is

outlined below in Table 1, and Table 2 details the specific measures included in each

regression model.

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

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[1] Note that since we control for prior cognitive ability of the child the model is akin to a "value added" model.

statistical models. A further set of weights is typically applied to adjust for differential non-response across the various sweeps (for further details see Ketende 2010; McDonald and Ketende 2010; Plewis 2007). All data analysis was carried out in STATA 12. Specific weights to account for non-response to the different survey components of MCS4 have not been calculated. Table 1A in the appendix details the response bias in our analytic sample compared to the complete MCS4 sample living in England over a number of key variables. As in all longitudinal studies (e.g. Elliott & Shepherd, 2006) the more affluent and privileged were more likely to have continuously participated and the more disadvantaged to have dropped out, either permanently or intermittently. As such, our analytic sample held more English speaking, white, two-parent families who were both working than the MCS4 sample of families in England.

[insert Table 1 and Table 2 here]

Results

The overall average MCS results at KS1 were slightly higher than the national average for England in 2008 (DfE, SFR 21/2008). For reading they were 16.0 compared with the national average of 15.6, for mathematics 16.1 as compared with 15.8 and for science 15.9 compared with a national average of 15.5. Only for writing was the average score the same as the national average, 14.2.

Figure 1 shows the average KS1 point scores in the four subjects for MCS children by stream, including for the majority of children who were not streamed. We can see that being in both the middle or bottom stream was associated with lower academic attainment across all four assessments, although maths ability appeared to be most strongly affected, and being in the top stream was associated with higher academic attainment.

[insert Figure 1 about here]

Multiple regression analyses

The estimated multiple correlation coefficient, R, shows the strength of the relationship between a set of predictor variables (i.e. streaming and child characteristics) and an outcome (i.e. KS1 scores). R has a range of 0 to 1. The closer to 1, the stronger the relationship is between the predictors and the outcome. R^2 takes this further, giving the actual percentage of variation in the outcome measure that has been explained by the set of predictor variables included in the model.

A standardised regression coefficient [β] is also calculated for each predictor. These give the strength of the relationship between any *one* predictor, i.e., streaming and the outcome, while holding constant the effect of the other predictors (i.e. child, family and school characteristics). The regression coefficients range between -1 to +1. Using 'top' stream as an example, the further from zero that β is, the stronger the relationship between 'top' stream placement and the outcome. A positive score (towards +1) tells us that being in the top stream has a positive association on the outcome, while a negative score (towards –1) indicates a negative association. Standardised regression coefficients do not directly indicate the effect of a unit change in the outcome, they rather represent change in terms of standard deviations. The predictor with the biggest regression coefficient is the most important predictor of the outcome, regardless of the direction of the relationship.

We include a bar chart for each of the KS1 scores(see Figures 2-4) that gives the standardised beta coefficient representing the relationship between being in the top, middle or bottom stream and the KS1 performance scores for each of the eight separate multiple regression models described earlier. A bar with a value greater than 0 indicates that children who were streamed had higher scores than children who were not streamed; a bar with a value less than 0 indicated that children who were streamed had lower scores than children who were not streamed. The

greater the value of a bar, in either direction, the stronger the association between the stream a child was in at school and their performance in the KS1 assessments. If a bar has a solid colour it is because this relationship was statistically significant (usually $p < .001$, but always $p < .05$). If the bar was empty (white) the relationship was not statistically significant – in other words, there was no evidence to suggest that young people who were streamed had significantly lower scores in the KS1 tests) than children who were not streamed.

Predictors of Key Stage 1 performance

The results from the final model (Model 8) are now discussed. We draw attention to the measures which remain independently associated with academic progress shown by performance in the KS1 assessments.

Streaming

The findings provided evidence of a relationship between being placed in the top, middle or bottom streams (compared to children who were in schools that did not stream) on Key Stage 1 scores (Model 1). Once child characteristics, such as previous academic attainment, gender, age, health, etc, were controlled for (Model 2), the size of the bar was reduced. This indicated that the relationship between streaming and KS1 reading was, to a certain extent, explained by other child characteristics – however being in the 'top' stream retained a significant positive association with all KS1scores and being in the 'middle' or 'bottom' stream retained a significant negative association with KS1 reading and overall performance scores. Being in the middle stream lost its significant relationship with maths performance scores once child characteristics were accounted for. However, in all other models including family socio-economic characteristics, such as parental education, income, health, etc, (Model 3) and other potential protective factors (Models 4 to 7) the association with stream placement remained

significant for the three KS1 measures, with the size of the standardised coefficients often unchanged from its original size (Model 1). Critically, the final model (Model 8) which included all child, family and school characteristics included in Models 2-7, showed that an independent effect of stream placement on KS1 scores was maintained. The relationship only lost its statistical significance for KS1 maths scores for children in the middle stream. Table 2A in the appendix provides the results for the three final models (Model 8).

Child characteristics

Of all the different measures included in the models, the child's own characteristics were the most important for reducing the association between streaming placement and academic progress. The child's earlier academic performance, as measured by the Foundation Stage Profile (FSP) score, was identified as the most significant predictor of later academic attainment as measured by KS1 performance. Behaviour difficulties, as measured by the Strengths and Difficulties Questionnaire (Goodman, 1997) were negatively associated with KS1 scores and being born in the Winter, Spring or Summer compared with being born at the start of the academic year in Autumn was negatively associated with later academic progress in KS1 maths, and being born in Spring and Summer for overall KS1 performance. There was no relationship with season of birth and KS1 reading. Higher birth weight was positively associated with KS1 reading, maths and overall scores, whereas being female was positively associated with KS1 reading and negatively associated with KS1 maths. For the overall score, gender was non-significant. Furthermore, once all measures were controlled for, being white was, perhaps surprisingly, negatively associated with KS1 reading and overall performance.

Family socio-economic characteristics

Among the family socio-economic characteristics, parental education remained significantly associated with the KS1 outcomes, after controlling for all other variables in the model.

Household income appeared to be an independent risk factor for overall KS1 performance , as did lone parenthood for KS1 maths attainment.

Child's school experiences

The child liking school was positively associated with performance in KS1 assessments. The child liking playing with friends at school had no association with KS1 scores.

Parenting behaviour and Home-Learning environment

Joint family activities were positively associated with KS1 scores as was being taken to a library for performance in KS1 maths.

Parental engagement with the school

Parental interest in their child's education was significantly related to KS1 performance in addition to and above the other variables included in the final models.

School Characteristics.

The percentage of children with special education needs (SEN) or receiving free school meals (FSM) had no significant association with KS1 performance in the final models.

[insert Figures 2 to 4 about here]

Discussion

Using the data from the MCS has enabled this research to demonstrate with a relatively large sample of children from a range of different school environments that those placed in middle or bottom streams do less well in KS1 reading and overall KS1 performance, and children in bottom streams do less well in KS1 mathematics than similar children in mixed ability classes and that those in the top streams do better. These differences have developed over a short period of time, since the children began compulsory schooling. The findings support the divergence hypothesis (e.g. Linchevski and Kutscher, 1998) which is of particular concern

given that prior teacher rated ability at age five was taken into account, along with a range of child and family and school factors. This raises a number of interesting issues, not least, why this might have occurred given that providing children with work matched to their needs through ability grouping, logically, should enhance the performance of all children.

There are a number of factors which may contribute towards the widening gap in attainment which emerges in highly structured ability grouping systems. As outlined earlier, existing research suggests that ability grouping impacts on the expectations held by teachers for their pupils which in turn affects curriculum content and the teaching methods adopted even in a context where there is a National Curriculum (Hallam and Ireson, 2003; 2005). This in turn affects pupils' aspirations and expectations (Gamoran, 1986; Hallam et al., 2004b). Parents' aspirations are also affected with children in the bottom streams having lower aspirations, being less likely to want their child to stay on for post-compulsory education than parents of children in middle or top ability groups (Hallam and Parsons 2013a). Finally, working with high attaining peers has a positive impact on the attainment of all children whether they are high or low attaining initially (Opdenakker and Van Damme, 2001; Opendakker et al., 2002; Duru-Bellat&Mingat, 1998; De Fraine, et al., 2003; Zimmer and Toma, 2000). Streaming therefore advantages those who are already high attainers, disadvantaging those who are placed in middle and lower groups who are deprived of opportunities for working with those who are more advanced. Streaming is particularly pernicious in this respect as no opportunities are afforded for such interactions in contrast with setting, which allows such interactions to occur in some subjects. Overall, being placed in a stream and the subsequent consequences of that have implications for curriculum content, pedagogy and the expectations and aspirations of pupils, teachers and parents.

The risk and protective factors in relation to attainment at KS1 which emerged in the research confirmed much earlier work. As expected, levels of parental education, household income, interest in education and the home learning environment were positively associated with high performance overall, while lone parenthood led to poorer maths attainment. Children with behaviour problems and low birth weight tended to perform less well than their peers. Girls outperformed boys on tests of reading while boys outperformed girls in mathematics and children with more positive attitudes towards school had higher attainment levels. Interestingly, date of birth was relevant for performance in mathematics but not reading. Why this might be the case requires further research.

In the current analysis, ethnicity was related to performance at KS1 but it was being non-white which was associated with higher performance. This reflects the national picture where there has been considerable improvement in the performance of some non-white groups at KS1 in recent years which has not been matched with the same level of improvement in some white groups (DfE, 2013). The lack of statistically significant over-representation of ethnic minorities in lower ability groups in previous research based on the same MCS data (Hallam and Parsons, 2013a) suggests that in placing children in ability groups schools may have taken account of previous biases and taken steps to avoid them.

Of course there are limitations to this study. There is an imbalance in size between the mixed ability and ability grouped samples. The lack of KS1 attainment data for Wales, Scotland and Northern Ireland limited the analysis and therefore the extent to which the findings can be generalised beyond England. The nature of the MCS data also mean that issues relating to school ethos, the quality of teaching, the extent of curriculum differentiation between groups and

teachers' expectations of pupils were not able to be addressed by the analysis. However, what the data do indicate is the need for these issues to be addressed with other research.

Implications

What are the implications of streaming for national educational aims? The data suggest that streaming undermines the attempts of governments to raise attainment for all children whatever their socio-economic status. The white paper 'The Importance of Teaching' points out that 'Many countries have much smaller gaps between the achievements of the rich and poor than we do' and goes on to suggest that schools in England should be attempting to reduce this gap. Data from the MCS indicate that those of lower socio-economic status, as identified across a number of measures, tend to be disproportionally placed in lower streams (Hallam and Parsons, 2013a) with consequences for attainment. International comparisons also suggest that where early educational selection is in place there tend to be higher levels of social segregation (Green et al., 2006; OECD, 2001) and reduced intergenerational mobility (Brunello and Checci, 2006; Maurin and McNally, 2008). Overall, the evidence indicates that streaming, particularly where it begins at a very early age, is likely to be counterproductive in reducing the attainment gap.

Current government policy supports increased freedom for schools in determining what is best for their pupils (DfE, 2010). This includes the kinds of pupil grouping that they adopt. Primary schools adopt structured ability grouping to: attempt to raise standards; match work to pupil needs; meet the demands of different curriculum subjects; make the best use of teacher expertise; enhance literacy and numeracy; and address issues of accountability to external bodies. In making these decisions other factors are important including school and class size, resources, timetabling and school ethos. Overall, school staff are, on the whole, not

ideologically biased in making such decisions but focused on raising standards and managing practical issues in the school environment (Hallam et al., 2002; 2004a). The evidence from this and earlier research demonstrates that streaming does not of itself raise attainment for all children (e.g. Barker Lunn, 1970; Ferri, 1971) and widens the gap between low and high attaining pupils. Schools need to take this into account when planning the ability grouping structures that they adopt.

To conclude, this research based on MCS, has raised issues relating to the impact of streaming on the attainment of children in England. In the long term the MCS will also provide the opportunity to follow the progress of these children as they continue with their education and move into the work force. This will provide the opportunity to answer questions about the long term impact of streaming which earlier research has been unable to do.

Figure 1: average Key Stage 1 assessment scores by stream placement
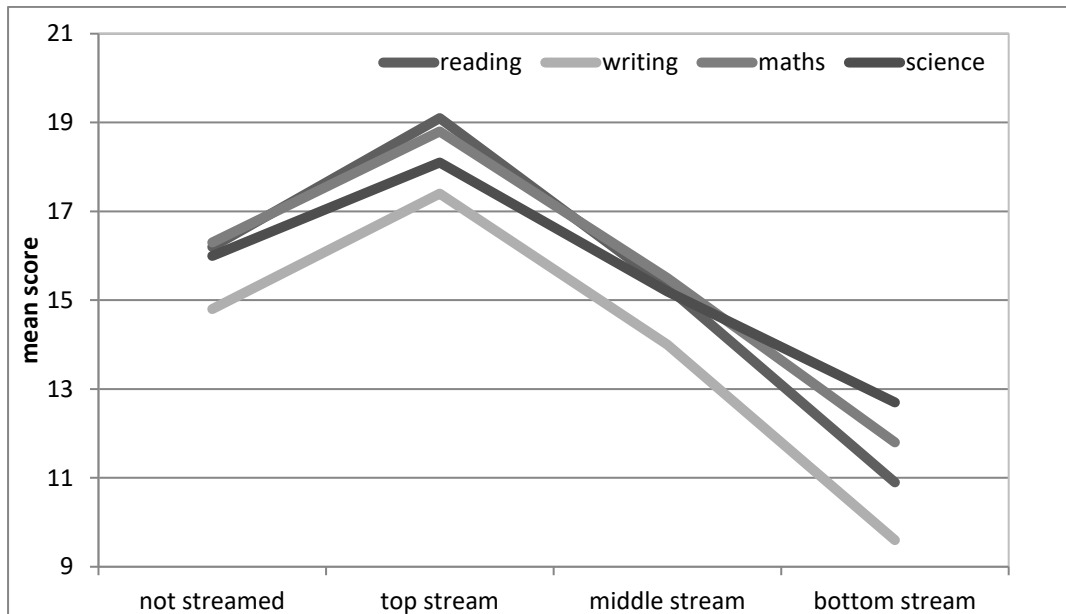

Figure 2. Predicting KS1 reading scores (Standardised Beta coefficients of the multiple regression models)
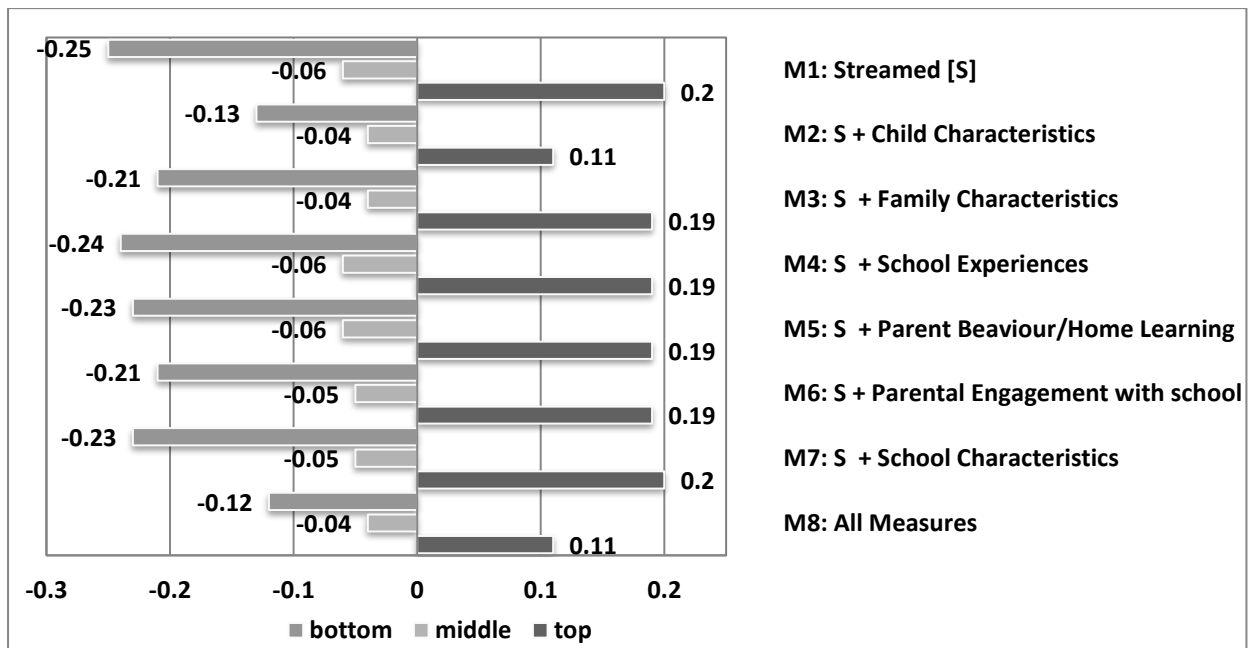
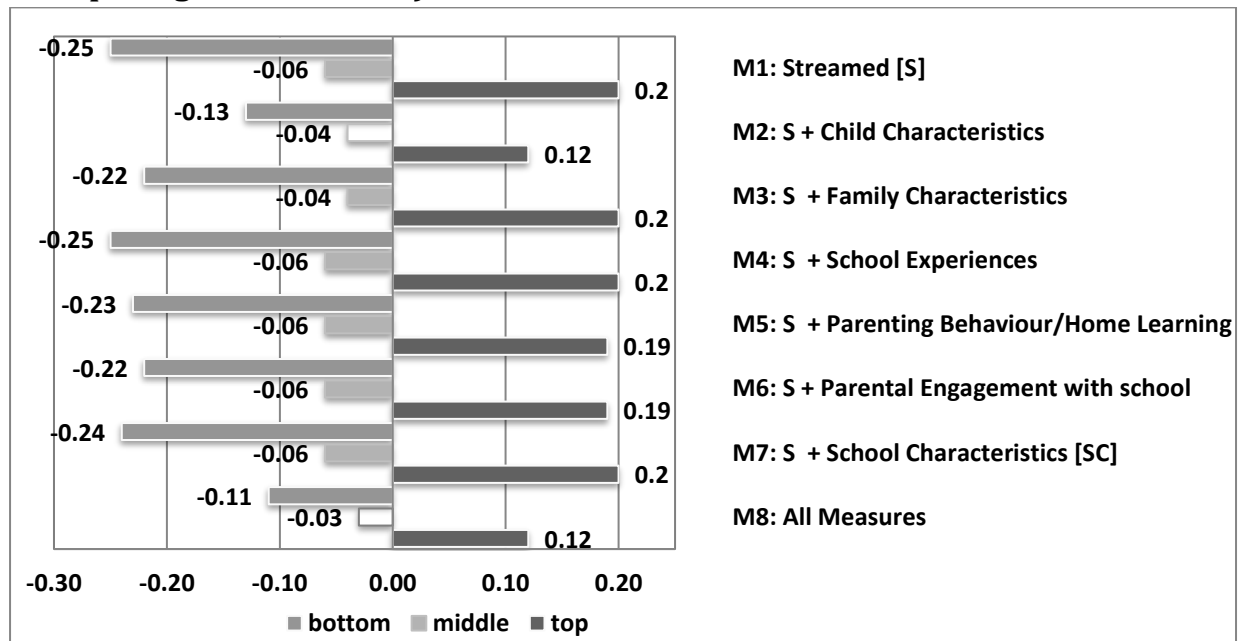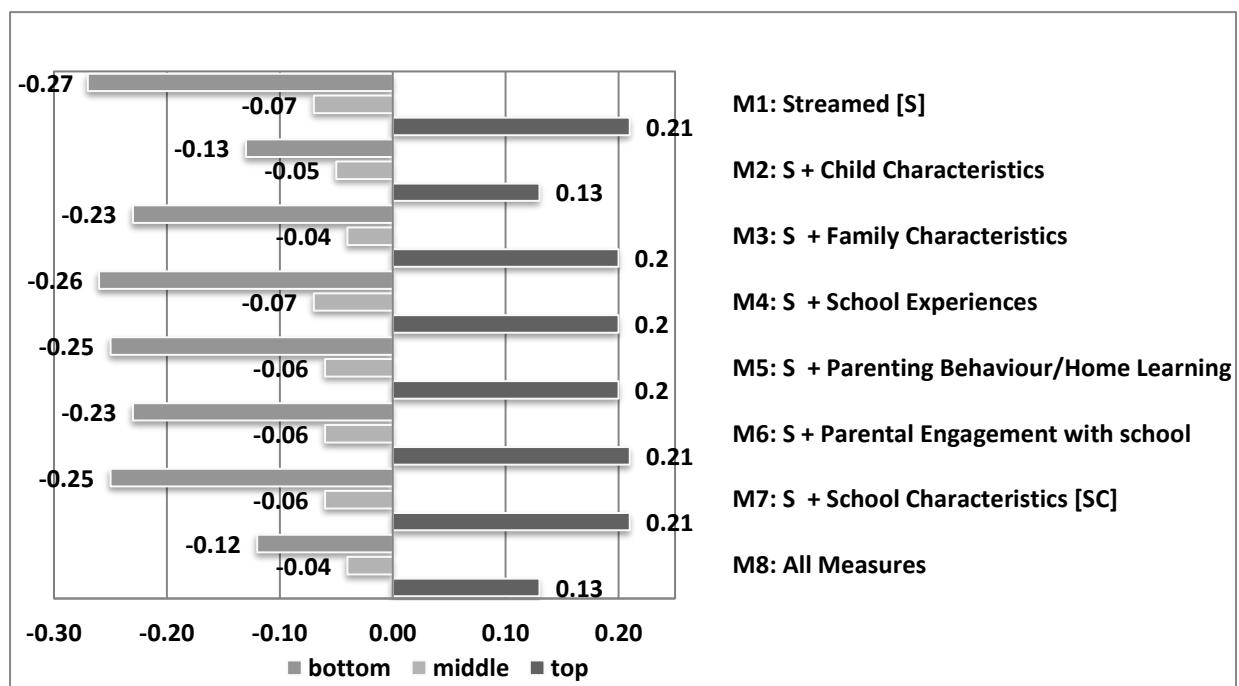**Figure 3. Predicting KS1 maths scores (Standardised Beta coefficients of the multiple regression models)**

M1: Streamed [S]

M2: S + Child Characteristics

M3: S + Family Characteristics

M4: S + School Experiences

M5: S + Parenting Behaviour/Home Learning

M6: S + Parental Engagement with school

M7: S + School Characteristics [SC]

M8: All Measures

Figure 4. Predicting KS1 overall scores (Standardised Beta coefficients of the multiple regression models)

M1: Streamed [S]

M2: S + Child Characteristics

M3: S + Family Characteristics

M4: S + School Experiences

M5: S + Parenting Behaviour/Home Learning

M6: S + Parental Engagement with school

M7: S + School Characteristics [SC]

M8: All Measures

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