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School effects and ethnic, gender and socio-economic gaps in educational achievement at age 11

ABSTRACT

There are long-standing achievement gaps in England associated with socio-economic status (SES), ethnicity and gender, but relatively little research has evaluated interactions between these variables or explored school effects on such gaps. This paper analyses the national test results at age 7 and age 11 of 2,847 pupils attending 68 mainstream primary schools in an ethnically diverse inner London borough. The groups with the lowest educational achievement and poorest progress were both Black Caribbean and White British low SES pupils. White British middle and high SES pupils made substantially more progress than White British low SES pupils, significantly increasing the SES gap over time. However low and high SES Black pupils made equally poor progress age 7-11. School effects on pupil progress were large, but there was no evidence of differential school effectiveness in relation to SES, ethnicity or gender. Low SES pupils in the more effective schools performed significantly better than high SES pupils in the less effective schools, but all pupils (both low and high SES) benefit from attending the more effective schools and so these schools do not eliminate the SES gap. The limits to change that may be achieved by schools alone are discussed.

INTRODUCTION

Perhaps the most prevailing inequalities in educational achievement in England are those associated with socio-economic status (SES), ethnicity and gender. While much research on equity gaps has focussed on secondary schooling, low achievement at the end of primary school is a key risk factor for subsequent low achievement at age 16, for leaving full-time education at the earliest opportunity, and for long term employment and occupational outcomes (Boudon, 1974; McIntosh & Vignoles, 2000; Kingdon & Cassen, 2010). Concerns about unequal achievement in relation to ethnicity, SES and gender are long standing (e.g. Douglas, 1964; DES, 1985; Strand, 1998, 1999; Sirin, 2005) and recent topic reviews from the Department for Education in England highlight the continued achievement gaps in contemporary data (see DfES, 2006; DCSF, 2007; and DCSF, 2009 for comprehensive reviews in relation to ethnicity, gender and socio-economic disadvantage respectively). The most recent 2011 national data at age 11 (DFE, 2011) reveals that the proportion of pupils achieving the national benchmark of level 4 or above in reading, writing and mathematics ranged from 60% of Black Caribbean, 63% of mixed White and Black Caribbean, 64% of Black African, 68% of White British, 68% of Bangladeshi, 77% of Indian and 80% of Chinese pupils. There were also significant gaps in relation to gender, with 62% of boys compared to 72% of girls achieving this benchmark. Lastly there is a substantial gap related to SES with 49% of pupils entitled to a free school meal (FSM) (a commonly used indicator of poverty) achieving the benchmark compared to 71% of those not eligible for a FSM.

The Government's national "closing the gap" agenda is raising awareness of these important issues. However little research has sought to compare the relative size of these gaps. It is important to stress that not all 'gaps' are of the same size, for example the social class gap in achievement in England has been reported to be six times larger than the gender gap, and three times larger than the ethnic gap, at age 14 (Strand, 2011) and at age 16 (Strand, in press). However such comparative data, by themselves, are limited. There is substantial overlap between ethnicity and SES in England, as there is in other countries in Western Europe and in the US (OECD, 2011; US Census Bureau, 2006). For example in primary schools in England 14% of White British pupils are entitled to a FSM compared to 9% of Indian, 10% of Chinese, 25% of Pakistani, 30% of Black Caribbean, 35% of Bangladeshi and 44% of Black African pupils (DCSF, 2009, p18). Thus some of the apparent ethnic gaps in achievement may reflect the substantial difference in SES between ethnic groups. Regression analysis allows for estimating the unique effect of different independent variables, such as ethnicity and SES, but the majority of studies exploring ethnic achievement gaps use SES simply as a control variable, failing to identify potential interactive effects (See Strand, in

press). While some studies test and explicitly reject interactions between ethnicity and SES or ethnicity and gender (e.g. Connolly, 2006; Rothon, 2007) other studies report substantial interactive effects. For example in an analysis of the age 11 national test data for 530,000 pupils in England, Strand (2010) reports significant interactions between ethnicity and SES and between ethnicity and gender, such that there was no achievement gap between White British and Black Caribbean boys among those in poverty (and indeed Black Caribbean girls achieved significantly higher than White British girls, 0.10 SD) but substantial underachievement by both Black Caribbean boys and girls relative to White British pupils (-.34 SD and -.25 SD respectively) among those from better-off families (not entitled to FSM). The gaps in progress age 7-11 were similar indicating these patterns became more pronounced as pupils progressed through primary school. Similarly at age 16, Strand (in press) analysed the nationally representative Longitudinal Study of Young People in England (LSYPE) revealing strong ethnic by SES interactions showing White British pupils were the ethnic group with the lowest achievement/poorest progress among low SES students but one of the ethnic groups with the highest achievement/greatest progress among high SES students. Additive models, treating the effect of SES as uniform across all ethnic groups, can lead to substantive misspecification. In particular it can lead to inflated predictions of what White students of low SES will achieve and conversely to underestimates for White pupils from high SES backgrounds (as we shall see later). The implications for schools with high concentrations of such students are clear. However studies explicitly assessing possible interactive effects are relatively rare. This has led Warikoo and Carter (2009) to argue in a recent review that “much of current research on race, ethnicity, culture and achievement relies on an additive, causal model rather than an intersectional model that exposes the complex and variable outcomes within different racial and ethnic groups” (p381).

A frequently proposed explanation for ethnic and SES achievement gaps, and particularly for why the gaps might grow over time, is that low SES and 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 (2011) 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). Other researchers have addressed the issue by directly modelling whether schools vary in their

outcomes for particular groups of pupils (differential school effectiveness). If schools are an important influence on equity gaps, then these gaps would be expected to be larger in some schools than in others. For example some schools may be more effective in promoting the progress of low SES than high SES pupils, or boys versus girls, or some ethnic groups more than others. There is very little research on this phenomenon (Kyriakides, 2004, p143) and current evidence on the existence of differential school effectiveness is mixed (see a recent review by Strand, 2010). However the existence of differential school 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 would be important for the design and implementation of policies on equal opportunities.

The current paper explore the impact of ethnicity, gender and SES, and the way these factors interact, in relation to educational achievement at age 11 within an ethnically and socially diverse inner London borough. In addition the analysis draws on pupil level background data from the School Census, supplemented by Local Authority data, to determine the extent to which factors such as pupil age, mobility, special educational needs (SEN), English as an additional language (EAL) and school attendance can account for achievement gaps. Finally the paper includes a measure of pupils' prior achievement to model educational progress age 7-11 and establish the extent of the 'school effect' on pupil progress, whether achievement gaps vary significantly between schools, and whether more 'effective' schools also reduce or even eliminate such achievement gaps.

METHOD

The sample

The Local Authority (LA) is a densely populated inner London borough serving one of the most ethnically and linguistically diverse populations in England. Over 40% of pupils have EAL, and over 150 languages are spoken at home. Nearly three-quarters (72%) of pupils are from ethnic minority groups, with the three largest ethnic groups being Black African (29%), White British (24%) and Black Caribbean (12%) pupils. The LA has high levels of deprivation with one-third (33%) of pupils entitled to FSM, more than double the national average for primary schools of 16% (DCSF, 2009). 43% of primary school pupils live in neighbourhoods identified as among the most deprived 10% in England, and almost four-fifths (79%) live in the 20% most deprived neighbourhoods, over four times the national average in both cases. Overall the LA is ranked 41 out of 326 LA districts in England on the Government Index of Multiple Deprivation 2010 (IMD, 2011). Despite this challenge, in recent years the national test results

at age 11 have improved faster than the national average, and in 2009 the proportion of pupils in the LA achieving the national benchmark of level 4 or above in English and maths reached the national average (72%). The dataset analysed here consists of the 2008 national test results of all 2,836 pupils aged 11 attending the 68 maintained primary schools in the LAⁱ.

Educational achievement

Age 11 average test score: At age 11 pupils in England complete national tests in English, mathematics and scienceⁱⁱ. These are often reported as National Curriculum levels, with the 'typical' pupil expected to achieve level 4 and higher attaining pupils achieving level 5. However as outcome variables NC levels lose the more detailed information contained in the raw test marks. The dependent variable used here was each pupil's average test mark across all eight national tests: English (reading, writing and spelling); mathematics (mental maths and two written papers, one allowing and one not allowing the use of calculators) and science (two written papers). While 98.5% of pupils had marks on all three tests, the use of the average mark allowed 40 pupils (1.4%) who had completed only two of the three tests to be included. Three pupils who completed only a single test and eight pupils who completed none of the tests were treated as missing. To aid interpretation average test marks was subject to a normal score transformation to give a mean of zero and SD of 1.

Age 7 average test score: Prior attainment was assessed through national tests completed in reading, writing and mathematics at age 7. Pupils' points scores were averaged across the three tests and transformed to a normal score with mean of zero and SD of 1.

Explanatory variables

Socio-economic Status (SES): Reliable and valid data on the socio-economic class of a pupils' home are costly and difficult to collect and are not available in the national school census. However two measures of socio-economic disadvantage are available. First, entitlement to a FSM is a direct measure of family poverty, since only students from families in receipt of state benefits such as income support, jobseekers allowance or child tax credits (if below 60% of national median income) are eligible for FSM. Second, the Income Disadvantage Affecting Children Index (IDACI) is a measure of poverty in the immediate neighbourhood in which the pupil resides, indicating the percentage of children under the age of 16 living in low income households. This data is produced by central government and is available for localised areas called super output areas, of which there are 32,482 in England, each containing approximately 1,500 peopleⁱⁱⁱ. Results are expressed both as a percentage and in decile bands, where decile 1 indicates the 10% most disadvantaged neighbourhoods nationally and deciles 10 the 10% least disadvantaged neighbourhoods nationally.

Entitlement to a FSM was strongly associated with educational achievement at 11, as shown in Table 1. There was a difference of over one-third of a standard deviation (0.37 SD) in achievement between those entitled and those not entitled to a FSM. For IDACI, the number of pupils within IDACI deciles 3-10 was relatively small, so these deciles were combined to indicate a *relatively* advantaged group. There was no significant difference between the achievement of pupils living in the 10% most disadvantaged (decile 1) and the 11%-20% most disadvantaged (decile 2) neighbourhoods, but both these groups had significantly lower achievement than those living in relatively more advantaged neighbourhoods (deciles 3-10) with a difference of 0.20 SD between deciles 1-2 and deciles 3-10.

The two measure of disadvantage are related but not identical. While around 87% of those entitled to FSM reside in neighbourhoods that are within the 20% most disadvantaged nationally, 13% of those entitled to FSM do not. Equally, of those pupils residing in neighbourhoods within the 20% most disadvantaged nationally over 60% are not entitled to FSM. Being entitled to a FSM was strongly negatively associated with achievement whatever the deprivation decile of the neighbourhood in which the pupil resided, and so is a powerful direct measure of family economic disadvantage. IDACI is however a useful adjunct to allow some differentiation of relative socio-economic disadvantage among the two-thirds of pupils not entitled to a FSM, who would otherwise be treated as equivalent^{iv}. The two measures were therefore combined to construct a measure of SES contrasted across three levels: *Low SES*: Pupils entitled to FSM (n=920, 33% of the sample); *Middle SES*: Pupils not entitled to FSM but living in one of the 20% most deprived neighbourhoods in England (IDACI deciles 1-2) (n=1397, 50% of the sample); *High SES*: Pupils not entitled to FSM and living in a relatively advantaged neighbourhood (IDACI deciles 3-10) (n=463, 17% of the sample). It is important to note that these terms describe the relative socio-economic status of pupils within the LA, since in absolute terms only a small minority of pupils attending LA primary schools might be described as socio-economically advantaged (e.g. only 3.2% of pupils reside in neighbourhoods that are below national average in terms of deprivation i.e. IDACI deciles 6-10).

Ethnic group: Pupil's ethnic group was recorded in one of 21 ethnic categories as used in the national school census. Numbers in several of the ethnic categories were low so for the purpose of analysis the original 21 ethnic groups were recoded into eight so that each ethnic group contained a minimum of 100 pupils. This sometimes required aggregation of small groups to form a sufficiently large group for analytic purposes (e.g. Bangladeshi, Pakistani, Indian and Any Other Asian groups were combined into the category 'Asian or Asian British').

The largest group in the sample was Black African pupils (33%) followed by White British (25%) and Black Caribbean (12%). The other ethnic groups each constitute around about 5% of the sample. Although White British are not the largest group, for the purpose of comparison they were used as the reference group since they are the majority group in England.

Gender: Boys are coded 0 and girls coded 1.

Age within year group: Pupil age in completed months at the time of sitting the age 11 tests was calculated. This value was deviated from the sample average (134 months) to give a variable with a mean of 0 and range -5 to 6.

Special education needs (SEN): Pupils without any identified SEN were the reference group with three dummy variables for different stages of identified SEN. The first stage is at the discretion of the school which identifies the pupil and decides the type of provision from within the school's own resources (*School Action*). The second stage (*School Action Plus*) reflects the school involving some external professional in providing for the pupil's needs. The final stage, for pupils with the greatest needs, is a statutory assessment which may lead to a *statement* of special educational needs for the pupil.

Pupil mobility: Pupils who remained in the same school throughout the age 7-11 period were the reference group with two dummy variables for those who joined their school in Y3/Y4 and those who joined later in Y5/Y6.

Absence: For each pupil the percentage of sessions (half days) missed due to absence (either authorised or unauthorised by the school) in the autumn and spring terms preceding the summer term national tests was recorded. The mean was 4.8% and SD 5.6.

EAL: This was a binary measure identifying those pupils with English as their first language (coded 0) against those with a language other than English as their first language (coded 1). The definition in the School Census is: "A first language other than English should be recorded where a child was exposed to the language during early development and continues to be exposed to this language in the home or in the community. If a child was exposed to more than one language (which may include English) during early development the language other than English should be recorded, irrespective of the child's proficiency in English." Thus it is important not to interpret this as a measure of fluency or proficiency in English but as a marker of exposure (at home or in the wider community) to a language other than English.

RESULTS

Mean age 11 scores and equity gaps

Table 1 presents the age 11 scores by ethnicity, gender and SES. The table shows the mean age 11 score and also the proportion of pupils in each group achieving level 4 or above in both English and mathematics and the proportion achieving level 5 or above in both English and mathematics. The differences between all three SES groups were statistically significant, girls on average achieved significantly higher scores than boys, and Mixed Other groups scored significantly higher, and Black Other groups and Black Caribbean pupils significantly lower, than White British pupils. The table includes a 'gap' measure which for SES is the contrast between high vs. low SES, for gender the contrast between boys vs. girls, and for ethnicity the contrast between White British pupils and the lowest scoring group i.e. Black Caribbean. The SES gap is the largest at over half a SD (0.57 SD). However the ethnic gap is not much smaller, with the gap between White British and Black Caribbean pupils just under half a SD (0.45 SD). The gender gap, while statistically significant, is relatively small at 0.08 SD, about one sixth of the size of the SES and ethnic gaps.

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This simple analysis of means is limited because of confounding particularly between ethnicity and SES. There is significant variation between ethnic groups in their distribution across levels of SES. For example 30% of White British pupils are entitled to FSM, compared to 36% Black Caribbean, 37% Mixed White and Caribbean, 40% of Black Other groups, 41% of White other groups and 42% of Asian pupils. At the other end of the spectrum, 28% of White British pupils are in the high SES group compared to only 15% of Black Caribbean and White Other pupils, 12% of Asian, 11% of Black Other and just 9% of Black African pupils.

Regression Modelling

In order to determine the unique influence of each explanatory variable multiple regression analysis is employed. School effects are also of interest and to capture the hierarchical nature of the data multi-level regression models were used. All analyses were completed using the MLWin package (V2.25) with pupils (level 1) grouped within schools (level 2). The analysis proceeds in three steps, each associated with a particular analytic model. First, a 'raw score' model explores the unique associations of achievement with ethnicity, SES and gender, while also testing for interactions between the explanatory variables. Second, a 'contextual' model included controls for a range of background variables such as pupil age, level of SEN, pupil

mobility, attendance, EAL and school composition factors, and examines the extent to which these factors can account for ethnic, SES and gender gaps^v. Third, a ‘value-added’ model includes prior achievement at age 7 for an analysis of progress during primary school (age 7-11). The full results of each model are contained in Table 2^{vi}. This text below highlights the main results from the analyses.

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Model 1 - ‘Raw score’ model for ethnicity, SES and gender

Initially a main effects model was computed. This was then compared against a model including interactions between ethnicity, gender and SES to determine whether these significantly improved the fit of the model. All interactions were initially evaluated. The three way interaction between ethnic group, gender and SES, and the two way interactions between gender and SES and between ethnicity and gender were not significant and were eliminated^{vii}. However the ethnic group by SES interaction was highly statistically significant and substantially reduced the -2LL by 41, $df=16$, $p<.01$. The SES gradient among White British pupils (0.92 SD) is steeper than for any minority ethnic group, and significantly steeper than for Black Caribbean, Black African, Mixed White & Caribbean and Asian pupils (see significant interaction coefficients in Table 2). Thus It is not possible to talk about the main effect of ethnicity or the main effect of SES, these can only be understood in the context of their interaction. Table 3 therefore presents the difference between the mean scores for each ethnic group and the mean score for White British pupils at each level of SES, indicating statistically significant ethnic contrasts within each level of SES. The results are also presented in Figure 1, although for reasons of clarity only the results for the three largest ethnic groups are presented.

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The results show just how misleading conclusions about achievement gaps based on main effects can be. SES is a far stronger differentiator of achievement for White British pupils than for minority groups, indeed among Black Caribbean and Black African groups there is almost no SES gradient at all. Foregrounding ethnicity, the ethnic gaps vary substantially at different levels of SES. For low SES pupils White British are the lowest performing ethnic group and

indeed Black African pupils score significantly higher than their low SES White British peers. For middle SES pupils, performance decrements relative to White British pupils start to appear, although only Black Caribbean pupils achieve significantly lower results than White British pupils. However for high SES pupils White British are the highest attaining group (along with Mixed other groups) and achieve significantly higher scores than their Black African, Black Caribbean, Mixed White & Black Caribbean and Asian peers. In summary, failing to account for the interaction substantially over-estimates the achievement of low SES White British pupils and under-estimates the achievement of high SES White British pupils. There is no evidence of ethnic underachievement at low SES, indeed White British pupils are the lowest scoring group. However there is significant underachievement by Black pupils from middle and particularly high SES backgrounds^{viii}.

Model 2: 'Contextualised' model of achievement

This model adds pupil background and school composition variables to examine whether these alter the patterns of achievement in relation to ethnic group and SES. There were strong and significant effects for all the pupil background variables except EAL (see Table 2). Overall including these variables significantly improved the fit of the model increasing the total variance explained from 9.2% to 36.1%. Pupil age was positively associated with age 11 score, with an increase of .027 SD for every completed month, a contrast of 0.16 SD between those 3 months below/above the average age. Pupils at School Action scored -0.78 SD lower, those at School Action Plus -1.05 SD lower, and those with statements of SEN -1.67 SD lower, than those with no identified SEN. Compared to those who had been in the same school for the whole period age 7-11, those who joined in Y3/Y4 scored -0.14 SD lower and those who joined in Y5/Y6 -0.38 SD lower. For each percentage point increase in absence age 11 score decreased by -0.017 SD so, given the SD of %absence was 5.6, there was a contrast of -0.20 SD between pupils one SD below/above the mean absence. All these effects are net of all other factors in the model. The school composition variables described in Table 4 were all entered initially and then removed via backwards elimination. None of the composition variables had a statistically significant association with age 11 score and so all were removed.

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How do these additional factors impact on the ethnic and SES gaps? Table 3 gives the ethnic contrasts against White British students at each level of SES and Figure 2 graphs the scores for the three main ethnic groups. Overall, the coefficients are somewhat attenuated but with

substantially the same pattern of results. Looking at White British pupils, the SES gap is reduced from $-.92$ to $-.55$ SD. This reflects in particular higher absence, greater SEN, and higher levels of pupil mobility among low SES pupils relative to the high SES group. However a substantial SES gap of over half a SD remains. In relation to ethnicity, among the low SES pupils there are no longer any significant differences between ethnic groups, thus the pupil background factors can account for the greater resilience of the Black African low SES pupils. A particularly marked factor here was pupil absence, with Black African pupils having the lowest level of absence of any ethnic group (absence for Black African low SES pupils was 3% compared to 10% for White British low SES pupils, See Appendix 1). However the significant underachievement of Black pupils from high SES backgrounds remains, and Black African and Black other groups now join Black Caribbean pupils in also underachieving significantly relative to White British among middle SES pupils. These gaps cannot be accounted for by age, SEN, mobility, attendance, EAL or school composition variables^{ix}.

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Model 3: value-added model of pupil progress age 7-11

Do the gaps at age 11 described above just reflect prior differences already existing at age 7, or have ethnic and SES gaps narrowed or increased during the last four years of primary school (age 7-11)? Such an analysis can only be completed for pupils with a valid age 7 test score, which include the majority (2,524 or 91%) of the 2,751 pupils with age 11 scores and all pupil background variables^x. The analysis is completed on this sample. Boys make more progress than girls age 7-11 (0.12 SD), though as we have seen they still achieve on average lower scores than girls at age 11. Older pupils make slightly less progress than their younger peers with a -0.05 SD score difference between those three months below/above the mean age. Pupils identified with SEN make significantly less progress than pupils without identified SEN (-0.23 , -0.31 and -0.74 SD respectively for school action, school action plus and statemented). The effect of mobility on pupil progress depends upon when the pupil joined their new school, with a significant negative impact on progress only for those who joined in Y5/Y6 (-0.12 SD). Absence was also negatively related to progress, with a 0.12 SD difference between pupils one SD above/below the mean absence. Pupils identified with EAL make slightly more progress than those not identified, although the effect is short of significance (0.06 SD). Again none of the school composition variables had significant associations with pupil progress.

The interaction between ethnic group and SES remained highly significant. Table 3 presents the ethnic group contrasts at each level of SES and Figure 3 graphs the data for the three main ethnic groups. In reading the figure the central horizontal 'zero' line indicates average progress 7-11 across the sample.

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Foregrounding SES, low SES pupils make less progress than their middle and high SES peers, so the SES gap widens further as children progress through primary school. White British pupils from low SES backgrounds make -0.32 SD less progress, and those from middle SES backgrounds make -0.14 SD less progress, than their high SES peers. The SES gap is particularly pronounced for White British pupils, but also for White Other, Mixed Other and Any Other pupils. However this is not true for Black groups. Indeed high SES Black pupils make no more, and in some cases less, progress than low SES Black pupils. Foregrounding ethnicity, there are no significant ethnic group differences among the low SES group. White British low SES pupils, as much as any other ethnic group, make less than expected progress through primary school. However among middle SES backgrounds Black African, Black Caribbean, Black Other and Mixed White and Caribbean groups all make significantly less progress than White British pupils. At High SES again it is Black Caribbean, Black African and Mixed White and Caribbean pupils, as well as Asian pupils, who make significantly less progress than their White British peers. Thus while middle and high SES is associated with significantly greater progress for White British pupils this is not the case for Black groups. In summary, poor progress age 7-11 is notable for pupils from low SES backgrounds whatever their ethnic group, but there is also evidence of particularly poor progress for Black pupils from middle and high SES backgrounds.

Variation across subjects

Analyses were also completed separately for progress in relation to 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 one major exception: the positive coefficient for boys progress for average age 11 score (0.12 SD) reflects boys making better progress than girls in mathematics (0.31 SD) and science (0.09 SD) but poorer progress than girls in English (-0.12 SD). However importantly the pattern of ethnic minority contrasts at different levels of SES were consistent across all subjects, with Black African and Black Caribbean middle and high SES pupils consistently underachieving relative to their White British peers. While subject differences are not unimportant, 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 (Strand, 2006). This warrants the focus on average test score as the key indicator of achievement at age 11.

School effects

A substantial proportion (two-thirds) of the pupil variance in age 11 scores can be explained by prior achievement and the pupil background variables, although these factors explain much less (under one-quarter) of the variation between schools. Substantial school effects remain accounting for around 25% of the residual variance and, given the inclusion of prior achievement, may be interpreted as effects on pupil progress age 7-11. Model 3 shows the school level variance in intercepts is .093 indicating (by taking the square root of the variance) a SD of 0.30. Thus there is a 0.60 SD difference in pupil progress between a school one SD above the LA average in value-added (approximately the school ranked 11) and a school one SD below the LA average (approx. the school ranked 57). A graphical display of the outcomes for the 68 primary schools is given in Figure 4.

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A key question here was the extent to which schools differ in the size of their ethnic, SES or gender achievement gaps. Given the introduction of the pupil premium in England^{xi}, school variation in the FSM gap in progress is of particular interest. Variation in school level coefficients were tested in a minor variation of model 3 which employed the FSM indicator rather than SES. The coefficient for each of three parameters (FSM, Black Caribbean and gender) were allowed in turn to vary at level 2 (school level). The FSM gap did not vary across schools, in fact school variance in the FSM gap was so close to zero as to be negligible such that the MLWin programme set the FSM parameter to zero at level 2 (i.e. no school showed any variation from the LA average FSM gap in pupil progress). A similar result was apparent when the coefficient for Black Caribbean was allowed to vary at the school level. There was some (very small) school variation in the gender gap, but this was not significant (Level 2 gender coefficient= 0.010, SE= 0.007) and no school had a gender gap that could be reliably differentiated from the LA average. The only variable for which there was statistically significant school variation was in relation to prior achievement, with evidence of some (small) school variation in the slope of the relationship between prior achievement and age 11 score (Level 2 age 7 coefficient= 0.009, SE= 0.003) although only two schools had slopes that varied significantly from the LA average. Thus overall there is little evidence of differential school effectiveness in relation to any of the pupil background variables.

The absence of school variation in relation to equity gaps precludes further analysis within the multi-level model, so a simple descriptive analysis is presented below, focussing on the key FSM achievement gap. From Figure 4, we can see there are 16 schools (24%) where pupil progress is significantly greater than the LA average (i.e. the lower bound of the CI is >0), 37 schools where progress cannot be statistically distinguished from the LA average (i.e. the CI overlaps the zero line), and 15 schools (22%) where progress is significantly less than the LA average (i.e. the upper bound of the CI is <0)^{xii}. Table 5 contrasts the 'raw' age 11 scores of pupils entitled and not entitled to FSM in these less, average and more effective schools.

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The table serves to make three simple points. First, pupils entitled to FSM in the more effective schools had higher achievement (0.21 SD) than pupils not entitled to FSM in the less effective schools (-0.06 SD). This attests to the fact that schools can and do make a significant difference to pupil achievement and can substantially improve the achievement of socially disadvantaged pupils. Second, school SES composition is not a bar to being an effective school, as defined by the contextual value added measure. Thus the proportion of pupils entitled to FSM did not differ significantly across the three levels of effectiveness, as would be expected given of the absence of a significant composition effect for the school percentage FSM. However third, despite the first point above, it is apparent that there are limits to what schools can do to close the FSM gap. It is notable that the gap in age 11 score between those pupils entitled and those not entitled to FSM is somewhat larger in the less effective schools (-0.49 SD) than it is in the average (-0.34 SD) or more effective schools (-0.33 SD). However the more effective schools do not eliminate the FSM gap. Thus even if all schools improved to the level of the most effective, there would still be a substantial achievement gap in relation to FSM.

DISCUSSION

Equity gaps in achievement and progress

This study highlights the importance of explicitly evaluating interactions between ethnicity and SES in their associations with educational achievement. Analyses that consider only the additive effects of ethnicity and SES substantially misrepresent the data. In particular White British pupils were the ethnic group most polarised by SES, being simultaneously both the

lowest and the highest attaining ethnic group at age 11, depending on the level of SES. Making comparisons between ethnic groups, even when controlling for SES, can be extremely misleading if it is assumed that SES has the same 'effect' for all ethnic groups, or conversely that ethnic gaps are the same at all levels of SES. While some authors have concluded that simple additive models are sufficient to reflect achievement gaps related to ethnicity, gender and SES (e.g. Connolly, 2006, Rothson, 2007) the current results support other research identifying significant interactions between these factors (e.g. Strand, 1999; Kingdon & Cassen, 2010, Dekkers et al. 2000). While the current data is drawn from a specific London LA, similar results have been reported in other London LAs (e.g., Strand 1999; Demie & Lewis, 2011), in national data for all 11 year olds in England (Strand, 2010) and in a nationally representative English sample at age 16 (Strand, in press).

The results show that low SES pupils from all ethnic groups had below average achievement at age 11. Differences in attendance, SEN and pupil mobility were able to explain approximately 40% of the SES gap among White British pupils, but a substantial 0.55 SD gap remained. Particularly troubling is the finding that low SES pupils, from all ethnic groups, make less progress than their more advantaged peers during the last four years of primary school. Far from equalising outcomes, gaps grow between age 7-11 with White British pupils from middle and high SES backgrounds pulling ever further ahead of their low SES peers. Poorer progress by pupils entitled to FSM compared to those not entitled has also been observed at an earlier stage between age 4-7 (Strand, 1999) and is a notable feature of national data in England at all stages 7-11, 11-14 and 14-16 (DCSF, 2009; Strand, 2010, 2011). Such findings have been termed 'Matthew effects' (Stanovich, 1986) or in everyday parlance 'the rich get richer and the poor get poorer'. Of course just because this gap widens during a period when students are attending schools does not mean that schools themselves are the cause of widening gaps, we will explore this further below.

However low SES is not the only risk factor for low achievement and poor progress. Substantial ethnic gaps exist among pupils from middle and high SES backgrounds. Black pupils from middle SES and high SES backgrounds have substantially lower achievement than their similarly advantaged White British peers. Black pupils had better attendance and higher levels of SEN and mobility than White British pupils, but rather than closing the gap including these variables served only to further exacerbate the underachievement of middle and high SES Black pupils^{xiii} (see Figure 3). Again it is troubling that these gaps appear to grow between age 7-11. Black Caribbean, Black African and Mixed White and Black Caribbean pupils from middle and high SES backgrounds make substantially less progress than their White British peers, further widening the gaps during the last four years of primary

school. Indeed middle and high SES Black pupils make no more, and in some cases even less, progress than their low SES peers. These effects on progress are net of controls for pupil background variables such as age, SEN, attendance, pupil mobility and EAL. A key question is why these groups do not benefit from higher SES as their White British peers do. The SES indicator employed here utilises a neighbourhood measure of disadvantage (IDACI) to differentiate among non-FSM pupils, and this may not adequately control for possible social advantages enjoyed by middle and high SES White British pupils. Black and White pupils may come from neighbourhoods broadly equivalent in terms of deprivation, but may differ in other key variables such as family income, educational resources in the home, parental education & involvement or levels of social and cultural capital (e.g. Mandara, Varner, Greene & Richman, 2009; Kiernan & Mensah, 2011; Strand & Winston, 2008)^{xiv}. However it is relevant to note that adding further measures from the LA Pupil Voice survey (see Appendix 2) on home resources, levels of parental support and involvement and cultural capital did not serve to explain the lower achievement of the middle and high SES Black pupils.

School effects

Differences in school quality are often posited as central to both SES and ethnic achievement gaps (e.g., Fryer & Levitt, 2004; Wilson, Burgess & Briggs, 2011; Kingdon & Cassen, 2010). School effects in this study were relatively large with a 0.60 SD difference between the less and more effective schools, after adjusting for prior achievement and pupil background. The school level accounts for around 25% of the residual variance in pupil progress which is high compared to the typical 5%-18% reported in a recent review (Sammons, 2007). The factors that lie behind these large school effects are not captured by the range of pupil background or school composition factors measured here. It can only be speculation but factors such as leadership and management, school ethos, or quality of teaching may account for these substantial differences in outcomes between schools (e.g., Harris, Chapman, Muijs, Russ & Stoll, 2006).

Importantly though there was no evidence of differential school effects on the progress of pupils in relation to pupil background variables such as FSM, gender or ethnicity. The absence of statistically significant school variation in relation to these factors may be a reflection of the relatively small number of schools (n=68). However an analysis of progress age 7-11 using national data from 534,000 pupils attending over 14,000 primary schools reports very similar results (Strand, 2010). Strand found no schools that reliably reversed the usual 'within school' pattern of FSM pupils making less progress than non-FSM pupils, or Black Caribbean pupils making less progress than White British pupils. Indeed primary schools that added the most value for White British pupils, girls, or non-disadvantaged pupils

also added the most value for Black Caribbean pupils, boys or pupils on FSM. The results may reflect Bayesian shrinkage in the ML estimates given the relatively small sample size within primary schools (average $n=41.9$, $SD=16.8$, inter-quartile range 29-53), although it should be stated that this sample size is not small compared to many studies (for example international comparative studies such as TIMSS aim to achieve within school sample sizes of $n=35$). However in primary schools the cohort size is relatively small compared to secondary schools, and it is notable that where differential schools effects have been reported this has tended to be in research with secondary schools (e.g., Nuttall, Goldstein, Prosser and Rasbach, 1989; Thomas, Sammons, Mortimore & Smees, 1997). Further research is currently being undertaken exploring school effects on progress age 7-11 with data aggregated over three years to achieve larger sample sizes. However sample size is not the only issue, since Strand (1999) reports no differential school effects on progress age 4-7 for a sample of 5,000 pupils from 55 primary schools with data collected over three successive cohorts (Strand, 1999).

Taken together these results suggest differences between schools, while they undoubtedly play some role, are unlikely to be the major locus of equity gaps in pupils' educational progress. While the SES and the White British-Black Caribbean gaps widen between age 7 and age 11, these gaps do not appear to be significantly greater in some schools than in others, making it difficult to sustain an argument that it is due to individual 'school quality'. As revealed in Table 4, while the most effective schools may raise the achievement of disadvantaged pupils, non-disadvantaged pupils may benefit just as much, so that these school do not eliminate the achievement gap. In short the *relative* performance of the disadvantaged remains similar even when the absolute performance of such groups has improved (Strand, 2010; Mortimore & Whitty, 1997). This suggests the influence of more systemic factors on equity gaps and it may be, as some authors have argued, that the results reflect widespread and pervasive low expectations on the part of teachers for low SES and Black pupils in English schools (e.g. Reay, 2006; Gillborn, 2008). However equally it may indicate there are substantial influences beyond the school gates which are outside the control of schools. Consistent 'within-school' gaps may indicate the influence of factors such as variation in the economic and social capital of families, the home learning environment, educational aspirations, neighbourhood or peer effects and other factors outside school. As Bernstein (1970) observed 'education cannot compensate for society'. While the current results suggest purely educational interventions aimed at 'failing schools' may have limited impact on equity gaps, focussing the attention of *all* schools on their 'within-school' gaps may be a more productive strategy. To this end the introduction of the Pupil Premium with the expectation that the grant will be used to support FSM eligible pupils, should focus on closing

the gap in attainment between them and their peers, and the publication of the FSM gap in school performance tables are positive developments, although it is too early to determine any impact on achievement gaps.

Conclusions

This analysis does not provide clear cut answers to the cause of gaps in educational achievement or to direct remediation strategies in relation to such gaps. However it articulates more clearly where such gaps lie. Explanations for achievement gaps based primarily on class, ethnicity or gender do not explain the nuances in the data and the interaction between these variables. This does not mean that all elements of these explanations are invalid. As Strand (in press) argues *“the greater progress of White British high SES pupils may reflect the stronger access to social and economic capital exerted by high SES pupils (e.g. Reay, 2006), but class based explanations also need to be able to account for why middle and high SES Black pupils do not make similar progress to their White British peers. Equally the underachievement of middle and high SES Black pupils may reflect factors within the school system such as teachers’ low educational expectations or pervasive racism within the educational process (e.g., Gillborn, 2008), but such accounts also need to be able to explain why there is no significant Black Caribbean-White British gap in achievement among low SES pupils”*. It is well to remember Mencken (1917) “there is always an easy solution to every human problem - neat, plausible, and wrong”. Complex social issues such as differential educational achievement and progress are rarely amenable to simple (single) explanations. This paper identifies such complexity and raises questions for more focussed research.

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Table 1: Age 11 average test score by ethnic group, gender and socio-economic status (SES)

Variable and values	Average score			Level 4+	Level 5+
	N	mean	SD	English & maths	English & maths
Free School Meals					
Entitled to a FSM	917	-.22	(0.89)	62%	8%
Not entitled to a FSM	1896	.16	(0.99)	75%	17%
IDACI					
Decile 1	1198	-.04	(0.95)	69%	12%
Decile 2	1003	-.00	(0.94)	70%	13%
Deciles 3-10	590	.18	(1.06)	72%	20%
SES					
Low	917	-.22	(0.89)	62%	8%
Middle	1392	.09	(0.97)	74%	15%
High	462	.35	(1.01)	78%	24%
Gap		0.57		14%	16%
Gender					
Boys	1431	-.02	(1.01)	68%	13%
Girls	1405	.06	(0.97)	72%	15%
Gap		0.08		5%	2%
Ethnic group					
White British	697	.20	(1.04)	74%	21%
White Other groups	178	.11	(1.11)	71%	18%
Mixed White & Caribbean	118	-.05	(0.88)	69%	9%
Mixed Other heritage	149	.25	(1.03)	80%	23%
Black African	882	-.03	(0.89)	70%	11%
Black Caribbean	347	-.25	(0.88)	62%	7%
Black Other groups	123	-.17	(0.88)	67%	8%
Asian / Asian British	129	-.06	(1.00)	70%	15%
Any Other ethnic group	213	-.02	(1.06)	67%	12%
Gap (White British vs Black Caribbean)		0.45		12%	14%

Note: Cases with missing data excluded so totals may not sum to 2,836.

Table 2: Multi-level regression analyses for age 11 score

	Null model		Model 1 (Raw scores)		Model 2 (Contextualised)		Model 3 (Value added)	
Fixed effects	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Intercept	0.031	0.05	-.348	.08	.410	.07	.157	.060
White Other groups			.103	.12	.044	.11	.131	.081
Mixed White & Caribbean			.185	.15	-.065	.12	.006	.093
Mixed Other heritage			.181	.15	.181	.12	.080	.096
Black African			.189 *	.08	.023	.08	.007	.059
Black Caribbean			.129	.10	-.070	.09	.012	.065
Black Other groups			.005	.14	-.131	.12	.014	.093
Asian or Asian British			.248	.14	-.008	.12	.042	.090
Any other ethnic group			.148	.13	-.005	.11	.069	.087
Girls (vs boys)			.091 **	.03	-.099 ***	.03	-.118 ***	.022
Middle SES			.480 ***	.08	.273 ***	.07	.176 ***	.050
High SES			.920 ***	.10	.550 ***	.08	.317 ***	.063
White Other *Mid. SES			.069	.17	.126	.14	-.024	.109
White Other * High SES			-.391	.22	-.112	.18	.007	.144
Mixed White & Caribbean * Mid. SES			-.293	.20	-.137	.17	-.168	.123
Mixed White & Caribbean * High SES			-.932 ***	.25	-.509 *	.20	-.373 *	.156
Mixed Other * Mid. SES			.035	.19	-.056	.16	-.037	.123
Mixed Other * High SES			-.058	.21	-.080	.17	-.133	.134
Black African * Mid. SES			-.265 *	.11	-.178 *	.09	-.195 **	.066
Black African * High SES			-.821 ***	.15	-.543 ***	.13	-.261 **	.096
Black Caribbean * Mid. SES			-.445 ***	.13	-.277 *	.11	-.302 ***	.082
Black Caribbean * High SES			-1.066 ***	.18	-.720 ***	.15	-.518 ***	.110
Black Other * Mid. SES			-.247	.19	-.190	.16	-.225	.121
Black Other * High SES			-.300	.30	.038	.24	.015	.192
Asian * Mid. SES			-.234	.19	-.025	.15	-.023	.120
Asian * High SES			-1.019 ***	.28	-.740 **	.23	-.390 *	.181
Any other ethnic group * Mid. SES			-.172	.16	-.129	.13	-.147	.104
Any other ethnic group * High SES			-.246	.25	-.111	.21	-.041	.168
SEN - School Action					-.779 ***	.04	-.227 ***	.034
SEN - School Action Plus					-1.054 ***	.05	-.307 ***	.040
SEN - Statemented					-1.677 ***	.07	-.742 ***	.063
Joined school Y3/Y4					-.144 ***	.04	.062	.037
Joined school Y5/Y6					-.377 ***	.06	-.123 *	.050
% sessions absent					-.017 ***	.00	-.011 ***	.002
Age in completed months					.027 ***	.00	-.009 **	.003
EAL					-.058	.04	.062	.033
Age 7 average score (normalised)							.660 ***	.015
Age 7 score squared							.050 ***	.010
Variance components								
Level 1 (pupil) variance	.837	87%	.775	89%	.516	84%	.279	75%
Level 2 (school) variance	.121	13%	.095	11%	.096	16%	.093	25%
Total variance	.958		.870		.613		.372	
Pupil variance reduction vs. Null	-		7.4%		38.3%		66.7%	
School variance reduction vs. Null	-		21.5%		20.4%		23.1%	
Total variance reduction vs. Null	-		9.2%		36.1%		61.2%	
Sample Size	2836		2751		2751		2524	

Note: *= $p<.05$; **= $p<.01$; ***= $p<.001$

Table 3: Contrasts in age 11 test score between minority ethnic groups and White British pupils at different levels of SES: Results for Models 1-3

Raw score (Model 1)		Socio-economic status (SES)		
Ethnic group	Low	Middle	High	
White Other groups	.10	.17	-.29	
Mixed White & Caribbean	.18	-.11	-.75	**
Mixed Other heritage	.18	.22	.12	
Black African	.19 *	-.08	-.63	**
Black Caribbean	.13	-.31 **	-.94	**
Black Other groups	.00	-.24	-.30	
Asian or Asian British	.25	.01	-.77	**
Any other ethnic group	.15	-.02	-.10	

Contextualised (Model 2)		Socio-economic status (SES)		
Ethnic group	Low	Middle	High	
White Other groups	.04	.17	-.07	
Mixed White & Caribbean	-.06	-.20	-.57	**
Mixed Other heritage	.18	.13	.10	
Black African	.02	-.15 *	-.52	**
Black Caribbean	-.07	-.35 **	-.79	**
Black Other groups	-.13	-.32 **	-.09	
Asian or Asian British	-.01	-.03	-.75	**
Any other ethnic group	-.01	-.13	-.12	

Value-Added (Model 3)		Socio-economic status (SES)		
Ethnic group	Low	Middle	High	
White Other groups	.14	.12	-.13	
Mixed White & Caribbean	-.01	-.16 *	-.38	**
Mixed Other heritage	.09	.06	-.05	
Black African	.01	-.19 **	-.28	**
Black Caribbean	.01	-.30 **	-.53	**
Black Other groups	.02	-.22 **	.01	
Asian or Asian British	.05	.02	-.32	**
Any other ethnic group	.07	-.07	.05	

*Notes: Data are the estimated marginal means for each ethnic group relative to White British pupils of the same SES. Tests of ethnic contrasts were made by varying the SES reference group (see Jaccard & Turrisi, 2003). For standard errors see Table 2. * = $p < .05$, ** = $p < .01$.*

Table 4: Descriptive statistics for school composition

School composition variable	N	Min.	Max.	Mean	SD
Number Y6 pupils	68	14	101	41.9	16.8
% SEN (SAP+statemented)	68	3.4	43.2	16.2	7.6
% entitled FSM	68	3.8	66.7	33.8	12.2
% girls	68	20.7	69.7	49.8	9.5
% EAL	68	6.3	95.8	40.9	20.6
% White British	68	.0	72.4	24.1	17.1
% joined Y3 or later	68	3.3	95.9	23.2	13.5
Mean age 7 score ^(a)	68	-.73	.78	-.002	.329
Church school	68	0	1	.34	.473

Notes: Mean and Standard Deviation (SD) calculated from 68 observations. Data excludes 28 pupils from three special schools. ^(a) tested only in the value-added model.

Table 5: The achievement of pupils entitled and not entitled to FSM in less, average and more effective schools.

Effectiveness	Mean age 11 score: FSM	Mean age 11 score: Not FSM	Mean % pupils entitled to FSM	Mean FSM gap
Less effective schools (n=16)	-0.55	-0.06	28%	-0.49
Schools in average range (n=37)	-0.26	0.08	36%	-0.34
More effective schools (n=15)	0.21	0.54	32%	-0.33
All schools	-0.22	0.16	33%	-0.38

Notes: More and less effective schools are those where pupils make significantly more or significantly less than average progress age 7-11, as calculated from the value-added model. Data in bold are the mean 'raw' age 11 scores for FSM and non-FSM pupils.

Figure 1: Mean age 11 score by ethnic group and SES: Simple main effects (left hand panel) versus ethnic * SES interaction (right hand panel)

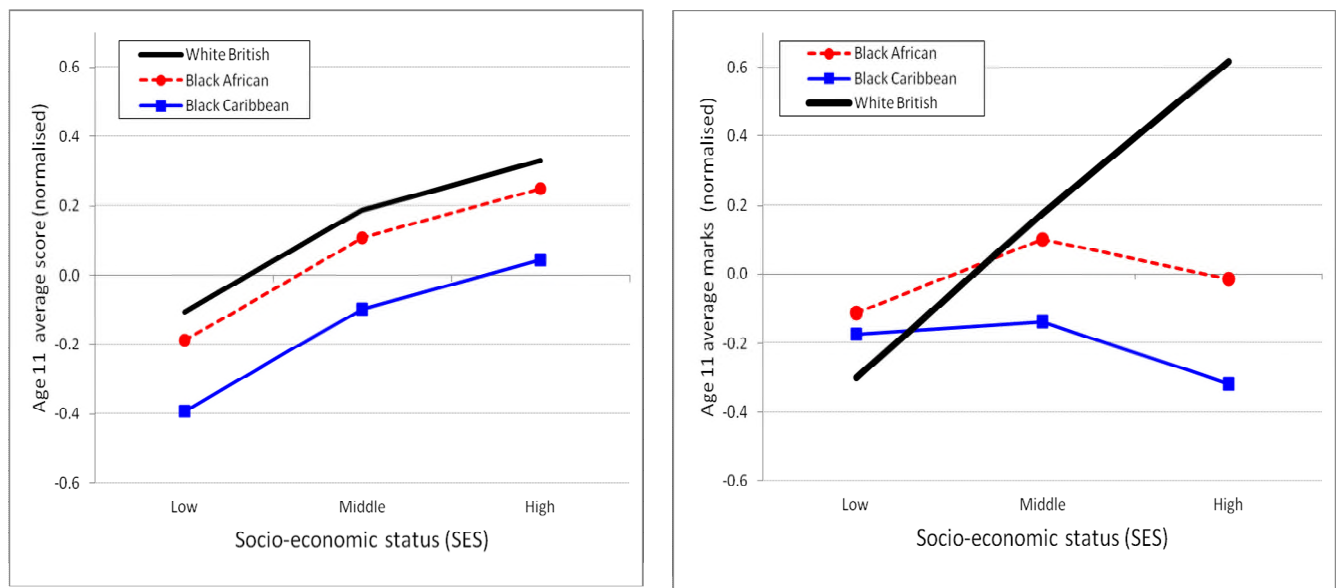


Figure 2: Mean age 11 score by ethnic group and SES after adjusting for pupil background (contextualised model)

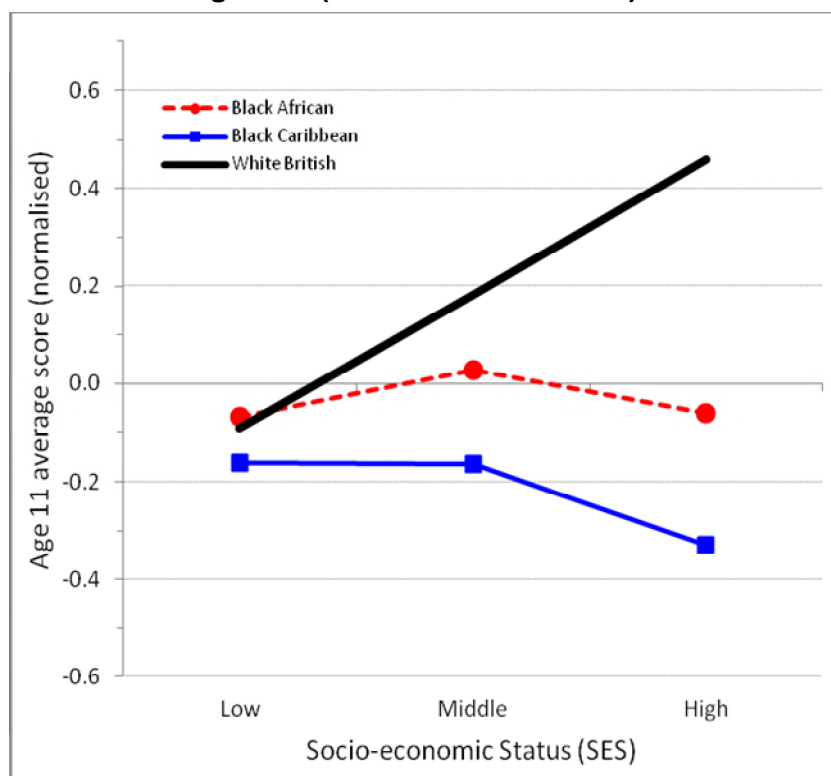
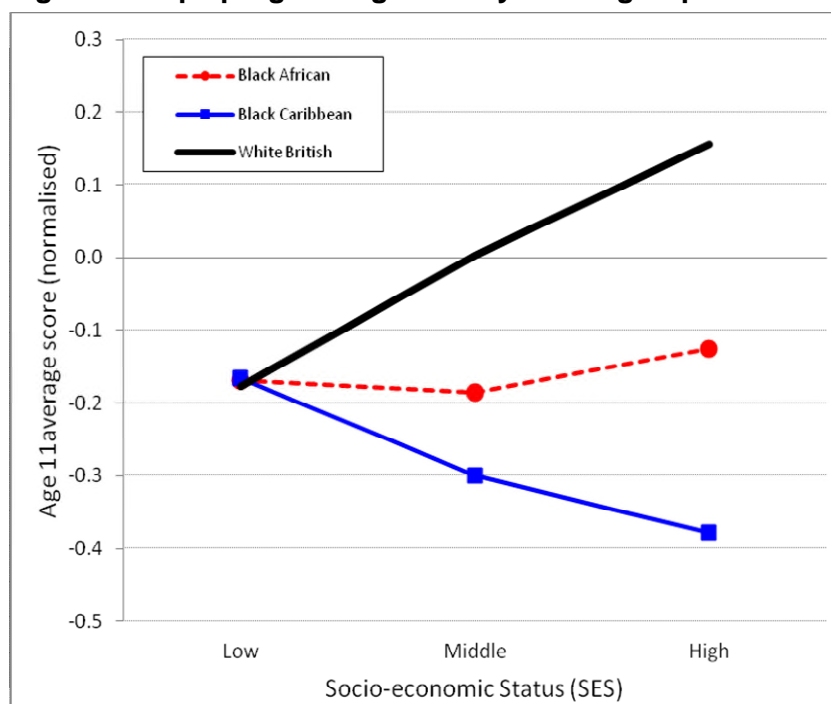
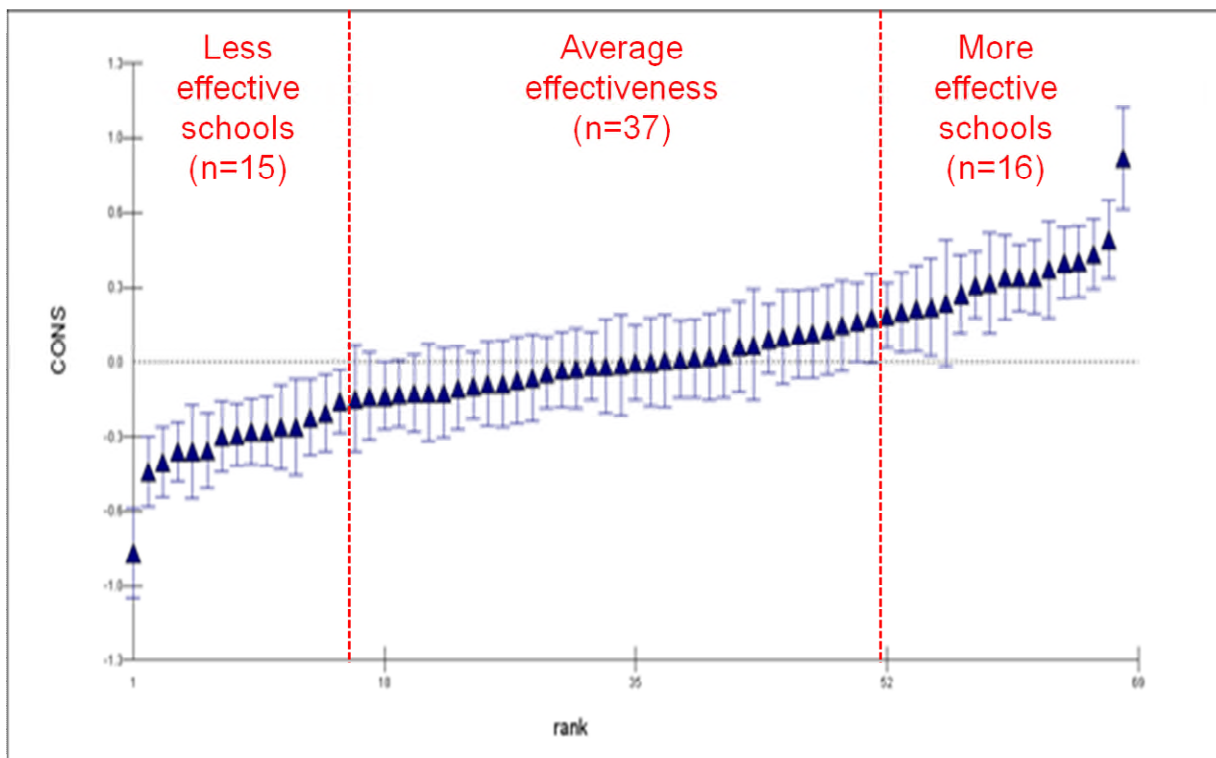


Figure 3: Pupil progress age 7-11 by ethnic group and SES (Value-added Model)



Note. A constant value has been added to all estimated marginal means (EMMs) to centre results on the average progress of the White British middle SES group. EMMs are calculated at the average age 7 score.

Figure 4: Value added results and 95% confidence intervals for the 68 primary schools



Appendix 1: Pupil absence (% of sessions missed) by ethnic group and SES

	Socio-Economic Status (SES)											
	Low			Medium			High			Total		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
White British	9.8	8.4	203	6.7	5.8	288	4.1	3.9	193	6.9	6.6	684
White Other groups	7.9	6.7	68	4.8	3.9	73	4.2	4.6	27	6.0	5.5	168
Mixed White & Caribbean	6.7	5.8	43	7.1	9.6	51	6.2	7.6	24	6.8	7.9	118
Other Mixed Heritage	7.1	5.7	47	3.4	4.6	57	4.0	4.0	45	4.8	5.0	149
Black African	3.0	3.0	275	2.4	3.3	516	2.3	2.6	75	2.6	3.2	866
Black Caribbean	4.9	4.7	120	4.3	6.2	170	3.8	3.7	52	4.4	5.3	342
Black Other	5.0	6.2	48	3.3	5.0	59	2.8	2.2	13	3.9	5.4	120
Asian or Asian British	6.5	3.9	55	5.8	6.2	58	3.9	4.5	14	5.9	5.1	127
Any Other group	4.5	3.8	60	5.1	5.6	121	6.2	7.3	20	5.0	5.3	201
Total	5.9	6.2	919	4.3	5.4	1393	3.9	4.3	463	4.8	5.6	2775

Appendix 2: Additional pupil explanatory variables

The study was able to draw on the results of the LA annual Pupil Voice Survey to supplement the pupil background measures for a sub-sample of pupils. A total of 1,203 pupils (42% of the cohort) completed the pupil voice survey in 2007 when they were in Y5, and provided an ID code that allowed their responses to be matched to their subsequent test score at age 11. Pupils were drawn from a total of 44 of the 68 primary schools and were representative of the full cohort in terms of ethnic, gender and SES composition. The voice survey was used to create a total of 15 variables (six full scales and nine ordinal or nominal variables) which were reliable and predictive of success at school. A detailed description of how these variables were created, their reliability and correlations with age 11 test score is given in Strand (2010b). When all variables were added to the model, pupils' attitude to school, perceptions of teacher behaviours, time spent on homework, time spent watching TV/DVDs/Videos or playing computer games and reported truancy did not add significantly to the explanation of age 11 scores, over and above the measures reported in model 3 above. However three variables were significant: A parental support scale composed of 6 items (.17 SD difference in attainment across a two SD range, $p < .001$) frequency of engaging in cultural leisure activities (attending local library, art galleries, theatre or museums) (.09 SD differences across a two SD range, $p = .051$) and reading at home for fun outside school (compared to those who read only once or twice a month or less, those who read once or twice a week scored .11 SD higher and those who read every day or almost every day scored .26 SD higher). However the additional pupil variables gave only a very modest increase to the overall explained variance, explained only a little more of the SES gap among White British pupils and did not significantly alter the ethnic by SES interactions, such that the significant underachievement by Black Caribbean pupils from middle and high SES backgrounds remained.

FOOTNOTES

- i. Data for 28 pupils from three special schools were excluded from the sample.
- ii. This was the case in 2008 when the current data were collected, although from 2010 the science tests are no longer universally required, being completed only by a representative sample of 5% of primary schools for national monitoring purposes.
- iii. Further details can be found on the Department for Communities and Local Government website <http://www.communities.gov.uk>.
- iv. Styles (2008) has argued cogently for supplementing the FSM indicator with census and area based measures.
- v. Listwise deletion of a small number of cases with missing values on one or more of the above variables ($n=85$, 3.0%) gives a sample of 2,751 pupils.
- vi. Statistical significance tests are reported here because I believe that that the Year 6 children observed in this study are just one sample of children in these schools among many, and one year of data among many. I am interested here in what has been termed model-based rather than design-based inference (see Plewis & Fielding, 2003; Goldstein & Noden, 2004, p441). However I recognise that some authors would eschew significance testing with what they would construe as population data and readers are referred to Gorard (2003) for a contrary view. In any event because the outcome has been normalised all associations with explanatory variables are expressed as effect sizes, so the substantive as well as the statistical significance of all associations can be assessed.
- vii. While the overall ethnic by gender interaction was not significant, one specific term was significant: in contrast to all other ethnic groups, Asian boys actually scored significantly higher than Asian girls ($t=2.10$, $df=2701$, $p=.036$).
- viii. The high SES group covers a wide range of scores on IDACI and it could be argued this aggregation might mask ethnic group differences. To check whether variation in IDACI scores could account for ethnic gaps in achievement within the high SES group, IDACI percentage score was added as a continuous covariate to model 2. It was not statistically significant and did not change the pattern of ethnic * SES interactions.
- ix. The contextual data available here is relatively limited compared to the rich data typically collected in detailed longitudinal cohort studies. However the study was able to draw on the results of the LA annual Pupil Voice Survey for a sub-sample of pupils to generate a wide range of additional explanatory variables. However the addition of these variables did not alter any of the conclusions drawn above (see Appendix 2).

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- ^x . The minority of students without age 7 scores will have entered the LA from outside England, reflecting the relatively high level of international migration to London as the capital city (see Strand & Demie, 2006).
- ^{xi} . The pupil premium is a new funding mechanism for schools, introduced in April 2011, which directly targets extra funding to schools based on the number of deprived pupils in the school, specifically any pupil who has been registered for a FSM at any census in the previous six years. The expectation is that the grant will be used to support pupil premium eligible pupils and to close the gap in attainment between them and their peers. Since April 2013 the grant has been £900 per pupil and the total annual funding will be £2.5 billion by 2015. See <http://www.education.gov.uk/schools/pupilsupport/premium>.
- ^{xii} . The 'less effective' and 'more effective' dividing lines are approximate indications only, for example the fifth school to the right of the 'more effective' schools dividing line is not included because its confidence interval (CI) overlaps the zero line. It should be noted that these categorisations are relative to the LA average, but that the LA as a whole is above the national average for contextual value added (CVA). Therefore this underestimates the number of more effective schools relative to national norms. For example national performance tables for 2008 showed 31/67 (46%) of the LA primary schools were significantly above national average CVA and only 10/67 (15%) were significantly below than the national average CVA. (N.B. One school became an Academy in January 2008 and because of this change in status was not included in national CVA analysis).
- ^{xiii} . These variables, particularly better levels of attendance, were able to account for the finding that low SES Black African pupils had significantly higher attainment than their low SES White British peers. This is congruent with other research (Strand, in press) which suggests that high pupil and parental aspirations, positive academic self-concept and motivation and effort as indexed by frequency of completing homework could account for the higher attainment of many minority ethnic groups from low SES homes. However in that study, as here, accounting for these variables simultaneously increased the relative under-achievement of Black Caribbean, Black African, Pakistani and Bangladeshi pupils from average and high SES homes.
- ^{xiv} . Even if the distinction between middle and high SES groups is discounted, it is clear that the big achievement gaps between ethnic groups are among non-disadvantaged pupils rather than among those entitled to FSM (low SES).