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

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ABSTRACT

This study analyses 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 is 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 achievement, 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 achievement 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 achievement. 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[1].

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)[2]. 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 achievement 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 or samples. This present study addresses this need.

Accounting for ethnic gaps

Any examination of ethnic gaps in educational achievement 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 achievement 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.

As well as socio-economic disadvantage, another frequently proposed explanation for ethnic gaps, and particularly for why the 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 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

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, other school effectiveness researchers have conceptualised 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 achievement 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). Palardy (2008), analysing student progress between ages 14 and 18 using the US National Education Longitudinal Study, did not directly model differential effects at the school level but broadly categorised schools into three groups based on the mean socio-economic status (SES) of the students attending the schools. Only one student characteristic (Asian ethnicity) provided strong evidence of a differential effects across the three school types, with Asian students in high SES schools making more progress relative to White students, but not in middle or low SES schools. 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 achievement, indicated by differences in the slope of the relationship between prior achievement 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 achievement of the lower performing group, rather than decreasing the achievement of higher performing groups, that are of special interest.

The plan of the paper is as follows. First an entire England national cohort of over 500,000 pupils is analysed to determine the size of ethnic gaps in achievement at age 11 and in progress between age 7 and age 11, that is whether ethnic gaps narrow or widen over the course of primary school. This analysis will also establish the impact of school composition factors and the overall size of the school effect on pupil progress. In England Black Caribbean pupils are unevenly distributed across schools and just 880 schools (6% of the total) contain nearly three-quarters of all Black Caribbean students. The second part of the paper compares the characteristics of these high Black Caribbean schools against all other schools. This will seek to establish whether these two sets of schools differ in terms of school quality. The third part is a direct exploration of differential school effectiveness by modelling the size of the White British - Black Caribbean gap within schools; is the gap larger in some schools than in others? This can only be directly modelled in schools actually teaching Black Caribbean pupils so the analysis is restricted to the high Black Caribbean schools. This section will also evaluate differentially effectiveness with regards to other pupil

characteristics such as prior achievement, gender and poverty. The final section reviews and considers the implications of the results.

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[3]. 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 11 years and 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 achievement 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 across the whole sample to have a mean of 0 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: The England Department for Children, Schools and Families specifies 17 main ethnic codes and the data are gathered from students themselves or in primary schools predominantly from pupils' parents. It is possible for schools to ascribe ethnic backgrounds in circumstances where the response rate from parents may be low, but this happens infrequently (85% of the data originates from parents or students self-allocation). For the purpose of the present analysis some extremely small groups (such as Gypsy-Roma and Irish Traveller pupils) and pupils with missing information have been subsumed within 'any other ethnic group', leaving thirteen main ethnic groups (see Table 1).

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[4].

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 across the whole sample 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.

Pupil achievement and progress

Effects on pupil achievement at age 11 were analysed using a multi-level regression model, with pupils at level 1 and schools at level 2. Effects on pupil progress age 7-11 were assessed by including pupils' prior attainment at age 7 in the regression model for age 11 test score thus measuring pupils' relative progress. The package MLwiN (v2.1) was used for the multi-level analysis.

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 achievement, 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 intercept was allowed to vary randomly at level 2 to model school effects.

---------- < 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 achievement (Strand, 1999, 2008). 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 statistically 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 .12 and .11 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 interactions were significant for most minority ethnic groups and the coefficients were uniformly positive (with the one exception of White Other pupils). This indicates that the negative impact of poverty on progress was significantly larger for White British pupils than it was for most minority ethnic groups (see Table 2).

---------- < 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 achievement 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[5]. 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 achievement. The effect was strongest for Black Caribbean and Black African pupils (see Table 2). The negative coefficients for these interactions indicate that pupils with high age 7 scores from these two ethnic groups achieved significantly lower age 11 scores than White British pupils with similar high age 7 scores. Because of the simultaneous interactions with FSM and gender as well as prior achievement, Figure 1 presents four charts for varying combinations of FSM, gender and age 7 score. For the sake of clarity the analyses focus on only White British and the two Black groups and three levels of age 7 score (1 SD below the mean, the mean and 1 SD above the mean respectively). The low performance of the Black Caribbean group is most pronounced among boys from non-disadvantaged background (Figure 1, top left). In contrast the Black Caribbean group generally outperform the White British group among girls from disadvantaged circumstances (Figure 1, bottom right). However across all four combinations it is apparent Black Caribbean pupils with high age 7 score make relatively poor progress compared to their White British peers. Black African pupils generally made better progress than White British pupils, but show a similar relative decrement at higher levels of prior achievement.

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

Finally the significant gender by age 7 interaction (see Table 2) indicates that the poorer progress of girls relative to boys was less pronounced among pupils with above average prior achievement.

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 pupils entitled to FSM (ES=-0.15)[6]. 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 achievement 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 achievement 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 (and therefore SD of 0.28) indicating that in schools at the 5th percentile in terms of progress the average pupil made -0.47 SD less than expected progress, while in schools at the 95th percentile the average pupil made 0.47 SD more than expected progress, a difference of 0.93 SD. The school effect on pupil progress was therefore substantial.

Differential school effects

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 size of the White British-Black Caribbean gap can only be directly modelled for schools actually teaching Black Caribbean pupils[7]. To enable an analysis of differential effectiveness for Black Caribbean pupils all schools with three or more Black Caribbean pupils in their Year 6 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'. Before moving to the direct modelling of within-school

gaps, we first compare the characteristics of these high Black Caribbean schools against all other schools in England.

The characteristics of high Black Caribbean schools

Comparing the 'high Black Caribbean' schools against all other schools in England tells us about the types of schools predominantly attended by Black Caribbean pupils. The data are 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 who spoke English as an Additional Language (EAL) (35% vs. 7% in 'all other' schools) which reflects the higher proportion of Asian and Black African pupils in the high Black Caribbean schools (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. The more effective (or higher quality) schools are those where pupils make the greatest progress between age 7 and age 11 after controlling for prior achievement, pupil background and school composition as modelled in Table 2 and described earlier. In the UK this is often refereed to as the school 'value-added'. 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 term of school quality (as measured by value-added) from all other schools. In addition Black Caribbean pupils are

actually slightly 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 modelling

A multi-level regression model was completed for the 880 schools identified above. Differential school 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). While it is not possible to test differential effects for all possible pupil groupings within a single model, 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). The analysis presented some technical challenges. In the MLwiN package 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 achievement, gender and poverty[8]. To allow school variation in the White British-Black Caribbean gap to be modelled alongside prior achievement, 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 and are discussed below.

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

There were large differences between schools in the progress made by pupils of average prior achievement, as indicated in Table 6 by the significant variance in intercepts ('cons/cons'). These have a variance of 0.081 (and therefore a standard deviation of 0.28), indicating a difference between an intercept of -.47 SD and 0.47 SD for schools at the 5th and 95th percentile respectively. The results are shown graphically in Figure 2. In fact 187 schools (21.3%) had intercepts that differed significantly from zero. There was also

significant variance in slopes between schools (age7/age7), 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 achievement the effects are small and for all but a tiny minority of schools slopes do not overlap significantly (see Figure 2). There was a relatively low but significant covariance between school slopes and intercepts (age7/cons, correlation=0.34), indicating that more effective schools tended to have slightly steeper slopes. To some extent then in schools where pupils of average prior achievement made the most progress, the gap between those with low and high prior achievement tended to be larger.

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

There are two other substantial covariances indicated in Table 6 involving the Black Caribbean gap. There was a low but significant negative covariance between the Black Caribbean gap and the overall school intercept (Bcrb/Cons, r= -0.35) as shown in Figure 3. In the more effective schools (for the average pupil) the Black Caribbean gap tended to be larger (note that negative figures on the x-axis of Figure 3 indicate that the within-school Black Caribbean gap is larger than average). 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 covariance between the Black Caribbean gap and the FSM gap (Bcrb/Fsm, r=0.66) 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 particular effective in addressing multiple equity gaps.

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Turning directly to the Black Caribbean-White British gap, the school variance in the Black Caribbean coefficient was .0046 while the standard error was .0032, indicating that school variation in the size of the Black Caribbean gap was not statistically significant. The school variance of .0046 indicates a SD of 0.068[9] around the Black Caribbean fixed coefficient of -.21 (see Appendix 1). The Black Caribbean-White British gap for schools at the 5th percentile and the 95th percentile were -.32 and -.09 SD respectively. Clearly this represents substantive variation across schools in the Black Caribbean gap, even if it is not statistically significant, but importantly the gap appears universal and no schools actually eliminated the gap. This 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 Black Caribbean-White British gap may tend to be larger in the more effective schools, both Black Caribbean and White British 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 (and therefore a SD of 0.06) around the gender fixed coefficient of -0.10 (see Appendix 1). The gender gap for schools at the 5th percentile and the 95th 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 (and therefore a SD of 0.07) around the FSM fixed coefficient of -.128 (see Appendix 1). The FSM gap for schools at the 5th percentile and the 95th 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 achievement, 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[10]. 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 achievement 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, 2009). 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[11] 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[12]. 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, in press). While much of the US literature on educational inequality focuses on the 'White-Black' gap, the current results suggest that shared skin colour is insufficient to account for differential patterns of achievement in England[13].

School effects

Of the variation in pupil progress that could not be explained by pupil prior achievement, 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 5th and 95th percentile of the value-added distribution). Given the magnitude of this school effect, it is true that the age 11 achievement of pupils entitled to FSM in schools in the upper 16% of value-added (the most effective schools) on average was higher than the performance of non-disadvantaged pupils in schools in the bottom 16% of value-added (the least effective schools). To this extent the results confirm those of previous research that schools do make a difference (e.g., Mortimore et al., 1988; Strand, 1997; Teddlie & Reynolds, 2001; Sammons, 2007). 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 & Alverez (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 and the factors associated with it. The results showed no evidence of differential school effectiveness in progress by ethnicity, since there was 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 achievement, 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, and Bayesian shrinkage in the estimates for particularly small groups like Black Caribbean students. However there were on average 37 pupils per school in this population study, substantially greater than in many other sample-based studies[14]. The results also replicate those reported by Strand (1999) who combined results over three years to boost the 'within school' sample size, and matches the conclusions of other studies (Brandsma & Knuver, 1989; Sammons et al., 1993).

Explanations that identify low quality schools as the cause of Black Caribbean under-achievement 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 achievement 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; Strand, in press). 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). There is a developing literature on school improvement in schools in challenging or socio-economically disadvantaged areas. A recent review has discussed the influence of factors such as a focus on teaching and learning, effective distributed leadership, an information-rich environment, development of a positive school culture and a strong emphasis on continuous professional development (Muijs, Harris, Chapman, Stoll & Russ, 2004, p168). However 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 achievement 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 achievement of White British and Black Caribbean pupils might actually increase. To counter this effect will require positive discrimination and a substantial switch of human and material resources towards programmes in areas 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

[1.] 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).

[2]. The report did not evaluate interactions or the question of school effects as will be described here.

[3]. 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.

[4.] 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 t hey are not entitled to Working Tax Credit and have an annual income as assessed by the Inland Revenue that does not exceed £13,910).

[5]. Considering the sample size in this study statistical significance is not necessarily a good guide to educational significance, since with a very large sample many relatively small differences may be statistically significant (see for example Eliot & Sammons, 2004). However given the outcome has been normalised regression coefficients indicated the size of effects in SD units, giving an indication of the magnitude of effects.

[6]. 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).

[7.] Approximately 40% of primary schools were 100% monoethnic since all their pupils were White British.

[8]. 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.

[9]. The standard deviation (SD) is the square root of the variance.

[10]. 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.

[11]. 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).

[12]. 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 achievement of these pupils exceeded that of their mono-lingual English peers.

[13]. 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 achievement between these groups (DfES, 2006).

[14]. For example Fryer & Levitt's ECLS-K sample contained an average of only 20 pupils per school (Fryer & Levitt, 2004, p449).

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TABLE 1: Descriptive statistics for the sample

Variable	Value	Count	%	KS2 (age 11) normal score mean	KS2 (age 11) normal score 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	0.96
	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 test score 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 achievement at age 7, achievement at age 11 and for pupil progress age 7 to age 11

	Age 7 score		Age 11 score		Progress age 7-11	
Value	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: 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

	FSM-girl		FSM-boy		No FSM-girl		No FSM-boy	
Ethnic group	Mean	SE	Mean	SE	Mean	SE	Mean	SE
White British	-0.24	*(0.003)*	-0.13	*(0.003)*	-0.10	*(0.002)*	0.00[(a)]	*(0.002)*
White Other groups	-0.04	*(0.016)*	0.04	*(0.016)*	0.11	*(0.009)*	0.19	*(0.008)*
Mixed White & Caribbean	-0.19	*(0.016)*	-0.11	*(0.016)*	-0.12	*(0.012)*	**-0.04**	*(0.012)*
Other Mixed heritage	-0.11	*(0.014)*	-0.02	*(0.014)*	0.02	*(0.009)*	0.11	*(0.009)*
Indian	-0.09	*(0.017)*	0.00	*(0.017)*	0.03	*(0.008)*	0.12	*(0.008)*
Pakistani	-0.18	*(0.011)*	-0.11	*(0.011)*	-0.08	*(0.008)*	**-0.01**	*(0.008)*
Bangladeshi	0.09	*(0.015)*	0.16	*(0.015)*	0.08	*(0.014)*	0.15	*(0.014)*
Other Asian groups	0.09	*(0.030)*	0.14	*(0.030)*	0.18	*(0.017)*	0.24	*(0.017)*
Black African	-0.03	*(0.014)*	-0.05	*(0.014)*	0.06	*(0.011)*	0.04	*(0.011)*
Black Caribbean	-0.17	*(0.014)*	**-0.18**	*(0.015)*	**-0.13**	*(0.010)*	**-0.14**	*(0.011)*
Other Black groups	-0.19	*(0.027)*	-0.15	*(0.028)*	-0.08	*(0.021)*	-**0.05**	*(0.021)*
Chinese	0.38	*(0.043)*	0.44	*(0.043)*	0.38	*(0.022)*	0.44	*(0.022)*
Any other ethnic group	-0.11	*(0.011)*	-0.03	*(0.011)*	-0.06	*(0.007)*	0.02	*(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.
Contrasts between minority ethnic groups and White British pupils within each of the four FSM and gender combinations were made by systematically changing the base group (White British-NoFSM-Boys, White British-NoFSM-girls, White British-FSM-Boys and White British-FSM-girls) and evaluating the resulting minority ethnic group coefficients. ***Bold*** *figures indicate the ethnic group made significantly less progress than White British pupils of the same FSM and gender combination (p<.05). Underlined figures indicate the ethnic group made significantly more progress than White British pupils of the same FSM and gender combination (p<.05).*

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

Variable	High Black Caribbean Schools (3+ Black Caribbean pupils)[(a)]	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	.03 (.56)	-.00 (.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 quintile	23.3%	19.8%	

Notes: [(a)] 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)

	School quality quintile				
Ethnic Group	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: School level random effects (variance and covariances) from the multilevel model

Parameter	Coeff.		SE	Correlation
Between schools				
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
Between pupils				
Cons / Cons	0.2477	*	0.0023	
Age 7 / Cons	0.0154	*	0.0012	
Age 7 / Age 7	0.0282	*	0.0019	

*Note: * indicates p<.05. 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 achievement indicating the particular school a pupil attends makes a greater difference for the progress of pupils with low prior achievement than those with average or high prior achievement.*

Figure Captions

Figure 1: Progress age 7-11 by ethic 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: **Predicted age 11 average test score by age 7 score for boys not entitled to FSM (top left), girls not entitled to SM (top right), boys entitled to FSM (bottom left) and girls entitled to FSM (bottom right).**

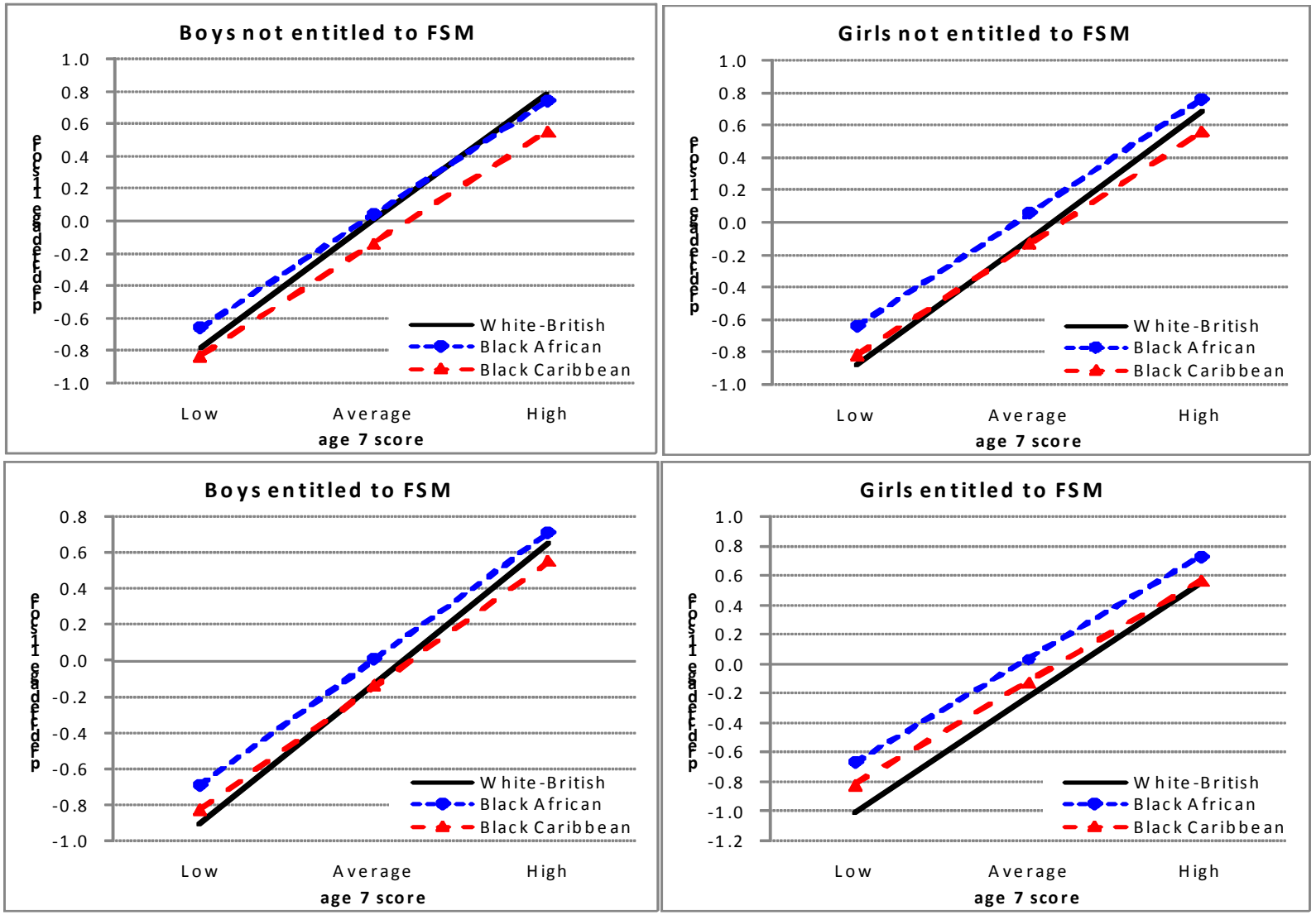


Figure 2: School regression lines (880 High Black Caribbean schools)

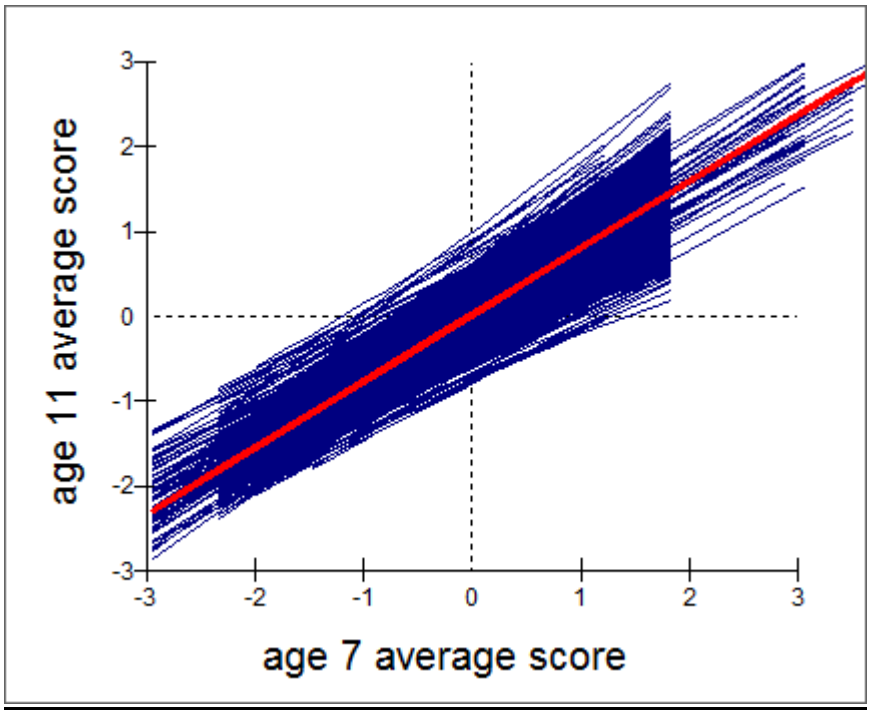


Figure 3: Correlation between school intercepts and the White British-Black Caribbean gap.

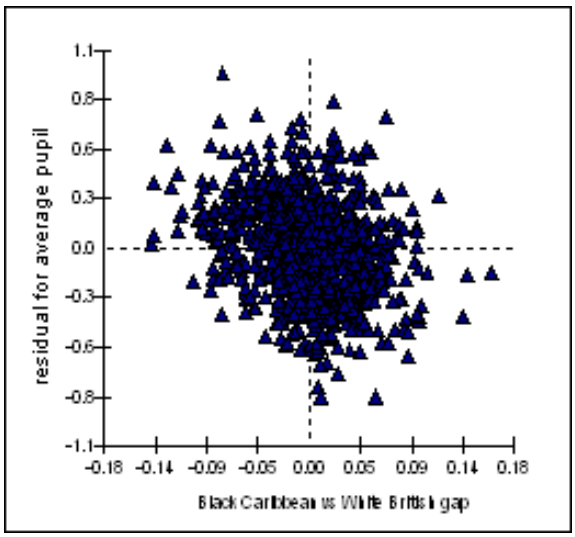


Figure 4: Correlation between school residuals for the Black Caribbean gap and the FSM gap

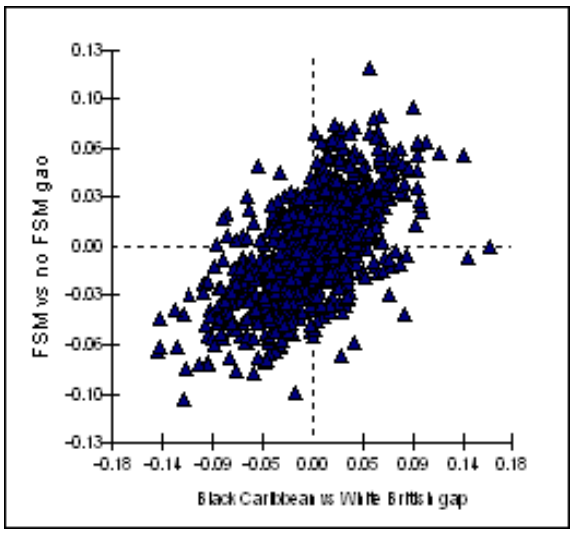
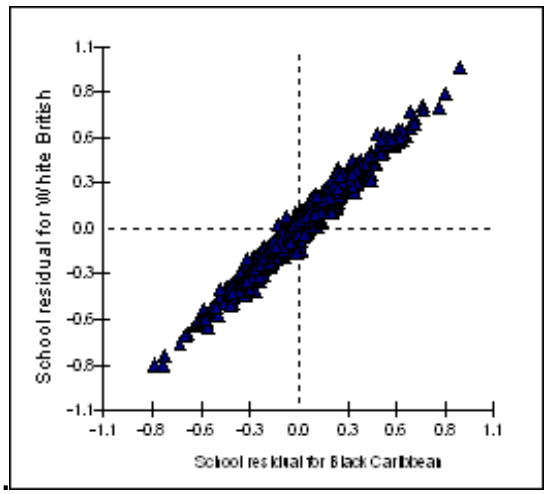


Figure 5: School effects on the progress of White British and Black Caribbean pupils



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.*