

University of Warwick institutional repository: <http://go.warwick.ac.uk/wrap>

This paper is made available online in accordance with publisher policies. Please scroll down to view the document itself. Please refer to the repository record for this item and our policy information available from the repository home page for further information.

To see the final version of this paper please visit the publisher's website. Access to the published version may require a subscription.

Author(s): Steve Strand

Article Title: Do some schools narrow the gap? Differential school effectiveness by ethnicity, gender, poverty and prior attainment

Year of publication: 2009

Link to published version: N/A

Publisher statement: None

**Do some schools narrow the gap? Differential school effectiveness by  
ethnicity, gender, poverty and prior attainment**

Paper presented to the International Congress for School Effectiveness and Improvement,  
Westin Bayshore Conference Centre, Vancouver, Canada, 4-7 January 2009

Dr Steve Strand

Associate Professor

Institute of Education

University of Warwick

England, UK

Tel: 044 24 7652 2197

Fax : 044 24 7652 4472

e-mail: [steve.strand@warwick.ac.uk](mailto:steve.strand@warwick.ac.uk)

Running Head: Do some schools narrow the gap?

Keywords: school effectiveness, equity, ethnicity, gender, attainment, progress

**Do some schools narrow the gap? Differential school effectiveness by ethnicity,  
gender, poverty and prior attainment**

**ABSTRACT**

This study analysed the educational progress of an entire national cohort of over 530,000 pupils in England between age 7 in 2000 and age 11 in 2004. The results show that Black Caribbean boys not entitled to free school meals, and particularly the more able pupils, made significantly less progress than their White British peers. There was no evidence that the gap results from Black Caribbean pupils attending less effective schools. There is also no evidence of differential effectiveness in relation to ethnic group; schools that were strong in facilitating the progress of White British pupils were equally strong in facilitating the progress of Black Caribbean pupils. There was some evidence of differential school effectiveness by pupil prior attainment, gender and poverty, but the absolute size of the effects were small. The results suggest the poor progress of Black Caribbean pupils reflects a systemic issue rather than the influence of a small number of 'low quality' schools.

## **INTRODUCTION**

Public concern about the educational attainment of ethnic minority groups has been long standing both in the US and UK. The seminal work of the Coleman report (1966) was the first to report a comprehensive collection of nationally representative data across the US. Verbal and non-verbal reasoning, reading and mathematics tests were completed at age 8, 11, 14 and 17. The results revealed a consistent picture where “the black student averages tend to be about one standard deviation below those of whites” (p219). Early work in the UK was summarised in the committee of inquiry into the education of children from minority ethnic groups (Swann report, 1985) which concluded that Black Caribbean children as a group “are underachieving in our education system”. These differences still persist. The most recent US data from the National Assessment of Educational Progress (NAEP) for 2005 reveals that in reading at age 9 a higher percentage of White students (41%) scored at or above Proficient than did their Black (13%) peers, with a similar ethnic difference in mathematics (47% and 13% respectively). Large gaps were also apparent at age 14 and age 18 (KewalRamani et al, 2007). Similarly a recent topic paper from the Department for Education and Skills in England (DfES, 2006) reviewed national test data at age 7, age 11 and age 14 as well as public examinations at age 16. The data reveal consistent differences between ethnic groups in attainment. Broadly speaking, the performance of Black Caribbean, Black African, Black Other, Pakistani and Bangladeshi groups is below that of their White British peers, while Chinese, Indian and Irish pupils score higher than White British<sup>1</sup>.

### **Progress during primary school**

Key questions have concerned the age at which these ethnic gaps first appear, and whether they change over time, that is do gaps increase or decrease during schooling? In an extensive analysis, Phillips, Crouse and Ralph (1998) conclude that Black pupils make less

---

progress than Whites in reading and vocabulary between age 7 and age 11, although they make the same progress in mathematics. An analysis of England national data on pupil progress between age 7 and age 11 also identifies that Black Caribbean, Black Other and Pakistani pupils make less progress than White British pupils, even after controlling for poverty (DfES, 2006)<sup>2</sup>. These ethnic gaps in progress may occur even earlier in the schooling process. Strand (1999) in a study of over 5,000 inner London pupils reported that Black Caribbean and Black Other boys, Black African pupils with high attainment at age 4 and White British pupils entitled to Free School Meals (FSM) all made less than expected progress between age 4 and age 7, after also accounting for age, pre-school education, English as an Additional Language (EAL) and Special Educational Needs (SEN). Fryer and Levitt (2004, 2006) use the Early Childhood Longitudinal Study-Kindergarten (ECLS-K) cohort to report that, once they controlled for a small number of covariates, the Black-White test score gap on entry to Kindergarten was eliminated. Over the first two years of school however the achievement of Black children fell behind their White, Hispanic and Asian peers, and Black children continued to lose ground at age 7 and age 9, on average by 0.1 SD per year relative to Whites. Further research is needed to confirm these longitudinal analyses of progress during primary school, preferably using national populations rather than samples or local area data. This present study addresses this need.

### **Accounting for ethnic gaps**

Any examination of ethnic gaps in educational attainment must take account of the substantial overlap between ethnicity and poverty. Absolute differences in rates of poverty among different ethnic groups have been well established in both the US and in the UK. The US Census reports 8% of Whites living in poverty compared to 11% of Asians, 22% of Hispanics and 25% of both Blacks and Native Americans (US Census Bureau, 2006). In England 14% of White British students are eligible for a free school meal (a commonly used indicator of poverty) compared to 29% of Black Caribbean, 34% of Pakistani, 42% of Black

---

African and 47% of Bangladeshi students (Department for Education and Skills, 2006). Socioeconomic disadvantage may have a direct influence on children's development, for example through limited material resources and an increased risk of a range of health and developmental problems (Spencer, 1996) and an indirect influence through parental education, expectations and aspirations (e.g., Phillips et al, 1998). While few studies have done so, it is also important to explicitly consider interactions between poverty and ethnicity. For example White British 'working class' pupils may show comparable levels of attainment and progress to their Black Caribbean peers (Strand, 1999; 2008). Gender may also interact with ethnicity, with particularly large difference between Black boys and girls. Ethnicity, poverty and gender do not necessarily combine in a simple additive fashion and analyses need to explicitly address interaction effects.

Another frequently proposed explanation, particularly for why ethnic gaps might grow over time, is that Black pupils attend schools of lower quality. This is often evaluated through control for school 'fixed effects' by including in regression equations separate terms for each individual school. For example, Fryer and Levitt (2004) conclude that differences in school quality account for the two-thirds of the growth in the Black-White gap between age 5 and age 7 (although Fryer & Levitt, 2006 do not give the same emphasis to this factor). Wilson, Burgess and Briggs (2005) suggest that school quality account for around half of the Black Caribbean and Black Other groups gaps with White British, and Kingdon and Cassen (2007) also argue that ethnic minority students are more likely to attend worse quality schools. Other studies though reach the opposite conclusion, that school quality is not the issue (e.g., Phillips et. al. 1998; Bali & Alvarez, 2004).

The term 'school quality' when applied to fixed effects modelling is somewhat misleading, since what is actually assessed is school membership. For example when Fryer and Levitt (2004) considered direct measures along traditional dimensions of school quality (such as such as average class size, teachers' qualifications, computer:student ratio etc) there was

no evidence that Black and White pupils attended different quality schools, although the percentage of pupils on FSM was much higher for the schools attended by Black students. In contrast to fixed effects modelling, school effectiveness researchers conceptualise the issue in a different way, by directly modelling whether schools vary in their outcomes for particular groups of pupils (differential school effectiveness). For example are some schools more effective in promoting the progress of more able versus less able pupils, boys versus girls, or some ethnic groups more than others? There is very little research on this phenomenon and current evidence on the existence of differential school effectiveness is mixed. Nuttall, Goldstein, Prosser and Rasbach (1989) and Thomas, Sammons, Mortimore and Smees (1997) both researching in London secondary schools report significant differential school effects in relation to prior attainment and ethnicity, with the White British - Black Caribbean gap varying significantly across schools. Smith and Tomlinson (1989) also report significant differential effects in relation to ethnicity, but conclude they are 'trivial compared with the very large school differences across all ethnic groups' (p305). However other research has failed to find evidence of differential effectiveness. In the Strand (1999) study described above, there was no evidence of differential school effectiveness in progress between age 4 and age 7 by ethnicity, gender or poverty, i.e. the same schools that were more effective for White British pupils, girls or economically advantaged pupils were also most effective for Black Caribbean pupils, boys or economically disadvantaged pupils. Sammons, Nuttall and Cuttance (1993) report similar results in relation to progress between age 8 and age 10, as do Brandsma and Knuver (1989). The only consistent evidence for differential school effects relates to prior attainment, indicated by differences in the slope of the relationship between prior attainment and outcomes across different schools, although even here results are not entirely consistent (e.g. Jesson & Gray, 1991).

In sum very little attention has been paid to the extent to which schools perform consistently across different pupil groupings (Kyriakides, 2004). However the existence of differential effects is particularly important in terms of policy. If schools differ significantly in terms of

their effectiveness for particular pupil groups, then an investigation of factors associated with differential effectiveness is important for the design and implementation of policies on equal opportunities. Of course, as Nuttall et. al. (1989) note, it is those school that narrow the gaps by increasing the attainment of the lower performing group, rather than decreasing the attainment of higher performing groups, that are of special interest.

The research questions addressed in this paper are:

- What are the size of ethnic gaps in attainment at age 11 in a national population study? Do ethnic gaps narrow or widen over the course of primary school (age 7 to age 11)?
- Are analyses of the 'main effects' of ethnicity adequate to describe the data, or do ethnic group, gender and poverty interact, placing qualifications upon average differences in progress by ethnic group?
- What are the characteristics of the schools attended by the majority of Black Caribbean pupils? Do these schools differ in 'quality' from other schools?
- Are schools differentially effective with regards to pupil characteristics such as prior attainment, ethnicity, gender and poverty?

## **METHOD**

### **Sample**

The initial sample was the entire population of pupils in Year 6 (aged 10/11 years) in state-maintained mainstream primary schools in England who completed national end of Key Stage 2 (KS2) tests in summer 2004<sup>3</sup>. This constituted 562,460 pupils from 14,292 schools. To investigate progress during primary school and factors associated with such progress, those without age 7 test scores or valid pupil background data were dropped, resulting in a sample of 534,724 pupils from 14,289 schools.

---



### Dependent variable

Pupils in schools in England complete compulsory tests in the summer term of Year 6 when they are around 11 years old (mean age at testing was 137.5 months, SD 3.5 months). In 2004, pupils completed tests in reading, writing, spelling, mathematics, mental mathematics and science. In each subject area (English, mathematics and science), pupils are awarded a level on the National Curriculum scale which will range from W (working towards level 1) for the lowest attainers to level 5 for the highest attainers. The typical level for a pupil aged 11 years is level 4. An overall indicator of pupil's attainment in the age 11 tests was derived by calculating the average test marks across all tests (total mark range 0 - 280) which was then subject to a normal score transformation to have a mean of zero and SD of 1.

### Pupil background measures

The following pupil-level background variables were available.

*Age* : calculated in completed months at the start of the week in which the age 11 tests were completed. This variable was normalised to a mean of 0 and SD of 1.

*Ethnic group*: Ethnic group was recorded in thirteen main ethnic groups, as indicated in Table 1. For the purpose of the present analysis some extremely small groups (such as Gypsy-Roma and Irish Traveller pupils) have been subsumed within any other ethnic group.

*Gender*: Boys (0) were contrasted with girls (1).

*Entitlement to a Free School Meal (FSM)*: This is a widely used indicator of family poverty since only families with extremely low income are eligible for FSM<sup>4</sup>.

*Special Educational Needs (SEN)*: a binary measure flagging if the pupil was at School Action Plus or Statemented for SEN. Both these stages involve schools seeking the involvement of external agencies and are the most consistent measure of SEN across schools (Strand & Lindsay, 2008).

*Mobility*: Pupils who spent year 3 to year 6 in the same school where they took the age 11 tests were contrasted with those who had entered their schools during the key stage (from January of year 3 onwards). Pupils moving from Infant to Junior schools at the start of year 3, and the small proportion of pupils moving from first to middle schools, were not defined as mobile since typically in these cases the whole cohort transfers *en masse*.

*Age 7 test score*: Pupils complete national tests in reading, writing and mathematics at the end of Year 2 when aged around 7 years. The average score across all three tests was calculated. This variable was normalised to a mean of 0 and SD of 1.

In addition school composition measures were created including the proportion of girls, the proportion of pupils entitled to FSM, the proportion of pupils with SEN, the proportion of mobile pupils, the proportion of pupils with English as an Additional Language, and the school mean age 7 test score and mean age.

## **RESULTS**

### **Descriptive statistics**

Table 1 presents descriptive statistics on the sample. It shows the proportion of pupils within each group for each pupil background variable and also the mean age 11 test score for each group. The results indicate substantial associations between the pupil background variables and age 11 average test score. The strongest associations, not surprisingly, are for prior attainment, with a difference of - 2.2 SD between pupils in the top and bottom quintiles at age 7, and SEN with a difference of -1.3 SD between pupils with and without SEN. There are also substantial associations with poverty with a difference of -.63 SD between pupils entitled and those not entitled to a FSM, for mobility with a difference of -.28 SD between pupils remaining in the same schools and new joiners, and for age with a difference of -.26 SD between autumn born and summer born pupils. There are large differences between

some minority ethnic groups and White British pupils, particularly for Black Caribbean (-.28 SD) and Pakistani pupils (-.37 SD), although these gaps are relatively small compared to those between White and Black pupils noted in much of the US literature (e.g. NAEP, 2005). The gap between boys and girls is small at just 0.08 SD in favour of girls.

Simple descriptive statistics do not take us very far since many of these background variables are confounded (e.g. poverty and ethnicity, as described in the introduction). To determine how these variables relate to educational progress all variables are considered jointly in a multi-level multiple regression model with pupils at level 1 and schools at level 2. The package MLwiN (v2.1) was used for the multi-level analysis.

----- < Insert Table 1 about here > -----

### **Fixed pupil-level effects**

Table 2 presents the fixed effects from the multi-level model. A simple main effects analysis indicated that all the pupil background variables were significantly and independently associated with pupil progress. However previous research suggested good reasons to consider possible interactions within the data, specifically between ethnicity and gender, poverty and prior attainment (Strand, 1999, 2008). All possible interaction terms were included initially, but only those with a strong theoretical base or terms statistically significant at  $p < .001$  and with a large partial eta squared, were retained in the final model. Including these interaction terms only marginally increased the overall  $R^2$  in the model of pupil progress, from 65.1% to 65.3%. However highly significant and substantial interactions between ethnic group, gender and poverty were found.

*Ethnic group by gender.* On average girls scored higher than boys at age 7, but there was no significant gender difference at age 11, indicating that girls made less progress than boys (after controlling for all other variables). However the gender gap was significantly smaller for several ethnic minority groups, in fact for Black African and Black Caribbean groups the

interaction effects of .11 and .12 respectively were actually greater than the fixed girl coefficient of -.10, indicating that in these ethnic groups girls actually made more progress than boys.

*Ethnic group by FSM:* The ethnic group by FSM coefficient for most minority ethnic groups was positive, indicating that the attainment gap in respect of poverty was significantly smaller for most minority ethnic groups than it was for White British pupils. White British pupils entitled to FSM were one of the groups making the least progress while White British pupils from more advantaged backgrounds were one of the highest progressing groups.

----- < Insert Table 2 about here > -----

The coefficients given for ethnic group at the top of Table 2 are relative to the base group which is White British, boys, not entitled to free school meal (and with no SEN, not mobile, of the mean age and prior attainment and at average values for school %FSM and school mean age 7 score). Table 3 uses all the regression coefficients from the model, including the interaction terms, to give an estimate of the amount of progress for each combination of ethnicity, gender and entitlement to FSM, estimated at the mean level of all other controlled variables. The reference group, indicated by a coefficient of 0.00, is White British, boys not entitled to FSM. Black Caribbean girls entitled to FSM made poor progress (-.17) but significantly better progress than White British girls entitled to FSM (-.24). Black Caribbean boys entitled to FSM made only slightly, though statistically significant, poorer progress than their White British counterparts (-.18 vs. -.13) and the same was true of Black Caribbean and White British girls not entitled to FSM (-.13 vs. -.10 respectively). The substantial White British-Black Caribbean gap was among boys not entitled to FSM, where Black Caribbean pupils made significantly and substantially less progress than their White British peers (-.14 vs. .00). It is notable that this pattern does not apply to all 'Black' groups. Thus Black African pupils made better progress than their White British counterparts across all four gender by poverty combinations. Also making relatively greater progress than their White British

counterparts across all combinations were Other mixed heritage groups, Indian, Bangladeshi, Other Asian groups, Chinese and any other ethnic groups.

----- < Insert Table 3 about here > -----

The above estimates are calculated for pupils at the mean age 7 score. However there were also significant interactions between ethnic group and prior attainment. The effect was strongest for Black Caribbean and Black African pupils (see Table 2). For Black Caribbean pupils the gap relative to White British was greater the higher the level of prior attainment, thus it was the highest attaining Black Caribbean pupils at age 7 who were making the least progress relative to their White British peers. A significant three way interaction between ethnic group, age 7 score and FSM indicated that these gaps were particularly pronounced for those pupils not entitled to FSM, as shown in Figure 1. The difference in progress between White British and Black Caribbean pupils entitled to FSM were small, but among those not entitled to FSM Black Caribbean pupils made less progress than White British pupils, and particularly so for those with high prior attainment at age 7. Figure 1 also shows the results for Black African pupils who on average made consistently more progress than Black Caribbean and White British pupils, but with a similar relative decrement as Black Caribbean pupils at higher levels of prior attainment.

----- < Insert Figure 1 about here > -----

Finally a significant gender by FSM interaction (see Table 2) indicates that the better progress of boys over girls was greatest for low and middle prior attainment, while within the top age 7 score quintile girls and boys made equal progress.

### School composition

There were significant effects for several school composition variables but only two variables had an effect size of 0.10 or more when all school composition variables were included simultaneously. Overall progress was poorer in schools with a high proportion of pupil entitled to FSM (ES=-0.15)<sup>5</sup>. Also progress was generally poorer in schools with a high mean age 7 score (ES= -0.09). This is slightly counter-intuitive given previous research on composition effects, but has been previously reported (Strand, 1997). These two school composition effects were over and above the impact of FSM and age 7 score at the level of the individual pupil.

### Variation across subjects

Analyses were also completed separately for English, mathematics and science test marks at age 11. Generally the effects noted above for average age 11 score were consistent across all three subjects, with two exceptions. First, the negative gender coefficient for progress for average age 11 score (-.10) reflects girls making better progress than boys in English (0.17) but poorer progress than boys in Mathematics (-0.25) and science (-0.18). Second, the negative coefficient for Black Caribbean boys entitled to FSM (-0.14) reflects particularly poor progress in mathematics (-0.18) and science (-0.20) but no significant difference in progress relative to their White British peers in English (-0.02). Generally it was notable that Indian, Pakistani, Bangladeshi and Black African pupils all made relatively less progress in Science than they did in either English or mathematics. While these subject differences are important, it is still the case that average age 11 test score is the best predictor of subsequent attainment at age 14 and age 16, both overall and in each of the separate core subjects of the curriculum, including English (Strand, 2006). This warrants the focus on average test score as the key indicator of attainment at age 11.

## **School effects**

In a null model (containing only a constant term at level 1 and level 2), the school level accounted for 12.7% of the variation in age 11 score. Including all pupil level and school aggregate explanatory variables accounted for 66% of the pupil variation and 39% of the school variation. Of the remaining (unexplained) variance in age 11 score the school level accounted for 21%. The variance of the school intercepts was 0.077 (SE=0.004) indicating a highly significant school effect on pupil progress. Direct inspection of school intercepts indicated that in schools at the 5<sup>th</sup> percentile in terms of progress the average pupil made - 0.44 SD less than expected progress, while in schools at the 95<sup>th</sup> percentile the average pupil made 0.42 SD more than expected progress, a difference of 0.86 SD. The school effect on pupil progress was therefore substantial.

A key research question for this paper is differential school effectiveness particularly with regard to Black Caribbean pupils, that is do some schools narrow the gap between Black Caribbean and White British pupils while others widen it? School variation in the White British-Black Caribbean gap can only be directly modelled for schools actually teaching Black Caribbean pupils. To enable such an analysis all schools with three or more Black Caribbean pupils in their Y6 cohort were selected. This identified 880 schools containing 43,376 pupils. These 880 schools represent just 6% of all primary schools nationally but accounted for almost three-quarters (72%) of the Black Caribbean pupils in the cohort. These schools are by definition those containing the majority of Black Caribbean pupils and are referred to subsequently as the 'High Black Caribbean schools'.

### The characteristics of High Black Caribbean schools

Comparing the 'high Black Caribbean' schools against all other schools in the nation tells us about the types of schools predominantly attended by Black Caribbean pupils. The data is presented in Table 4. The High Black Caribbean schools are ethnically mixed, but White British pupils are still the largest single ethnic group within these schools (average 40%).

Across the 'High Black Caribbean' schools the proportion of Black Caribbean pupils ranged from 2% up to 51% (mean 12%), while the proportion of White British pupils ranged across schools from 3% to 90%. The 'high Black Caribbean' schools had a much larger proportion of pupils with EAL (35% vs. 7% in 'all other' schools) which reflects the higher proportion of Asian and Black African pupils in the high Black Caribbean (26%) compared to all other schools (6%).

----- < Insert Table 4 about here > -----

The difference in age 11 test score between the two groups of schools is highly statistically significant, although in terms of effect size relatively small ( $ES=0.13$ ). This can be seen in the small differences in the proportion of pupils achieving level 4 or above and level 5 or above for the English and mathematics national tests. Differences at age 7 were slightly more marked ( $ES=0.17$ ). The more substantial variables differentiating the two sets of schools are location, size, deprivation and pupil mobility. All the high Black Caribbean schools are located in areas defined by the Government as 'urban', they are on average significantly larger by around 100 pupils ( $ES=0.72$ ) and two-thirds of them are located in London (compared to 8% of 'all other' schools). A key difference is the substantially greater level of deprivation in High Black Caribbean schools, with almost one-third (31%) of pupils entitled to FSM compared to just 16% in all other schools ( $ES=0.92$ ). The high proportion of pupils entitled to FSM is not simply a reflection of the fact that minority pupils are more disadvantaged and also over-represented in these schools. The proportion of White British pupils entitled to FSM in the High Black Caribbean schools was 24%, compared to just 14% of White British pupils in all other schools, so these schools serve a more disadvantaged White British community as well. The schools also had a significantly higher level of mobility ( $ES=0.30$ ) and a higher proportion of pupils with SEN ( $ES=0.18$ ).



Perhaps most pertinent are the results relating to school quality, measured by the average pupil progress between age 7 and age 11 as calculated and described earlier. This is sometimes referred to as the 'value-added' measure of school effectiveness. The average value-added of high Black Caribbean schools did not differ significantly from the average value-added in all other schools ( $ES=0.06$ ). The school value-added distribution was broken into quintiles to identify the 20% of schools where pupils made the most and the 20% of schools where pupils made the least progress. This showed that, if anything, top quintile schools were slightly over-represented among the high Black Caribbean schools (23.3% vs 20.1%) and bottom quintile schools were under-represented (18.6% vs. 19.8%) compared to all other schools (see Table 4). These results relate to the proportion of schools rather than to individual pupils, but a similar result is demonstrated when directly comparing the proportion of each ethnic group attending schools of different quality, as shown in Table 5. It is apparent that Black Caribbean pupils are over-represented in the top quintile schools (24%) compared to White British pupils (17%).

----- < Insert Table 5 about here > -----

In summary, the schools attended by the majority of Black Caribbean pupils serve more disadvantaged communities but do not appear to differ significantly in terms of school quality (as measured by value-added) from all other schools. In addition Black Caribbean pupils are if anything over-represented within the higher quality schools. The paper now proceeds to directly model school variation in the White British-Black Caribbean gap.

### **Differential school effects**

Within the context of a single model it is not possible to test differential effects for all possible pupil groupings. However it is important where possible to test effects in combination rather than singly, to allow for the possibility of variables being confounded (Thomas et al, 1997).

Differential effects were tested by simultaneously allowing the coefficients for age 7 score, gender, FSM and Black Caribbean to vary randomly at level 2 (school level).

In the package used for this analysis (MLwiN) where the variance for a parameter is so close to zero as to be negligible then the relevant coefficient for that parameter is set to zero. This is what happened when the coefficient for Black Caribbean was allowed to vary randomly at the school level along with prior attainment, gender and poverty<sup>6</sup>. To allow school variation in the White British-Black Caribbean gap to be modelled alongside prior attainment, gender and poverty gaps, ethnicity was collapsed to three groups, White British, Black Caribbean and Other. The fixed effects from this model are reported in Appendix 1, the random effects are presented in Table 6.

----- < Insert Table 6 about here > -----

There were large differences between schools in the progress made by pupils of average prior attainment, as indicated by the significant intercept term ('cons') in Table 5 and shown graphically in Figure 2. In fact 187 schools (21.3%) had intercepts that differed significantly from zero. There were also significant differences in slopes between schools, as indicated by the 'age 7' coefficient in Table 5, but these were much less substantial and only five schools (0.6%) had slope coefficients that differed significantly from zero. Thus while there is some evidence of significant differential effects by prior attainment the effects are small and for all but a tiny minority of schools slopes do not overlap significantly. There was a relatively low but significant correlation ( $r=0.34$ ) between school slopes and intercepts, indicating that more effective schools tended to have slightly steeper slopes. To some extent then in schools where pupils of average prior attainment made the most progress, the gap between those with low and high prior attainment tended to be larger.

---

----- < Insert Figure 2 about here > -----

There are two other significant covariances indicated in Table 5 and both involve the Black Caribbean gap. There was a low but significant negative correlation between the Black Caribbean gap and the overall school intercept ( $r = -0.35$ ) as shown in Figure 3. In the more effective schools (for the average pupil) the White British-Black Caribbean gap tended to be larger. Thus Black Caribbean pupils do not seem to gain as much as White British pupils from attending the more effective schools.

----- < Insert Figure 3 about here > -----

There was a more substantial correlation ( $r = 0.66$ ) between the Black Caribbean gap and the FSM gap as shown in Figure 4. Schools with a smaller White British-Black Caribbean gap also tended to have a smaller FSM gap. Thus some schools seem particularly effective in addressing multiple equity gaps.

----- < Insert Figure 4 about here > -----

Turning directly to the White British-Black Caribbean gap, the school level variation for the Black Caribbean coefficient was .0046 while the standard error was .0032, indicating that variation in the White British-Black Caribbean gap across schools was not statistically significant. The variance of .0046 indicates a SD of  $0.068^7$  in the school variation around the Black Caribbean fixed coefficient of  $-.205$  (see Appendix 1). The White British-Black Caribbean gap for schools at the 5<sup>th</sup> percentile and the 95<sup>th</sup> percentile of the distribution were  $-.32$  and  $-.09$  SD respectively. The gap was universal across schools and no schools actually eliminated the gap. The fact that there is no significant school variation in the Black Caribbean gap is an important point that will be returned to in the discussion.

---

Separate estimates of schools' effects for their White British pupils and for their Black Caribbean pupils were generated by removing the constant term at Level 2 and explicitly including a term for White British. The correlation between school effects for White British and Black Caribbean pupils was 0.97, and shown in Figure 5. Thus the schools that were most effective for White British pupils were also the most effective for Black Caribbean pupils. Thinking back to Figure 3, while the White British-Black Caribbean gap may tend to be larger in the more effective schools, both White British and Black Caribbean pupils benefit from attending these schools, although White British pupils do so to a slightly larger degree.

In contrast to the result for the Black Caribbean gap, there was statistically significant variation in the size of the boy-girl gap across schools. The school level coefficient for gender was .0032 (indicating a SD of 0.06) around the gender fixed coefficient of -0.10 (see Appendix 1). The gender gap for schools at the 5<sup>th</sup> percentile and the 95<sup>th</sup> percentile were -.19 and -.01 respectively, so very few schools actually eliminated the gender gap in progress. The correlation between schools' residuals for boys and for girls was 0.98, so while there was significant variation in the gender gap across schools there was no evidence of substantial differential effectiveness; schools that did well for boys also did well for girls.

There was also statistically significant variation in the size of the FSM gap across schools. The school variance was .0051 (indicating SD of 0.07) around the FSM fixed coefficient of -.128 (see Appendix 1). The FSM gap for schools at the 5<sup>th</sup> percentile and the 95<sup>th</sup> percentile of the distribution were -.24 and -.01 respectively so only a very small proportion of schools were able to eliminate the FSM gap in progress. Again the correlation between schools' residuals for pupils with FSM and those without FSM was 0.97, so there was no evidence of substantial differential effectiveness; schools that did well for pupils entitled to FSM also did well for pupils not entitled to FSM.

## DISCUSSION

### Pupil progress

These results indicate that a focus on the main effects on progress of ethnic group, poverty, gender and prior attainment, without explicit consideration of the interactions between these variables, would misrepresent the data. In particular the FSM gap for progress was significantly greater within the White British group than within the Black African, Black Caribbean, Mixed White and Caribbean, Bangladeshi, Pakistani and Chinese groups. White British pupils were more polarised with respect to poverty than any other ethnic group and the extent of white 'working class' under-achievement would be missed without accounting for these interaction effects. White British and Black Caribbean pupils from economically deprived circumstances made equally poor progress<sup>8</sup>. In contrast to a simple 'main effects' analysis the interactions were able to identify Black Caribbean, boys, not entitled to FSM as the primary locus for the White British-Black Caribbean gap. The fact that this gap, which was already present at age 7, widens even further by age 11 is a key concern. The additional fact that the gap is proportionately greatest for the more able Black Caribbean pupils (as indicated by age 7 score) is a particularly worrying feature. Thus these findings elaborate and expand upon issues around the progress of Black Caribbean pupils that have only previously been considered at local level or with sample data (e.g., Sammons, 1995; Strand 1999; Fryer & Levitt, 2006).

The results reveal significant differences between the two main Black groups. Black African pupils made more progress during primary school than both Black Caribbean pupils and Mixed White and Black Caribbean pupils, and indeed made more progress than White British pupils (particularly among girls). These differences are also apparent in educational attainment at age 16, where Black Caribbean pupils as a group underachieve relative to White British but Black African pupils do not (Strand, 2008) and in disproportionality for

---

special educational needs with Black Caribbean pupils over-represented relative to Black African pupils for moderate learning difficulties and behavioural emotional and social difficulties (Strand & Lindsay, 2008). A key differentiating factor may lie in patterns of immigration to the country. The major wave of immigration from the Caribbean was in the 1950's, while the major increase in immigration in the 1990's was from Africa, including significant numbers of refugees and asylum seekers. Most Black Caribbean pupils of primary school age are therefore third generation UK born, while many Black African pupils are more recent immigrants<sup>9</sup> some of whom have arrived directly from abroad. The strong progress of Black African pupils may partly reflect language factors since a high proportion are recorded as having English as an additional language<sup>10</sup>. However differences in culture may be more significant. For example despite high levels of poverty Black African parents on average have higher levels of educational qualifications and higher educational aspirations for their children than other ethnic groups, and Black African pupils' reported the most positive attitudes to school and the highest levels of motivation of all ethnic groups (Strand 2007). While much of the US literature on educational inequality focuses on the 'White-Black' gap, and treats African Americans as an homogenous group, the current results suggest that shared skin colour is insufficient to account for differential patterns of attainment<sup>11</sup>.

### **School effects**

Of the variation in pupil progress that could not be explained by pupil prior attainment, background and school composition, around 20% was at the school level, at the higher end of many estimates (Sammons, 2007). While not large compared to the variation at the pupil level, it reflects a difference of 0.86 SD in average pupil progress between the most effective and least effective schools (those at the 5<sup>th</sup> and 95<sup>th</sup> percentile of the value-added distribution). To this extent the results confirm those of previous research with primary

---

schools (e.g., Mortimore et al, 1988; Strand, 1997). However this research has added significantly to what we know about differential school effects on pupils' progress. The study revealed that Black Caribbean pupils are concentrated in a very small number of schools. Just 6% of primary schools nationally contain almost three-quarters of all Black Caribbean pupils in the cohort. The research shows that these schools serve much more disadvantaged communities, have more mobile populations, are significantly larger in terms of pupil roll and predominantly located in London. However importantly these schools do not differ significantly in terms of school quality as measured by average pupil progress compared to all other schools in England. These results therefore tend to support the conclusions of authors such as Phillips et al (1998) and Bali & Alvarez (2004) that differences in school quality play a relatively minor role in the Black Caribbean gap in progress.

Importantly multi-level as opposed to 'fixed school effect' modelling allowed direct measurement of the size of the White British-Black Caribbean gap within schools, its variation and the variables associated with it. The results showed no evidence of significant differential school effectiveness in progress by ethnicity, and a correlation of 0.97 between school residuals for White British pupils and for Black Caribbean pupils. The same schools that were more effective for White British pupils were also more effective for Black Caribbean pupils, although in the more effective schools there was a tendency for White British pupils to gain to a proportionately greater degree. This substantive conclusion also holds for differential school effects for prior attainment, FSM and gender. While there was statistically significant school variation in relation to these pupil groupings, the correlations between school effects for boys/girls and for FSM / No FSM pupils were also 0.96 and above. It might be that these results reflect the small sample size in many primary schools, but there were on average 37 pupils per school in this population study, substantially greater

than in many other sample-based studies<sup>12</sup>. The results also replicate those reported by Strand (1999) who combined results over three years to boost the 'within school' sample size, and the conclusions of other studies (Brandsma & Knuver, 1989; Sammons et al 1993).

Explanations that identify low quality schools as the cause of Black Caribbean underachievement are in some ways reassuring, since they suggest the problem resides in a minority of 'low quality' schools which, if these schools can somehow be fixed, will ameliorate the issue of Black Caribbean underachievement. If, as argued here, the White British-Black Caribbean gap widens between age 7 and age 11, but not because they attend poorer quality schools, then the White British-Black Caribbean gap within a significant proportion of schools must be increasing. This within school gap does not appear to be significantly greater in some schools than in others, rather this research suggests the Black Caribbean gap grows almost universally across schools (the gap ranged between -.32 to -.09 in 90% of schools and no school eliminated the gap). The causes of the growth of the White British-Black Caribbean gap are not identified by the study. However it is difficult to sustain an argument that it is due to idiosyncratic within-school factors when Black Caribbean pupils underperform relative to White British pupils in all schools they both attend. This analysis suggests more systemic factors are at play.

It has been argued that the unequal distribution of novice teachers across classrooms within schools may be one such factor (Clotfelter, Ladd & Vigdor, 2005), although their analysis only looked at the attainment of pupils at age 12 not their progress. Similarly tracking or ability grouping might result in large within-school variation and has been hypothesised to contribute to the Black Caribbean gap (Braddock & Slavin, 1993; Gillborn & Youdell, 2000), but these practices are relatively infrequent in primary schools in England where pupils are predominantly taught for all subjects in a single class by the same teacher. It may be that the results are evidence of widespread low expectations of Black pupils in English schools and

---



certainly some authors have argued this (e.g. Gillborn, 2008). However explanations also need to be able to account for the marked success of some Black groups. The success of Black African pupils is difficult for explanations “constructed around meta-narratives of education as an agent of racism” (Moore, 1996, p148). Alternatively it may indicate there are substantial influences beyond the school gates which are outside the control of schools. As Bernstein (1970) observed ‘education cannot compensate for society’. The controls for socio-economic factors available in this study (entitlement to FSM, SEN, pupil mobility and school % entitled to FSM) are limited and may not adequately capture the extent of socio-economic disadvantage experienced by Black Caribbean pupils. However many studies with more comprehensive data on socio-economic status (SES) have also failed to find SES accounts for the Black-White gap (e.g. Phillips et al., 1998). Cultural differences may also play a role, for example Sewell (1997) observes that Black Caribbean boys may experience considerable pressure by their peers to adopt the norms of an ‘urban’ or ‘street’ subculture where more credence is given to unruly behaviour with teachers and antagonistic behaviour with other pupils than to high achievement or effort to succeed (Haynes et al., 2006, p580). Purely educational interventions aimed at improving schools may have limited success unless they also tackle poverty, low aspirations, the home learning environment and other factors outside school.

What is clear from this study is that the schools that are most effective for White British pupils, girls, or those not entitled to FSM are also most effective for Black Caribbean pupils, boys, and those entitled to FSM. But the results also suggest the possibility of an equity-effectiveness trade-off where the most effective schools raise the attainment of all pupil groupings but at the same time can increase the White British-Black Caribbean gap. Thus if all schools improve so they perform at the level of the most effective, then the difference in the overall attainment of White British and Black Caribbean pupils might actually increase. To counter this effect will require positive discrimination and a massive switch of human and material resources towards schools with a large proportion of minority or disadvantaged

students (Mortimore & Whitty, 1997). What is clear is that future research needs to focus on within-school gaps, more than on between school differences, if we are to gain a fuller understanding of the origin and growth of equity gaps.

## FOOTNOTES

<sup>1</sup>. England has experienced successive waves of immigration dating back over many centuries. In recent times, the major influxes have been from the Caribbean and the Indian sub-continent in the 1950's. Many Pakistani men brought over their families in the 1960's/1970's although many Bangladeshi men did not do so until the 1980's. Most recently the largest waves have been from Africa and from central and eastern Europe. For the current proportion of the school age population in each ethnic group see DfES (2006).

<sup>2</sup>. The report did not evaluate interactions or the question of school effects as will be described here.

<sup>3</sup>. Approximately 3.4% of the primary age-group in England attend private (independent) schools which are not state-maintained and do not have to complete national tests or provide background data on their pupils. A small proportion of pupils attending state-maintained special schools (1%) were excluded since national tests are not designed to be sensitive enough to pick up the progress made by such pupils.

<sup>4</sup>. Eligible families are those on Income Support; Income Based Jobseekers Allowance; support under part VI of the Immigration and Asylum Act 1999; Guarantee element of State Pension Credit; or Child Tax Credit (provided they are not entitled to Working Tax Credit and have an annual income as assessed by the Inland Revenue that does not exceed £13,910).

<sup>5</sup>. Effect size is calculated by multiplying the %FSM coefficient by 2 \* the SD of %FSM (corresponding to the difference between schools one SD above and one SD below the grand mean for %FSM) and dividing by the SD of the pupil level age 11 score (see Elliot & Sammons, 2004).

<sup>6</sup>. This was not the case when the coefficients for other ethnic groups were allowed to vary. For example the Black African coefficient did vary significantly across schools.

<sup>7</sup>. The standard deviation (SD) is the square root of the variance.

<sup>8</sup>. Though this average reflects the fact that Black Caribbean boys entitled to FSM made less progress, and Black Caribbean girls entitled to FSM made more progress, than their comparable White British peers.

<sup>9</sup>. This is reflected in the much younger age structure of the Black African population with 30% aged under 16 compared to 20% among Black Caribbean and White British groups (ONS, 2001).

<sup>10</sup>. A binary record of whether English was an Additional Language (EAL) was available for the current sample but has not been included in the regression analysis for two reasons. First it is effectively co-terminus with ethnicity, for example 0.2% of White British but 95% of Pakistani and 98% of Bangladeshi pupils were recorded as EAL. Second the EAL flag gives no information regarding the key question of the pupil's level of fluency in the English language. For example Strand and Demie (2005) report that 42% of pupils with EAL were fully fluent in English and the attainment of these pupils exceeded that of their mono-lingual English peers.

<sup>11</sup>. Black African is itself a heterogeneous group. While Nigerians and Ghanaians form the two largest communities, significant numbers have arrived in recent years particularly from Somalia, Ethiopia, Congo, Uganda and Zimbabwe, and there are quite marked differences in attainment between these groups (DfES, 2005).

<sup>12</sup>. For example Fryer & Levitt's ECLS-K sample contained an average of only 20 observations per school (Fryer & Levitt, 2004, p449).

## REFERENCES

- Bali, V., & Alvarez, R. (2004). The Race Gap in Student Achievement Scores: Longitudinal Evidence from a Racially Diverse School District. *Policy Studies Journal*, 32, (3), 393-415.
- Bernstein, B. (1970). Education cannot compensate for society. *New Society*, 387, 344-347.
- Braddock, J. & Slavin, R. (1993). Why ability grouping must end: achieving excellence and equity in American education. *Journal of Intergroup Relations*, 20, (2), 51-64.
- Brandsma, H. P., & Knuver, J. W. (1989). Effects of school and classroom characteristics on pupil progress in language and arithmetic. *International Journal of Educational Research*, 13(7), 777-788.
- Clotfelter, C. T., Ladd, H. F., & Vigdor, J. (2005). Who teaches whom? Race and the distribution of novice teachers. *Economics of Education Review*, 24, (4), 377-392.
- Coleman, J. S. (1966). *Equality of educational opportunity*. Washington: Office of Education, US Department of Health, Education and Welfare.
- Committee of Inquiry into the Education of Children from Ethnic Minority Groups. (1985). *Education for all*. The report of the committee of enquiry into the education of children from ethnic minority groups ("The Swann report"). London: HMSO.
- DfES (2006). *Ethnicity and education*. London: DfES. Available of the world wide web at: <http://publications.teachernet.gov.uk/eOrderingDownload/DFES-0208-2006.pdf> [accessed 27th June 2007].
- Elliot, K., & Sammons, P. (2004). Exploring the use of effect sizes to evaluate the impact of different influences on child outcomes: Possibilities and limitations. In I. Schagen & K. Elliott (Eds.), *But what does it mean? The use of effect sizes in educational research*. (pp. 6-24). Slough: National Foundation for Educational Research.
- Fryer, R., & Levitt, S. (2004). Understanding the Black-White Test Score Gap in the First Two Years of School. *Review of Economics and Statistics*, 86, (2), 447-464.
- Fryer, R., & Levitt, S. (2006). The Black-White Test Score Gap Through Third Grade. *American Law and Economics Review*, 8, (2), 249-281.

- Gillborn, D. (2008). *Racism and Education: Coincidence or conspiracy?* : Abingdon: Taylor & Francis.
- Gillborn, D. & Youdell, D. (2000). *Rationing education: Policy, practice, reform and equity*. Buckingham: Open University Press.
- Haynes, J., Tikly, L. & Caballero, C. (2006). The barriers to achievement for White/Caribbean pupils in English schools. *British Journal of Sociology of Education*, 27, (5), 569-583.
- Jencks, C. & Philips, M. (1998). *The Black-White test score gap*. Washington: Brookings Institution Press.
- Jesson, D., & Gray, J. (1991). Slants on slopes: Using multi-level models to investigate differential school effectiveness and its impact on pupils' examination results. *School Effectiveness and School Improvement*, 2, (3), 230 - 247.
- KewallRamani, A., Gilbertson, L., Fox, M., & Provasnik, S. (2007). *Status and trends in the education of racial and ethnic minorities (NCES 2007-039)*. Washington, DC: National Centre for Educational Statistics, Institute of Educational Sciences, US Department of Education.
- Kingdon, G., & Cassen, R. (2007). *Understanding low achievement in English schools (CASE 118)*. London: Centre for Analysis of Social Exclusions, London School of Economics.
- Kyriakides, L. (2004). Differential School Effectiveness in Relation to Sex and Social Class: Some Implications for Policy Evaluation. *Educational Research and Evaluation*, 10, (2), 141 - 161.
- Moore, R. (1996). Back to the Future: the problem of change and the possibilities of advance in the sociology of education. *British Journal of Sociology of Education*, 17(2), 145-161.
- Mortimore, P., & Whitty, G. (1997). *Can school improvement overcome the effects of disadvantage?* London: Institute of Education.

- Mortimore, P., Sammons, P., Stoll, L., Lewis, D. & Ecob, R. (1988). *School matters: The junior years*. Somerset: Open Books.
- Nuttall, D., Goldstein, H., Prosser, R., & Rasbash, J. (1989). Differential school effectiveness. *International Journal of Educational Research*, 13, 769-776.
- Office for National Statistics (2001). Age distribution by ethnic group (2001 Census). Available at <http://www.statistics.gov.uk/cci/nugget.asp?id=456>. Accessed 20th November 2008.
- Phillips, M. Crouse, J. & Ralph (1998). *Does the Black White test score gap widen after children enter school?* In Jencks, C. & Philips, M. (1998). *The Black-White test score gap*. Washington: Brookings Institution Press.
- Sammons, P., Nuttall, D., & Cuttance, P. (1993). Differential School Effectiveness: Results from a reanalysis of the Inner London Education Authority's Junior School Project Data. *British Educational Research Journal*, 19, (4), 381-405.
- Sammons, P. (1995). Gender, Ethnic and Socio-economic Differences in Attainment and Progress: a longitudinal analysis of student achievement over 9 years. *British Educational Research Journal*, 21(4), 465 - 485.
- Sammons, P. (2007). *School effectiveness and equity: Making connections*. Reading: Centre for British Teachers.
- Sewell, T. (1997). *Black masculinity and schooling: How black boys survive modern schooling*. Stoke on Trent: Trentham books.
- Spencer, N. (1996). *Poverty and child health*: Oxford: Medical Press.
- Smith, D. J., & Tomlinson, S. (1989). *The school effect: A study of multi-racial comprehensives*. London: Policy Studies Institute.
- Strand, S. (1997). Pupil Progress during Key Stage 1: a value added analysis of school effects. *British Educational Research Journal*, 23(4), 471 - 487.
- Strand, S. (1999). Ethnic group, sex and economic disadvantage: Associations with pupils' educational progress from Baseline to the end of Key Stage 1. *British Educational Research Journal*, 25, (2), 179-202.



- Strand, S. (2006). Comparing the predictive validity of reasoning tests and national end of Key Stage 2 tests: which tests are the best? *British Educational Research Journal*, 32(2), 209-225.
- Strand, S. (2007). *Minority ethnic pupils in the longitudinal study of young people in England (LSYPE)*: Nottingham: Department for Schools, Children & Families.
- Strand, S. (2008). *Minority Ethnic pupils in the LSYPE: Extension report on performance in public examinations at age 16. DCSF Research Report RR029*. Nottingham: Department for Schools, Children and Families.
- Strand, S., & Demie, F. (2005). English language acquisition and educational attainment at the end of primary school. *Educational Studies*, 31(3), 275 - 291.
- Strand, S. & Lindsay, G. (2008). Ethnic disproportionality in special education: Evidence from an English population study. *Journal of Special Education, Online First*.
- Thomas, S., Sammons, P., Mortimore, P., & Smees, R. (1997). Differential Secondary School Effectiveness: Comparing the Performance of Different Pupil Groups. *British Educational Research Journal*, 23, (4), 451-469.
- US Census Bureau (2006). *Current population reports, p60-231, Income, poverty and health insurance in the United States 2005*: US Government Printing Office: Washington DC. Retrieved from the www at <http://www.census.gov/prod/2006pubs/p60-231.pdf> on 7th July 2007.
- Wilson, D., Burgess, S. & Briggs, A. (2005). *The dynamics of school attainment of England's ethnic minorities*. Bristol: CMPO working paper.

**TABLE 1: Descriptive statistics for the sample**

Variable	Value	Count	%	KS2 (age 11) normal score	
				mean	SD
Ethnic group	White British	440,310	82.3%	0.05	0.96
	White Other groups	10,592	2.0%	0.13	1.01
	Mixed White & Caribbean	5,629	1.1%	-0.11	0.92
	Other Mixed heritage	9,292	1.7%	0.17	0.98
	Indian	11,441	2.1%	0.14	0.92
	Pakistani	14,127	2.6%	-0.37	0.91
	Bangladeshi	5,175	1.0%	-0.20	0.91
	Other Asian groups	2,429	0.5%	0.25	0.98
	Black African	7,062	1.3%	-0.11	0.92
	Black Caribbean	7,393	1.4%	-0.28	0.87
	Other Black groups	1,840	0.3%	-0.21	0.88
	Chinese	1,499	0.3%	0.64	1.00
	All other ethnic groups	17,935	3.4%	-0.08	0.98
	Gender	boy	271,762	50.8%	-0.01
girl		262,962	49.2%	0.07	0.96
Poverty	Not entitled to FSM	444,309	83.1%	0.14	0.94
	Entitled to FSM	90,415	16.9%	-0.49	0.88
Mobility	Same school Y3-Y6	448,346	83.8%	0.07	0.95
	Joined school from Y3 onwards	86,378	16.2%	-0.20	0.96
birth season	autumn	176,741	33.1%	0.17	0.97
	spring	173,284	32.4%	0.03	0.95
	summer	183,887	34.4%	-0.10	0.93
Special educational needs status	None or School Action	489,604	91.6%	0.14	0.90
	School Action Plus & Statemented	45,120	8.4%	-1.15	0.79
Age 7 quintile	very low	98,055	18.3%	-1.08	0.64
	low	111,894	20.9%	-0.44	0.57
	average	95,061	17.8%	-0.02	0.56
	high	127,223	23.8%	0.44	0.59
	very high	102,491	19.2%	1.14	0.67
school phase	primary	503,005	94.1%	0.03	0.96
	middle	31,719	5.9%	-0.01	0.92
School type	Community	360,327	67.4%	-0.03	0.96
	Voluntary aided	102,384	19.1%	0.19	0.94
	Voluntary controlled	55,452	10.4%	0.11	0.96
	Foundation	16,561	3.1%	0.12	0.95

**TABLE 2: Fixed effect coefficients for attainment at age 7, age 11 and pupil progress age 7 to age 11**

Value	Age 7 score		Age 11 score		Progress age 7-11	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Intercept	0.18	0.002	0.25	0.002	0.18	0.002
age 7 score	-	-	-	-	0.78 ***	0.001
White other groups	-0.03 *	0.012	0.16 ***	0.013	0.19 ***	0.008
Mixed White & Caribbean	-0.06 **	0.018	-0.11 ***	0.018	-0.04 ***	0.012
Other mixed heritage	0.08 ***	0.013	0.16 ***	0.014	0.11 ***	0.009
Indian	-0.10 ***	0.012	0.02	0.012	0.12 ***	0.008
Pakistani	-0.48 ***	0.011	-0.42 ***	0.012	-0.01	0.008
Bangladeshi	-0.46 ***	0.020	-0.26 ***	0.021	0.15 ***	0.014
Any Other Asian group	-0.06 *	0.025	0.17 ***	0.026	0.24 ***	0.017
Black African	-0.10 ***	0.016	-0.08 ***	0.017	0.04 ***	0.011
Black Caribbean	-0.21 ***	0.015	-0.34 ***	0.016	-0.14 ***	0.011
Black Other Groups	-0.18 ***	0.031	-0.22 ***	0.032	-0.05 *	0.021
Chinese	0.05	0.032	0.46 ***	0.033	0.44 ***	0.022
Any other ethnic group	-0.12 ***	0.009	-0.06 ***	0.010	0.02 ***	0.006
Girl	0.13 ***	0.003	0.00	0.003	-0.10 ***	0.002
Entitled to FSM	-0.49 ***	0.004	-0.53 ***	0.004	-0.13 ***	0.003
SAP/Statemented	-1.21 ***	0.004	-1.18 ***	0.004	-0.26 ***	0.003
Mobile	-0.15 ***	0.003	-0.18 ***	0.003	-0.06 ***	0.002
age in months	0.18 ***	0.001	0.11 ***	0.001	-0.03 ***	0.001
White Other Groups * FSM	-0.25 ***	0.020	-0.09 ***	0.020	-0.01	0.016
Mixed White & Caribbean * FSM	0.13 ***	0.024	0.18 ***	0.024	0.07 ***	0.017
Other mixed heritage * FSM	0.02	0.021	0.02	0.021	0.01	0.015
Indian * FSM	0.12 ***	0.024	0.11 ***	0.024	0.01	0.017
Pakistani * FSM	0.28 ***	0.015	0.29 ***	0.015	0.03 **	0.012
Bangladeshi * FSM	0.34 ***	0.023	0.39 ***	0.024	0.15 ***	0.017
Any Other Asian group * FSM	-0.02	0.042	0.07	0.043	0.04	0.030
Black African * FSM	0.03	0.020	0.12 ***	0.021	0.04 **	0.015
Black Caribbean * FSM	0.30 ***	0.021	0.34 ***	0.022	0.10 ***	0.015
Black Other Groups * FSM	0.27 ***	0.041	0.27 ***	0.042	0.03	0.029
Chinese * FSM	0.21 **	0.064	0.23 ***	0.066	0.13 **	0.043
Any other ethnic group * FSM	0.00	0.015	0.09 ***	0.015	0.08 ***	0.012
White Other Groups * girl	-0.02	0.016	-0.02	0.017	0.02	0.011
Mixed White & Caribbean * girl	0.01	0.022	0.02	0.023	0.03	0.015
Other mixed heritage * girl	0.01	0.017	0.02	0.018	0.01	0.012
Indian * girl	-0.01	0.016	0.00	0.016	0.01	0.011
Pakistani * girl	0.01	0.014	0.02	0.015	0.04 ***	0.010
Bangladeshi * girl	-0.04	0.023	-0.02	0.024	0.04 *	0.016
Any Other Asian group * girl	0.01	0.034	0.04	0.035	0.05 *	0.023
Black African * girl	-0.01	0.020	0.09 ***	0.021	0.12 ***	0.014
Black Caribbean * girl	0.01	0.020	0.09 ***	0.020	0.11 ***	0.013
Black Other Groups * girl	-0.03	0.039	0.03	0.040	0.07 **	0.027
Chinese * girl	0.03	0.043	0.07	0.044	0.04	0.029
Any other ethnic group * girl	-0.02	0.013	0.00	0.013	0.02 **	0.009
White other groups * Age 7	-	-	-	-	-0.05 ***	0.006
Mixed White & Caribbean * age 7	-	-	-	-	-0.03 **	0.010
Other mixed heritage * age 7	-	-	-	-	-0.01	0.007
Indian * age 7	-	-	-	-	0.00	0.007
Pakistani * age 7	-	-	-	-	-0.02 **	0.007
Bangladeshi * age 7	-	-	-	-	-0.06 ***	0.012
Any Other Asian group * age 7	-	-	-	-	-0.06 ***	0.013
Black African * age 7	-	-	-	-	-0.08 ***	0.010
Black Caribbean * age 7	-	-	-	-	-0.09 ***	0.009
Black Other Groups * age 7	-	-	-	-	-0.04 *	0.019
Chinese * age 7	-	-	-	-	0.01	0.016
Any other ethnic group * age 7	-	-	-	-	-0.02 **	0.005
Boy * Age 7	-	-	-	-	0.03 ***	0.002
Schol percentage FSM	-	-	-	-	0.00 ***	0.000
school mean age 7 score	-	-	-	-	-0.12 ***	0.003
R squared	0.237		0.206		0.656	

*Notes: There was also a significant ethnic group \* FSM \* age 7 score interaction (p<.001) but individual coefficients are not shown (see text for interpretation). Pupil background characteristics were collected at age 11 so there may be greater error in the coefficients at age 7 for time varying variables such as FSM.*

**TABLE 3: Estimated marginal means for progress age 7-11 by ethnic group, gender and entitlement to FSM**

Ethnic group	FSM-girl		FSM-boy		No FSM-girl		No FSM-boy	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
White British	-0.24	(0.003)	-0.13	(0.003)	-0.10	(0.002)	0.00 <sup>(a)</sup>	(0.002)
White Other groups	<u>-0.04</u>	(0.016)	0.04	(0.016)	0.11	(0.009)	0.19	(0.008)
Mixed White & Caribbean	<u>-0.19</u>	(0.016)	-0.11	(0.016)	-0.12	(0.012)	<b>-0.04</b>	(0.012)
Other Mixed heritage	<u>-0.11</u>	(0.014)	<u>-0.02</u>	(0.014)	<u>0.02</u>	(0.009)	<u>0.11</u>	(0.009)
Indian	<u>-0.09</u>	(0.017)	<u>0.00</u>	(0.017)	<u>0.03</u>	(0.008)	<u>0.12</u>	(0.008)
Pakistani	<u>-0.18</u>	(0.011)	-0.11	(0.011)	<u>-0.08</u>	(0.008)	<b>-0.01</b>	(0.008)
Bangladeshi	<u>0.09</u>	(0.015)	<u>0.16</u>	(0.015)	<u>0.08</u>	(0.014)	<u>0.15</u>	(0.014)
Other Asian groups	<u>0.09</u>	(0.030)	<u>0.14</u>	(0.030)	<u>0.18</u>	(0.017)	<u>0.24</u>	(0.017)
Black African	<u>-0.03</u>	(0.014)	<u>-0.05</u>	(0.014)	<u>0.06</u>	(0.011)	<u>0.04</u>	(0.011)
Black Caribbean	<u>-0.17</u>	(0.014)	<b>-0.18</b>	(0.015)	<b>-0.13</b>	(0.010)	<b>-0.14</b>	(0.011)
Other Black groups	-0.19	(0.027)	-0.15	(0.028)	-0.08	(0.021)	<b>-0.05</b>	(0.021)
Chinese	<u>0.38</u>	(0.043)	<u>0.44</u>	(0.043)	<u>0.38</u>	(0.022)	<u>0.44</u>	(0.022)
Any other ethnic group	<u>-0.11</u>	(0.011)	<u>-0.03</u>	(0.011)	<u>-0.06</u>	(0.007)	<u>0.02</u>	(0.006)

Notes. (a) Coefficients are expressed relative to a base of the progress of White British boys not entitled to FSM. The coefficients control for all other variables and are evaluated at the average school %FSM and average school mean KS1 score.

SE= standard error.

**Bold** indicates this group made significantly less progress than White British pupils of the same FSM and gender combination ( $p < .05$ ).

Underline indicates this group made significantly more progress than White British pupils of the same FSM and gender combination ( $p < .05$ ).

**TABLE 4: Comparison of schools with 3 or more Black Caribbean pupils against all other schools**

Variable	High Black Caribbean Schools (3+ Black Caribbean pupils) <sup>(a)</sup>	All other schools	Effect Size (for continuous variables)
number of pupils	43,376	491,348	-
number of schools	880	12,476	-
Ethic group			-
White British	39.8%	86.0%	-
White Other groups	6.7%	1.6%	-
Mixed White & Caribbean	3.9%	0.8%	-
Other mixed heritage	4.6%	1.5%	-
Indian	7.2%	1.7%	-
Pakistani	6.1%	2.4%	-
Bangladeshi	2.5%	0.8%	-
Other Asian groups	1.8%	0.3%	-
Black African	8.6%	0.7%	-
Black Caribbean	12.2%	2.0%	-
Black other groups	2.0%	0.2%	-
Chinese	0.6%	0.3%	-
Any other ethnic group	4.1%	3.3%	-
Age 11 normal score	-.09 (.97)	.04 (.96)	0.13
Level 4+ English	76%	80%	-
Level 5+ English	24%	28%	-
Level 4+ maths	71%	76%	-
Level 5+ maths	28%	32%	-
Age 7 normal score	-.14 (.97)	.03 (.95)	0.17
Age 7 bottom quintile	23.3%	17.9%	-
Age 7 top quintile	15.6%	19.5%	-
% girls	49.5%	49.1%	0.00
% entitled to FSM	30.5%	16.0%	0.92
% of mobile pupils	22.8%	17.9%	0.30
% English Additional Language	34.6%	7.3%	1.40
% SEN	9.7%	8.5%	0.18
Total school roll	412 (149)	316 (134)	0.72
Church schools	21.0%	30.0%	-
Urban vs. rural location	100.0%	81.0%	-
Located in London region	68.1%	8.3%	-
School average progress	-.00 (.56)	.03 (.56)	0.06
% schools in bottom quintile	18.6%	20.1%	
% schools is low quintile	17.5%	20.1%	
% schools in middle quintile	18.8%	20.1%	
% schools in high quintile	21.8%	19.9%	
% schools in top quartile	23.3%	19.8%	

Notes <sup>(a)</sup> These schools contain nearly three-quarters of all Black Caribbean pupils in the cohort.

**TABLE 5: The proportion of each minority group in schools of different quality (as defined by the average value-added for the school)**

Ethnic Group	School quality quintile				
	bottom 20%	low	middle 20%	high	top 20%
White Other groups	15.5%	18.2%	20.1%	21.6%	24.6%
Mixed White & Caribbean	20.1%	19.7%	20.8%	20.6%	18.8%
Other Mixed heritage	17.5%	18.5%	21.4%	20.8%	21.9%
Indian	19.7%	20.2%	20.8%	21.4%	18.0%
Pakistani	23.3%	20.8%	20.7%	18.2%	16.9%
Bangladeshi	17.0%	19.6%	19.3%	19.1%	25.0%
Other Asian groups	17.0%	20.0%	20.3%	22.1%	20.7%
Black African	17.2%	15.2%	20.1%	21.3%	26.1%
Black Caribbean	19.3%	16.9%	19.0%	21.0%	23.7%
Other Black groups	17.9%	19.1%	20.1%	19.9%	22.9%
Chinese	15.2%	20.2%	20.9%	20.5%	23.1%
All other ethnic groups	20.1%	19.9%	21.2%	19.6%	19.1%
White-British	20.7%	21.8%	21.3%	19.8%	16.5%
Total	20.4%	21.3%	21.2%	19.9%	17.3%

*Note: The average school roll in the bottom quintile schools was 320 compared to an average of 307 in the top quintile schools. Because a high proportion of the top quintile of schools are relatively small schools, only 17% of the total cohort are shown as attending the top 20% of schools.*

**TABLE 6: Random effects from the multilevel model**

Parameter	Coeff.		SE	Corr.
<u>Between schools</u>				
Cons / Cons	0.0805 *		0.0051	1
Age 7 / Cons	0.0105 *		0.0016	0.34
Age 7 / Age 7	0.0121 *		0.0010	1
Sex / Cons	0.0004		0.0018	0.03
Sex / Age 7	-0.0004		0.0008	-0.07
Sex / Sex	0.0032 *		0.0012	1
Fsm / Cons	-0.0033		0.0021	-0.16
Fsm / Age 7	-0.0019 *		0.0009	-0.24
Fsm / Sex	-0.0014		0.0010	-0.35
Fsm / Fsm	0.0051 *		0.0016	1
Bcrb / Cons	-0.0067 *		0.0030	-0.35
Bcrb / Age 7	-0.0013		0.0013	-0.18
Bcrb / Sex	-0.0011		0.0014	-0.29
Bcrb / Fsm	0.0032		0.0017	0.66
Bcrb / Bcrb	0.0046		0.0032	1
Other / Cons	-0.0048 *		0.0024	-0.17
Other / Age 7	0.0005		0.0010	0.05
Other / Sex	0.0003		0.0011	0.05
Other / fsm	0.0013		0.0013	0.18
Other / Bcrb	0.0075 *		0.0020	0.99
Other / Other	0.0104 *		0.0020	1
<u>Between pupils</u>				
Cons / Cons	0.2477 *		0.0023	
Age 7 / Cons	0.0154 *		0.0012	
Age 7 / Age 7	0.0282 *		0.0019	

*Note: The fit of the model was improved by allowing age 7 score to vary at the pupil as well as the school level. This revealed greater variance in age 11 score at either end of the age 7 score distribution for both pupils and for schools, but relatively more so for schools at the lower end. The Variance Partition Coefficient (VPC) is therefore greater at low levels of prior attainment indicating the particular school a pupil attends makes a greater difference for the progress of pupils with low prior attainment than those with average or high prior attainment.*

## Figure Captions

Figure 1: Progress age 7-11 by ethnic group, age 7 score quintile and entitlement to FSM

Figure 2: School regression lines (880 High Black Caribbean schools)

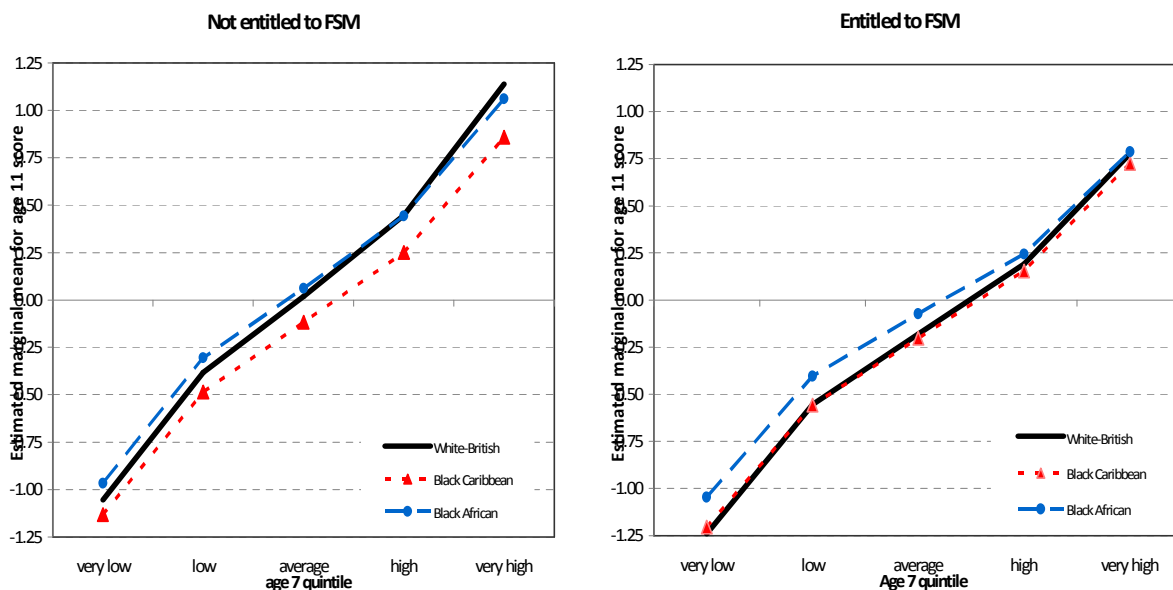
Figure 3: Correlation between school intercept and White British-Black Caribbean gap.

Figure 4: Correlation between school residuals for the Black Caribbean gap and the FSM gap

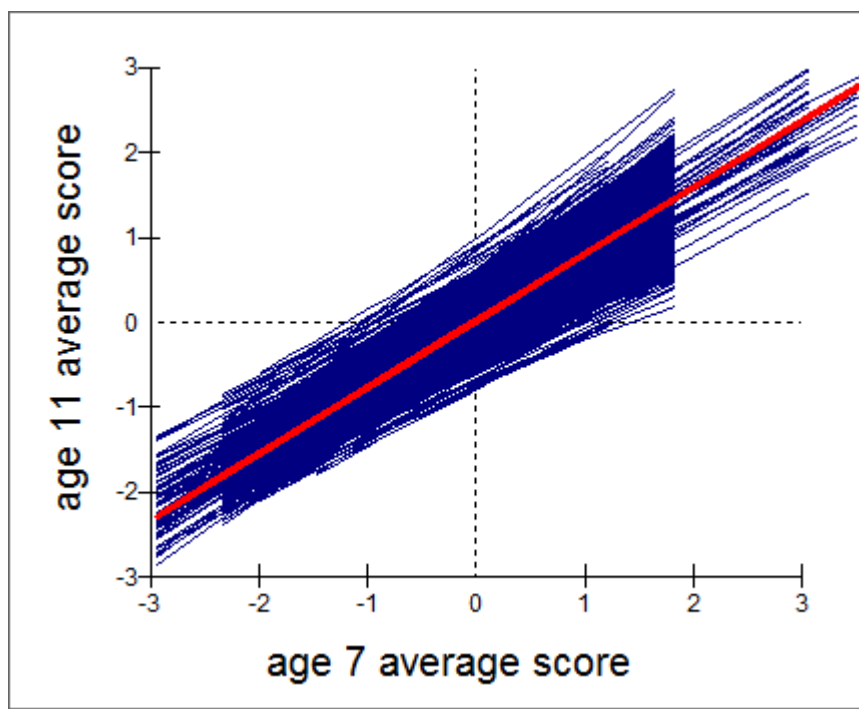
Figure 5: School effects on the progress of White British and Black Caribbean pupils.



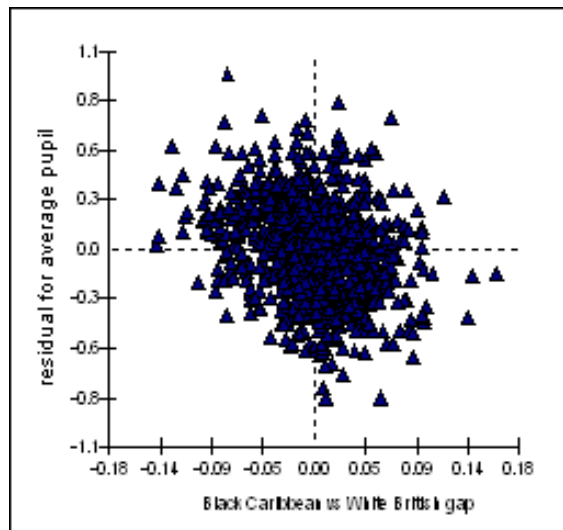
**Figure 1: Progress age 7-11 by ethnic group, age 7 score quintile and entitlement to FSM**



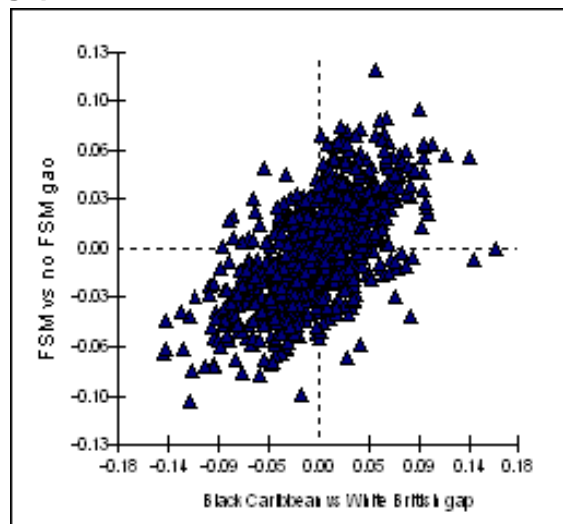
**Figure 2: School regression lines (880 High Black Caribbean schools)**



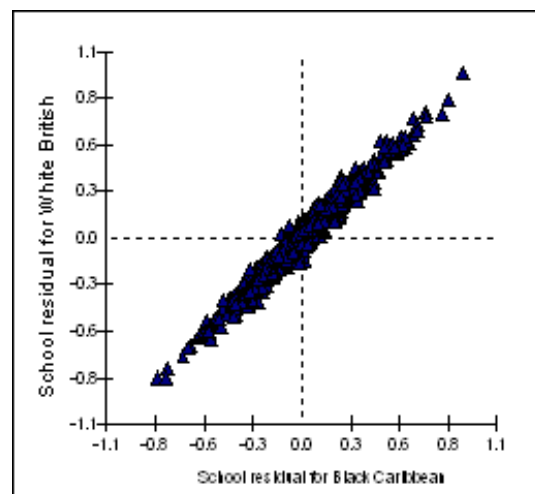
**Figure 3: Correlation between school intercepts and the White British-Black Caribbean gap.**



**Figure 4: Correlation between school residuals for the Black Caribbean gap and the FSM gap**



**Figure 5: School effects on the progress of White British and Black Caribbean pupils**



**APPENDIX 1: Fixed effects from the multi-level model for high Black Caribbean schools with ethnicity recoded to three groups.**

variable	Coeff	SE
Constant	0.203	0.025 *
Age 7 score	0.779	0.006 *
age (normalised)	-0.039	0.003 *
sex	-0.099	0.008 *
SEN	-0.323	0.010 *
mobility	-0.040	0.007 *
FSM	-0.128	0.010 *
age 7 score squared	0.041	0.003 *
Black Caribbean	-0.205	0.014 *
Other ethnic	0.019	0.010
Black Caribbean*FSM	0.072	0.018 *
Other ethnic*FSM	0.063	0.013 *
Black Caribbean*sex	0.098	0.017 *
Other ethnic*sex	0.031	0.011 *
Black Caribbean*age 7	-0.040	0.010 *
Other ethnic*age7	-0.018	0.007 *
School %FSM	-0.003	0.001 *
School average age7 score	-0.209	0.035 *
School %mobility	-0.002	0.001 *

Notes

\*=  $p < .05$ .