UNIVERSITY OF OXFORD

# A Quantitative Longitudinal Analysis of Exclusions from English Secondary Schools

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# Abstract

Exclusion from school is widely used as a disciplinary tool, but there is concern that it might be applied disproportionately to certain groups of students. Student, family, neighbourhood and school characteristics all relate individually to differences in rates of exclusion but most studies (predominantly in the US) have focussed on a small subset of potential explanatory variables, have not used nationally representative data or have been limited to exclusions at one period of time. in contrast we examine the relationship between exclusion from school and a wide range of variables, using data for a whole cohort of over 500,000 students in England between their entry into secondary education at age 11 and the end of their compulsory education at age 16. We find that 16.3% of all students experience one or more fixed term exclusions (FTE) during their five years of secondary schooling, but that this rises to over 30% for Black Caribbean and Mixed White & Black Caribbean students. The probability of experiencing one or more FTE is strongly related to gender, ethnicity, poverty (as indicated by entitlement to a Free School Meal and by local neighbourhood deprivation), scores in national attainment tests (particularly English) at age 11 and early patterns of attendance in Year 7. The relationship between ethnicity and the odds of experiencing one or more FTE remains large and significant even after controlling for all these other variables. Among those who experience at least one FTE, 56% go on to experience a second or further FTE, but 44% do not. Despite their greatly increased risk of experiencing the first exclusion, conditional on this Black Caribbean and Mixed Black & Caribbean students are no more likely to experience repeated FTEs than White British students. Experience of FTE is the predominant predictor of permanent exclusion but higher rates of permanent exclusion, especially of students from deprived neighbourhoods and certain ethnic groups, are not fully accounted for by previous FTEs. In multi-level regression models the school (20%) and the Local Authority (6%) levels account for significant variation in rates of FTE and very little of this is explained by school characteristics (though schools serving a higher proportion of students from poor families were less likely to exclude, after controlling for the higher risk of exclusion for individual students). We conclude that the drivers of differential rates of exclusion may have significant socio-cultural and school policy dimensions. This robust analysis of nationally representative data establishes a rationale and focus for more qualitative investigations of the role played by family, neighbourhood and school in determining rates of exclusion and the need for further evidence about reasons for variation in rates of exclusion at the school level.

# Introduction

Exclusion from school is widely used as a disciplinary response to misbehaviour by students in the English school system and the rate of exclusions is far higher during the secondary phase than the primary. In the 2010/11 academic year, there were a little over eight exclusions per hundred students in mainstream English secondary schools and more than 15 exclusions per hundred students in special schools (UK Government Department for Education, 2012).

Exclusion from school is not a disciplinary tool unique to England. In the US for instance, where exclusion from school is termed suspension, Raffaele Mendez, Knoff and Ferron (2002), reported similar national rates of suspension from schools in 1997. Differential rates of suspension have long been reported in the US literature (Nielsen, 1979; McFadden, Marsh, Price and Hwang, 1992). The over-representation of ethnic minorities, and African Americans in particular, has been widely debated (e.g. Raffaele Mendez and Knoff, 2003). In the UK, differential rates of exclusion are reported annually in official statistical releases (UK Government Department for Education, 2012) and concerns about differential rates of exclusion have prompted two recent reports on the extent of inequalities and what might be done to remediate them (UK Office of the Children's Commissioner, 2012, 2013).

Although exclusion is widely used and its differential application widely reported, there is considerable uncertainty about its impact. There is widespread consensus in the research literature that young people who are excluded from school are at far greater risk of a variety of negative outcomes, including poor educational attainment, prolonged periods out of employment; poor mental and physical health; involvement in crime; and homelessness (Gregory, Skiba and Noguera,2010; Gazeley, 2010; Pirrie et al, 2011, DfE, 2010; Daniels and Cole, 2010; Maag, 2012). However, there is no evidence as to whether exclusion from school is the *cause* of these outcomes or merely a symptom of underlying drivers. Additionally a full evaluation of exclusion as a process would need to take account of its wider impact including on the learning of other students in the class/school. For example a recent nationally representative survey of over 2,000 students aged 8-15 for the Office of the Children's Commissioner (2012) reported that 80% of students had experienced disrupted learning caused by the poor behaviour of their peers, and OFSTED have highlighted low level ongoing disruption as an important factor underlying low achievement in schools facing challenging circumstances. The purpose of the current research is not to make a judgment on whether exclusion from school is inherently a good or a bad thing so much as to explore proportionality in its use with different groups, with a particular focus on ethnic minority students.

### *Student-level correlates of exclusion*

Several student and family characteristics have been related to differential rates of exclusion. Achilles, Mclaughlin and Croninger (2007) identified ethnicity, age, gender and socioeconomic status as important explanatory variables, while Krezmien, Leone and Achilles (2006) reported disproportionate rates of suspensions for students with disabilities and Bowman-Perrott *et al.* (2013) highlighted students with emotional or behavioural disorders and with learning difficulties. Looking beyond the socio-demographic characteristics of students, Christle, Nelson and Jolivette (2004) found that attendance rate and academic attainment were negatively related with rates of suspension. Many of the factors associated with exclusion are mutually correlated but relatively few studies have examined the strengths of relationships between exclusion and multiple characteristics simultaneously. Skiba, Michael, Nardo and Peterson (2002) found only one study that investigated differential rates of exclusion for minority ethnic students while controlling for socio-economic status (SES). Their conclusion that race made a contribution to disciplinary outcome independent of SES was ill-founded because the study they found had only allowed for SES measured as an aggregate at the school level[1]. In two, more recent studies that have considered multiple explanatory variables, even the strong link between ethnicity

1 Reaching conclusions about the relationship between an outcome and an explanatory variable at one level (e.g. student) when account has only been taken of the explanatory variable measured at a different level (e.g. school) is a well-known inferential mistake referred to as a "unit of analysis" error.

and exclusion has been questioned. In a study of 1,824 7-14 year old students in the Special Education Elementary Longitudinal Study (SEELS), Achilles, Mclaughlin and Croninger (2007) found that, for students with emotional and behavioural difficulties, African American ethnicity became a non-significant predictor of suspension when family and socio-economic factors were added to a model. The focus of their study was disability and suspension and may not have wider implications, and the finding in any case begs the question of whether minority ethnic students are more frequently judged to have emotional and behavioural difficulties as indicated in an analysis of national data for England by Strand & Lindsay (2009). We return to the significance of that question when we look at special educational need (SEN) later. Theriot, Craun and Dupper (2012) reached a broader conclusion from a multilevel analysis of 9,706 middle and high school students. They found that ethnic minority status was not a significant predictor of suspension when other student level and school level data were included in a model. However, their data related only to students with at least one reported disciplinary incident and we also express reservations about their methodology below.

***Neighbourhood and school-level correlates of exclusion***

Few studies have considered the role of neighbourhood and school. Hemphill *et al.* (2010) found that students in more deprived areas had higher rates of suspension after controlling for a wide range of risk factors at the student and family levels. Fenning and Rose (2007) argued from a review of the literature that school disciplinary policy was an important determinant of differential rates of exclusion but they reported little quantitative evidence to substantiate the assertion. Christle *et al.* (2004), Gregory, Cornell and Fan (2011) and Hatton (2013) concluded respectively that governance / leadership, structure / support and ethos were related to between-school variations in rates of suspension. However, these studies did not take account of student-level variables, which makes inferences about the direction of causality at the school level suspect. The appropriate methodology to support inferences about schools is multilevel analysis, and ideally with a rich set of explanatory variables. Theriot *et al*. (2012), who fitted a multilevel model, concluded that highly statistically significant variation in rates of exclusion at the school level proved that some schools were more punitive in their handling of student infractions. In fact, the odds ratio on the rate of exclusion at the school level – which they used as an explanatory variable – was small (only 1.02) and too few student-level variables were included in the analysis to warrant their conclusion that the variation was attributable to school policy (rather than selection of students into schools based on unmeasured characteristics). Sullivan, Klingbeil and Norman (2013) conducted a multilevel logistic regression whose outcome variable was ever having been suspended, but there were only 39 schools in their sample and of the 15 school-level, explanatory variables they used, only the rate of non-drugs / weapons disciplinary offences achieved significance. The use of this variable at the school level but not the pupil level has parallels with Theriot *et* al. (2012) and conclusions again cannot be drawn from it about schools' disciplinary policies. Although they fitted a multilevel model, Sullivan *et al*. (2013) did not report variation in rates of suspension at the school level. There is therefore no published evidence pertaining to the importance of that variation among schools.

***Current Study***

Most of the evidence to date has had a US focus, and in judging the relevance to the UK of findings in that literature, account needs to be taken of social, cultural and education system differences between the UK and US. More importantly, little of the research to date has simultaneously studied the relationships between exclusion and multiple influences on children's development that include school, neighbourhood and socio-economic background. In England, the National Pupil Database (NPD) brings together comprehensive data on all students in the education system. It links socio-demographic variables collected in regular school censuses with attainment in National Curriculum tests as well as information about attendance and exclusions. Information on rates of exclusion is published in Statistical First Releases (e.g. Department for Education, 2012) but, although the data can be linked over time using a unique student number (UPN), no-one has hitherto analysed exclusions over a longer period than a year.

The purpose of this research was to identify factors that relate sufficiently strongly to exclusion from secondary school that policies targeted at exclusion might have a substantively greater impact on children's education if they had regard to them. The purpose was to identify strong

patterns in the data that might arise from underlying processes, rather than to establish causality or to address the impact of exclusion on educational outcomes.

To this end, we used the rich data on the NPD to obtain robust evidence about irregularities in propensities to fixed term and permanent exclusions. We related data on exclusions for a cohort of over 500,000 students throughout the whole of their secondary education to a wide range of potential explanatory variables. In particular, the analysis sought to determine whether ethnicity continues to be a powerful predictor when other factors are taken into account, whether variation in rates of exclusion among schools are large and related to school type or intake (once the corresponding characteristics are taken into account at the student level) and whether absenteeism or academic performance might provide early indicators of subsequent propensity to exclusion.

A small proportion of exclusions (4,000 out of more than 300,000) are permanent. While this proportion is small, the impact on the individual is potentially much more profound. So an important research question was whether there are factors associated with permanent exclusion (PE), *over and above* those associated with fixed-term exclusion (FTE).

# Method

***The Data***

The data used in this study were obtained from the NPD and relate to one cohort of students who began their secondary education in September 2006 and took their GCSEs (or key stage 4 tests) in summer 2011. We used thirteen NPD files, a list of which, grouped by type, is shown in Table 1.

Student level data were matched using a unique student identifier that appears on all the files except the school level data file. Student identifiers in the five Spring census files were matched (in R) to obtain numbers joining and leaving the cohort. The annual exclusions data were merged into a single file that provided the basis for simple cross-tabulations. The merged exclusions file was matched using student ID with the 2007 Spring census file, the 2006/07 key stage 2 results file and the 2006/07 absences file, which together provided a range of explanatory variables for a set of regression analyses. It was important for subsequent survival analyses to include in this file a record for each student who was never excluded. All these student data were then matched with data from the school characteristics and compositional aggregates file, matching a school identifier on that file with one on the 2007 Spring census file.

Table 1: Files Obtained from the National Pupil Database and Merged for Analysis

| File type | File descriptions |
|---|---|
| School Spring censuses | Year 7 students 'on roll' Spring 2007. |
| | Year 8 students 'on roll' Spring 2008. |
| | Year 9 students 'on roll' Spring 2009. |
| | Year 10 students 'on roll' Spring 2010. |
| | Year 11 students 'on roll' Spring 2011. |
| Exclusions<br><br>One exclusion per record. A student may have multiple exclusion records in each year. | Exclusions in 2006/07 for students on 2007 Spring census. |
| | Exclusions in 2007/08 for students on 2008 Spring census. |
| | Exclusions in 2008/09 for students on 2009 Spring census. |
| | Exclusions in 2009/10 for students on 2010 Spring census. |
| | Exclusions in 2010/11 for students on 2011 Spring census. |
| Key stage 2 (KS2) results | KS2 Candidate and Indicator data for 2005/2006. |
| Students' absences | Absences (in each of three terms) in 2006/2007 for students recorded on 2007 Spring census. |
| School characteristics and compositional aggregates | Data from the 2007 Spring census, for all students in the school aged 11-16/18, aggregated to the school level. |

***The variables***

A range of variables were selected from the various data sets in the NPD, and combined in three analysis files. The first analysis file, on which summary statistics for students were based, comprised one case per student; the second, on which summary statistics for exclusions were based, comprised one case per exclusion; the third, on which Cox regressions were carried out, comprised one case per exclusion plus one case per non-excluded student. Table 2 lists the variables on one or more of the analysis files, each with a brief definition and description of the source data set.

Most of the student characteristics referred to in this report were collected in the students' first year at secondary school, in Spring 2007. Variables collected in the school census, such as eligibility for free school meals (FSM), special educational needs (SEN) status or school attended, are subject to change. There was no attempt in this analysis to relate exclusions to dynamic measures of such variables (or to changes in, for instance, school or neighbourhood).

The ethnicity codes from the NPD were rationalised slightly during the analysis. "Refused", "Missing" and "Not obtained" which had similar coefficients in the regression were merged into "Unknown" and the tiny category, "Gypsy /Romany", was absorbed in "Other". The types of school were also rationalised into groupings with a total student population of at least five thousand. Where a student had absence records at two or more schools in a single year, (presumably because of in-year transfers between schools), the data in those records were aggregated.

Table 2 : Variables used in the Analysis - Sources and Definitions

| Variable name | Definition | Source |
|---|---|---|
| Gender | Female=0; Male=1 | School census, Spring 2007 |
| Age | Age in months on 1/9/2006 (at start of secondary education) calculated from year and month of birth | |
| Age at exclusion | Age in months on date of exclusion, calculated from year and month of birth and date of exclusion | |
| FSM | Eligibility for free school meals: No=0; Yes=1 | |
| IDACI | Income Deprivation Affecting Children Index, (derived from postcode of student's residence) | |
| Ethnic group | Student's ethnic group (based on national set of 18 ethnic codes) | |
| SEN | Category of special educational need: None=0 and dummies for each of 12 SEN primary needs | |
| Looked.After | Whether the child is in local authority care on the census day: No=0; Yes=1 | |
| KS2_eng.pts | Finely graded level of aggregated marks in KS2 tests in English (reading, writing & spelling), Mathematics and Science completed at age 11 in the last year of primary school (Y6) | 'Final' Key Stage 2 Candidate and Indicator data for the 2005/2006 academic year. |
| KS2_maths.pts | | |
| KS2_sci.pts | | |
| FSMxEth | Interaction term: the product of FSM and Ethnicity (but with White British=0 as reference category) | Derived |
| Duration | The length of an exclusion in sessions (half-days) | Student exclusions data. Merged annual data sets, relating to students in the 2006 Autumn census and 2008-2011 Spring censuses. |
| Wait | Time since a previous exclusion or start of secondary education (measured in school days) | |
| Parity | Cumulative number of exclusions, including the current exclusion | |
| Days | Cumulative number of days excluded, excluding the current exclusion | |
| Time.left | Number of school days remaining when the current exclusion ends | |

| Variable name | Definition | Source |
|---|---|---|
| School.type9 | Type of educational establishment | School level data set from the 2007 Spring Census |
| School.FSM.eligible | Percentage of students eligible for free school meals | |
| School.WBRI | Percentage of students whose ethnicity is recorded as White British, Black Caribbean or Chinese | |
| School.BCRB | | |
| School.CHNE | | |
| Absence_Aut07_pc | Absences in the Autumn and Spring terms of 2006/07 as a percentage of possible attendances | Student absence data, by term, in 2006/07. |
| Absence_Spr07_pc | | |
| Absence_N | Autumn and spring attendance (normal score transformed: mean=0, SD=1) | |

Note: This table lists the variables used in cross-tabulations and regression analyses in this study. The first column gives the name commonly used, the second, a longer description and the third, a description of the NPD table from which it came.

In addition, comparison of regression coefficients on absences for different reasons revealed that exclusion itself was a reason for absence. Its inclusion would have introduced circularity into the analysis and absences for this reason were therefore omitted from the explanatory variables. Different measures of attainment at age 11, such as test score marks, were tried in the regression analysis and fine grade scores were found to be the most powerful predictors. Permanent exclusions are distinguished from fixed-term exclusions (FTEs) by having "System missing" values for their durations (enabling the selection of those cases for separate analysis in SPSS).

***The analysis***

We outline the scale of the issue in terms such as days of schooling lost and then present simple comparisons of rates of exclusion, which illustrate the different experiences of exclusion across groups of students. Figures are generally presented relative to a baseline group (e.g. boys versus girls) and are shown separately for fixed-term and permanent exclusions. After the descriptive tables, we present results from statistical models that were fitted to the exclusions data, using SPSS. We used three models to investigate the strengths of the relationships between exclusion and the characteristics of students and schools. The explanatory variables used in the models included demographic characteristics, previous attainment, school characteristics and early absence from secondary school.

We began by investigating student characteristics associated with fixed-term exclusion (FTE). To exploit all the available information, including differences between groups of students in the average time before exclusions occurred, we used Cox's regression, a type of survival analysis. The estimated coefficients on the predictor variables should be similar to the odds ratios estimated using logistic regression, (but logistic regression only fits a statistical model to *whether* exclusion occurs and does not take account of how quickly). We fitted separate survival analysis models to time to first FTE, time to second FTE, etc. Sullivan *et al*. (2013) broke the exclusion data down in a similar way though they applied logistic regression to the successive exclusions. The survival time in these models was the number of school days since the previous exclusion, or if there was no previous exclusion, since the start of secondary education, and if the student did not have a further exclusion, until the final day of secondary education. Cox regression can involve predictor variables that change over time but our aim was to determine the predictability of exclusion based on data available early in a child's secondary education. A 'proportional hazards' model was used (in which the relative odds of exclusion for any two individuals remains constant over time), rather than 'time-dependent covariates'[2]. The explanatory variables were

2 Issues that might be investigated using time-dependent covariates include the impact on exclusion of changing eligibility for FSM, the mediating role of being categorised as having behavioural difficulties during secondary education, and different rates of exclusion in newly established academies (whose numbers rose from 46 in 2007 to 408 in 2011). Such analysis would need to address more serious missing data issues.

added in separate blocks, to establish the additional predictive power of certain variables. For instance, Maths and Science scores in the key stage 2 tests were added to the model after the English scores, and the neighbourhood deprivation index was added after eligibility for free school meals (FSM), in both cases to determine whether their marginal contribution was substantively important.

We tested an alternative approach that brought all the FTEs into a single statistical model. In this, we employed ordinal regression, with total number of FTEs as the outcome variable. The advantage here was parsimony: a single set of estimates was derived using all the data rather than multiple sets of estimates from models for successive exclusions. Sullivan *et al*. (2013) mentioned this approach, though they rejected its use for technical reasons we discuss later.

Differences in the environments in which school operate and the policies they adopt could account for significant variations in rates of exclusion but Cox regression models that only take account of student characteristics shed no real light on that. The third statistical analysis we undertook used a multilevel model (MLM) to assess variability in rates of exclusion that occurs at the school level. The single level models had used the full data set of over 500,000 students and 300,000 FTEs, so as to obtain best estimates of the strengths of relationships but computing limitations prevented our fitting a MLM to the full data set. We therefore applied the model to a representative sub-sample of local authorities. Again, we made the number of FTEs the outcome variable and used ordinal regression. Because ordinal regression does not have a multilevel option in SPSS, the model was set up using the "Generalized linear" option of the "Mixed models" command in the Analysis menu (referred to as GLMM). A full listing of the SPSS syntax is given in the Appendix.

Finally, we addressed the question of whether there are factors associated with permanent exclusion *over and above* those associated with exclusion as a whole by fitting a statistical model to the probability that an exclusion is permanent. Identifying factors associated with the differential experience of permanent exclusion is difficult because estimates based on 4,000 permanent exclusions provide much less discrimination that those based on 300,000 FTEs. We therefore based the model on all exclusions (rather than first exclusions or a random sample). However, it seemed intuitively likely that students who experienced multiple FTEs would be at disproportionate risk of permanent exclusion. To test the hypothesis that permanent exclusion might be explained entirely by the accumulation of perceived misbehaviour, we included measures of previous experience of exclusion. Modelling probabilities that successive exclusions for a single student would be permanent required a multilevel approach. So the final statistical model we used was a multilevel logistic regression. The focus in this model was on student characteristics – with 4,000 permanent exclusions among 3,000 schools, it would have been unrealistic to build a complex model at the school level.

# Results

***The Cohort: Joiners, Leavers and Missing Data***

While the NPD is based on school censuses whose coverage is the entire school population, the analyses in this study omit small numbers of students who may not have been recorded at every census, or for whom key variables are not available.

Table 3: Annual Numbers of Joiners and Leavers of the Secondary School Cohort

| Year | Cohort size at census date | Joined in last twelve months | Left in last twelve months |
|---|---|---|---|
| 2006/07 | 573,873 | | |
| 2007/08 | 574,999 | 9,334 | 8,208 |
| 2008/09 | 575,156 | 9,136 | 8,979 |
| 2009/10 | 576,268 | 9,771 | 8,659 |
| 2010/11 | 567,714 | 4,900 | 13,454 |
| Any Spring census | 601,444 | | |

Note: This table shows annual changes in the cohort of secondary schoolchildren being studied. Numbers are based on censuses of schoolchildren undertaken in the Spring term of each school year. Each row relates to a spring census in an academic year and the inflow and outflow since the preceding the census.

601,444 students were recorded at one or more of the five Spring censuses during the secondary school phase for the cohort we studied, but Table 4 shows that the number recorded at any one census was around 25,000-35,000 fewer. The numbers of students joining or leaving the cohort were not large – close to 9,000 in most years – but Table shows that those who left between year 7 and year 11 experienced significantly more fixed-term exclusions (FTEs). The NPD does not tell us why students appear on or disappear from school censuses (e.g. because of migration, either between England and the other three countries that make up the UK or internationally, or because of transfers to and from the private sector). So we do not know whether the higher rate of exclusions for those who left had a causal role in their exit.

Table 4: Incidence of Fixed-term Exclusions for Cohort Joiners and Leavers

| | Students recorded at any census | Late joiners | Early leavers, not permanently excluded | Permanently exclusions (PEs) | Students recorded at 2007 census |
|---|---|---|---|---|---|
| Students | 601,444 | 32,811 | 35,612 | 4,012 | 573,873 |
| Number of FTEs | 309,057 | 16,643 | 50,583 | 24,432 | 302,142 |
| FTEs per student | 0.51 | 0.51 | 1.42 | 6.11 | 0.53 |
| Number of PEs | 4,087 | 166 | - | 4,087 | 3,921 |

Note: This table shows rates of exclusion for all students in the cohort, students whose recording at school censuses changed during the secondary phase and students recorded at the first secondary school Spring census. Students whose status changed twice are included in both the joiners and the leavers columns. As joiners and leavers would have spent less time in secondary education in England, the rates of exclusion may understate the intensity of their experience of exclusion.

However, the wider concern is to base the study on students who are representative of the whole so that conclusions are robust. We base subsequent analysis on the students recorded at the 2007 Spring census. They include most early leavers, their experience accounts for over 97% of FTEs, 96% of permanent exclusions (PEs) and their rate of fixed-term exclusion is similar to that of the whole cohort. The effect on estimation of basing the analysis on one year group rather than another is small: for instance, the relative exclusion rates of groups of students in Table 4 are almost identical whether the 2007 or 2010 Spring Censuses are used as the base for analysis.

The data used in the regression analyses combined variables from several tables in the NPD and there was some mismatch. Sophisticated imputation procedures were not warranted by the small numbers involved. As we allowed SPSS to apply listwise deletion, the numbers of cases varied a little according to which explanatory variables were being used. Details of the numbers of cases with full data for different subsets of explanatory variables are shown in Appendix A. One noteworthy issue with missing data concerns students' absences – there was no absence data for the vast majority of those at special schools. Listwise deletion makes estimates for this school type, which in any event need careful interpretation, unreliable.

***Incidence of Exclusions***

Over the course of their secondary education, the 573,873 students recorded on the 2007 Spring census experienced 302,142 FTEs3, amounting to 810,852 school days. Table shows a frequency distribution of numbers of FTEs. Slightly less than one in six students in the cohort (93,366 or 16.3%) had at least one FTE during their secondary education. The majority of those experienced one or two exclusions, with the mean number of exclusions slightly higher than three, but large numbers of students were excluded on multiple occasions.

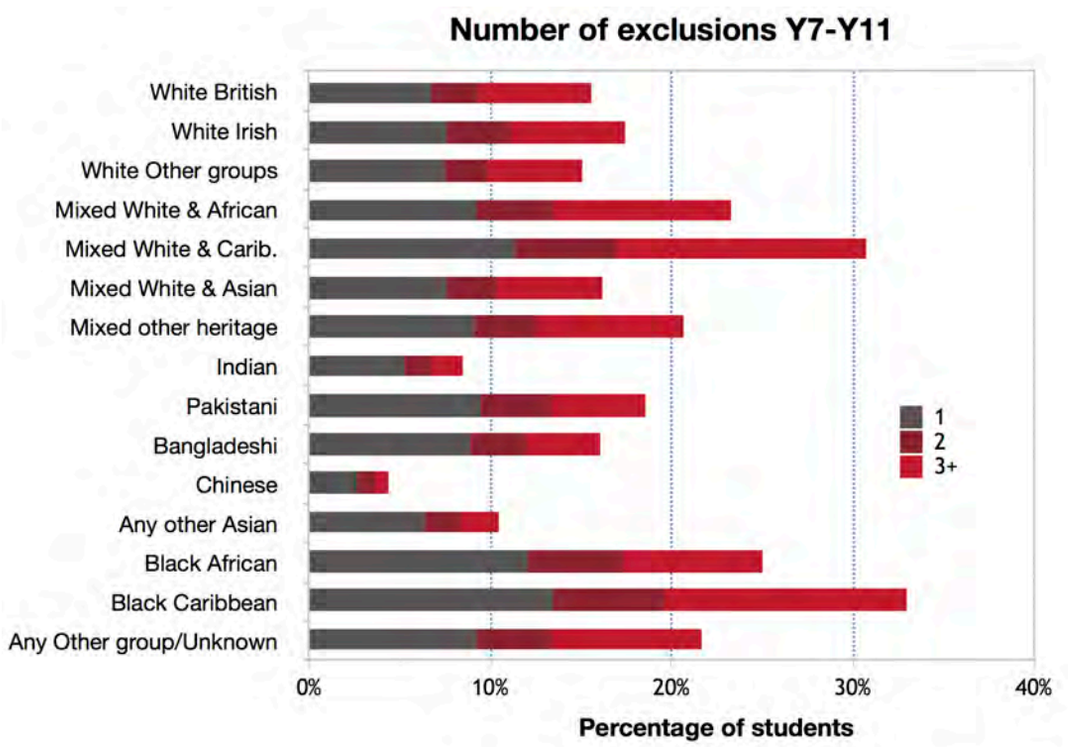
Table 5: Frequencies of Numbers of Fixed-Term Exclusions

| Number of FTEs | Number of students | Proportion who are subsequently given an FTE | Number permanently excluded | Percentage who are permanently excluded |
|---|---|---|---|---|
| 0 | 480,507 | | 332 | 0.07% |
| 1 | 41,172 | 56% | 440 | 1.1% |
| 2 | 16,234 | 69% | 405 | 2.5% |
| 3 | 9,435 | 74% | 406 | 4.3% |
| 4 | 6,342 | 76% | 400 | 6.3% |
| 5 | 4,556 | 77% | 347 | 7.6% |
| 6 | 3,565 | 77% | 316 | 8.9% |
| 7 | 2,664 | 78% | 240 | 9.0% |
| 8 | 1,956 | 79% | 198 | 10.1% |
| 9 | 1,593 | 79% | 174 | 10.9% |
| 10 or more | 5,849 | | 579 | 9.9% |
| Total | 573,873 | | 3,837 | |

Note: This table shows the numbers of students with different numbers of FTEs, the proportions who go on to have a further FTE and the proportions who are permanently excluded. Proportions in the middle column are calculated as the ratio of those who have at least one more FTE to those who have at least the stated number. For the 80 children who were permanently excluded more than once the penultimate column refers to their first permanent exclusion.

3 Around 2% (6,000) of the fixed-term exclusions on the NPD appear to be duplicated, i.e. with student ID and date of exclusion the same on both records. In these cases only the exclusions with the longer durations, (or in 4 cases the permanent exclusions), were included in the analysis.

Figure 1: Percentage of students experiencing one, two or three or more exclusions (FTE & PE) by ethnic group




Of the 16% of students who experience a FTE during their time at secondary school, a little over a half (56%) experience further exclusion. If a deterrent effect of FTE varied among students, we might expect those students who are excluded exactly once to have different characteristics from those who are excluded more than once. We address this question later using logistic regression and survival analysis on second FTEs. The proportion that continues to experience exclusions after a given number of exclusions rises quickly and beyond three FTEs it reaches three quarters. These high proportions suggest that FTE does not have a powerful deterrent effect for these individuals.

Figure 1 shows the proportion of students for each ethnic group who experience just one, exactly two or three or more exclusions by ethnic group. The sum of these three outcomes, indicated by the total height of the bar, is the proportion of students experiencing *at least* one exclusion, this is over one-third of Black Caribbean and Mixed White & Black Caribbean students (33% & 31% respectively) compared to around 15% of White British students, 8% of Indian and just 4% of Chinese students. Later in this report we will look at the these rates adjusting for social disadvantage and other factors.

The table also show numbers of students excluded permanently. There were 3,917 permanent exclusions (PEs) of students in this cohort. Multiple permanent exclusions are rare. 76 students were permanently excluded twice; two were permanently excluded three times. Permanent exclusion without a previous FTE is not especially rare (332 cases). The fact that the proportion permanently excluded after a given number of FTEs rises fairly steeply suggests that prior history of exclusion, and to some extent early exclusions, will be moderately good predictors of permanent exclusion.

***Distribution of Exclusions over Time***

Table shows a breakdown of exclusions by year of secondary education. Data for the cohort show that the largest numbers of FTEs occur in years 9 and 10. However, it is only the very low rate of exclusion in May, June and July (not shown) that brings the year 11 average down.

The rate of exclusion would otherwise be similar to years 9 and 10. This dip in exclusions may reflect different school policy towards exclusion during and after the GCSE exams more than it reflects different behaviour by students.

Table 6: Exclusions by Year of Education

| | Year of Education | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|
| Fixed-term exclusions | Number of exclusions | 41,874 | 62,705 | 78,616 | 77,147 | 48,837 |
| | Percentage of 5 years | 14% | 20% | 25% | 25% | 16% |
| | Number of students | 21,874 | 28,864 | 36,068 | 37,394 | 30,615 |
| | Percentage of students in year | 3.8% | 5.0% | 6.3% | 6.5% | 5.4% |
| Permanent exclusions | Number | 521 | 923 | 1,157 | 1,169 | 137 |
| | Percentage of 5 years | 13% | 24% | 30% | 30% | 3% |

Note: This table shows numbers of exclusions and students excluded, broken down by academic year. Figures in the second and penultimate rows are calculated with each year's exclusions as the numerator and the 5-year total as the denominator. The percentage in the 4th row has the student population as the denominator.

The distribution of permanent exclusions over school years is similar but with a more pronounced drop in year 11, which accounts for only three percent of permanent exclusions.

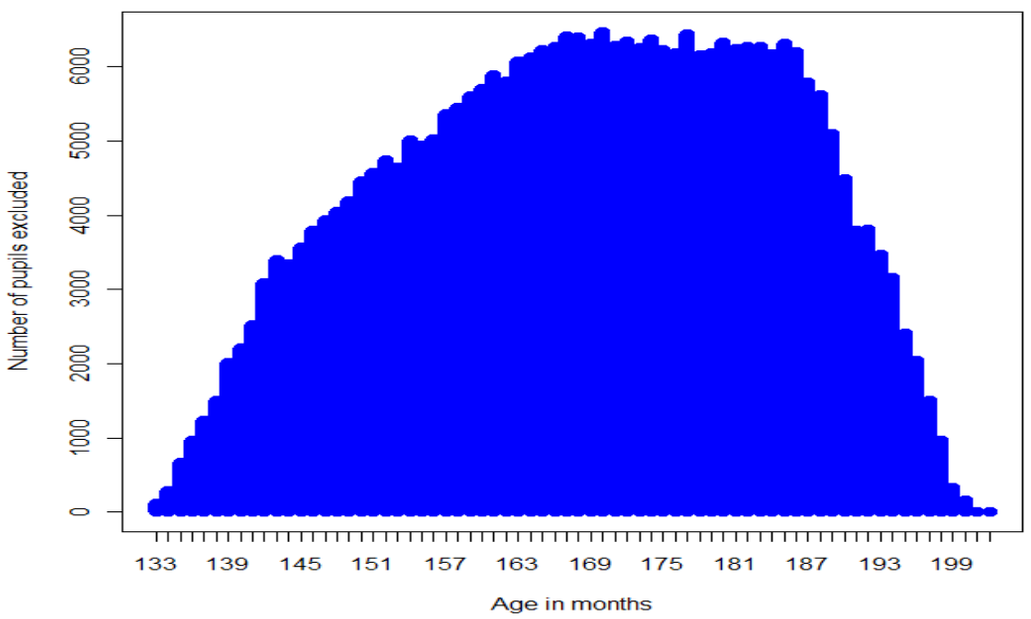
Table 7 shows a breakdown of FTEs by month within the school year (averaged across the five years of secondary education). Although it shows wide variations in the proportions excluded in different months, it seems likely that most of the variations can be attributed to the summer, Christmas and Easter holidays. There is a rising trend in the proportion of exclusions between September and November which would be consistent with a process of cumulative effect, that is with exclusion being the result of repeated behaviours within a school year.

Table 7: Percentages of Exclusions by Month within School Year

| Month | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June | July | Aug |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Per-cent-age | 6% | 9% | 12% | 8% | 10% | 9% | 14% | 6% | 10% | 10% | 7% | 0% |

Figure 2 also shows a distribution of FTEs along the time dimension, but in this case by student age. The sharp rise between 132 months and 143 months occurs because children's ages are distributed in that range when they begin secondary education. Likewise, the sharp fall between 188 and 199 months reflects the range of ages immediately before GCSEs, after which there are no significant exclusions. Elsewhere the graph shows a steady increase in the rate of FTE between the ages of 12 years and 16 years. Once account is taken of patterns determined by the timing of enrolment and examination, propensity to be excluded seems to rise with physical age, perhaps approaching a steady state rate around age 14.

Figure 2: Student Ages in Months at the Time of Fixed-Term Exclusion




***Exclusion and Special Educational Needs***

The comparative experience of exclusion of students with special educational needs (SEN) is discussed separately because a major category of SEN primary need seems to be intrinsically bound up with the management of discipline. Type of special educational need is recorded for students deemed to require "School Action Plus" or those who have a "Statement", and the discussion that follows relates to the "primary need" recorded for these students. Table provides statistics on numbers, rates of exclusion and durations of exclusion. These students constituted somewhat less than 10 per cent of the year 7 cohort in 2007, with the largest categories of need relating to moderate or specific learning difficulties and behaviour, emotional and social difficulties (BESD). Physical disability and sensory impairment were fairly insignificant fractions of the whole.

It might seem that SEN is a useful indicator of propensity to exclusion. Those in the BESD group in the 2007 Spring Census have rates of exclusion higher than any group (including those defined by any of the socio-demographic characteristics in Table 9). However, there seems to be a close relationship between the management of misbehaviour and the classification of students in the BESD group. Official statistics reveal enormous collinearity between BESD and FTE, with 56% of secondary school students identified with BESD experiencing a FTE in 2011 (DFE, 2012, p27). Furthermore, the number of students identified with BESD increases substantially during secondary school. For this cohort, the number rose by nearly 75% between 2007 and 2010. Finally, Black Caribbean and Mixed White and Black Caribbean students are over twice as likely to be identified at with BESD at SAP or above as White British students, even after adjustment for socio-economic deprivation (Strand & Lindsay, 2009). If, as seems highly likely, students are classified in the BESD group as part of the process of managing misbehaviour, including BESD in a statistical model intended to tease out relationships between exclusion and ethnicity or FSM would probably confuse the issue.

Table 8: Exclusions Rates and Durations by Special Educational Need

| SEN primary need (in 2007) | Number of students | FTEs per student | Average duration (days) | PEs per thousand exclusions |
|---|---|---|---|---|
| Behaviour, emotional and social difficulties | 12,280 | 3.65 | 2.90 | 16.4 |
| Moderate learning difficulty | 16,962 | 1.11 | 2.66 | 12.2 |
| Other difficulty / disability | 2,557 | 0.96 | 2.81 | 23.3 |
| Specific learning difficulty | 8,754 | 0.84 | 2.67 | 12.9 |
| Speech, language and communication needs | 4,357 | 0.59 | 2.56 | 9.8 |
| Autistic spectrum disorder | 3,731 | 0.56 | 2.80 | 8.7 |
| Hearing impairment | 1,182 | 0.49 | 2.54 | 10.3 |
| No special educational need | 518,762 | 0.43 | 2.55 | 12.3 |
| Visual impairment | 653 | 0.40 | 3.00 | 11.5 |
| Severe learning difficulty | 2,280 | 0.36 | 2.74 | 14.5 |
| Physical disability | 1,822 | 0.24 | 2.27 | 9.2 |
| Multiple sensory impairment | 62 | 0.11 | 5.43 | 0.0 |
| Profound and multiple learning difficulty | 471 | 0.08 | 3.32 | 27.0 |

Note: This table shows average numbers and durations of fixed-term exclusions, together with rates of permanent exclusion per 1,000 exclusions, for students with different types of special education need (SEN).

The average durations of exclusions do not vary enormously. (The average durations of more than 3 days should not be over-interpreted as they are based on small numbers of exclusions.) For PEs, It is worth mentioning, though it is not explicit in Table, that over 4% of all students identified as having BESD at the 2007 Spring Census end up being permanently excluded, a rate that is more than 16 times higher than for children with no SEN. Another figure that stands out, (albeit for a small group of students), is the proportion of exclusions that are permanent for children with other difficulties or disabilities, which is nearly twice the average.

### *Exclusion and Socio-demographic Characteristics*

Table 9 provides statistics on the comparative experience of exclusion of groups of students defined socio-demographically. Students who are entitled to free school meals[4] experience nearly three times as many FTEs as those who do not. It is likely that this comparison understates the strength of the relationship between socio-economic status (SES) and exclusion because FSM, being dichotomous, is a blunt measure of family poverty and even more so of SES (Hobbs and Vignoles, 2010). Although the differential between males and females is slightly smaller, the relative risk, a factor of 2.5 times, has more significance in terms of numbers of exclusions because it relates to such a large proportion of the school population.

4 Eligibility for free school meals (FSM), which is commonly used as an indicator for poverty or (less appropriately) for socio-economic status, is prone to change over time. These statistics are based on FSM in year 7. Models that predict GCSE results have obtained very marginal increases in explanatory power by using data about FSM in several years.

Table 9: Exclusion Rates and Durations by Student Characteristics

| Risk factor | FTEs per student | Average duration (days) | Percentage of FTEs lasting 5 days | PEs per thousand exclusions |
|---|---|---|---|---|
| Male | 0.74 | 2.66 | | 13.6 |
| Female | 0.30 | 2.50 | | 11.3 |
| Eligible for FSM | 1.16 | 2.77 | | 15.0 |
| Not eligible for FSM | 0.40 | 2.54 | | 11.8 |
| Previously in LA care | 1.49 | 3.12 | | 18.1 |
| Currently in LA care | 2.16 | 2.69 | | 9.0 |
| Gypsy / Romany | 1.70 | 2.63 | 15% | 17.9 |
| Traveller of Irish Heritage | 1.20 | 2.93 | 15% | 2.9 |
| White and Black Caribbean | 1.07 | 2.85 | 16% | 16.0 |
| Caribbean | 1.00 | 3.26 | 18% | 20.7 |
| Any Other Black Background | 0.87 | 3.04 | 17% | 20.3 |
| White and Black African | 0.74 | 2.69 | 13% | 13.3 |
| Information Not Obtained | 0.71 | 2.68 | 12% | 17.9 |
| Any Other Mixed Background | 0.65 | 2.81 | 15% | 12.1 |
| Refused | 0.61 | 2.58 | 13% | 14.3 |
| African | 0.58 | 3.13 | 17% | 14.7 |
| White British | 0.53 | 2.54 | 13% | 12.1 |
| Irish | 0.49 | 2.75 | 13% | 9.0 |
| White and Asian | 0.46 | 2.78 | 16% | 16.2 |
| Pakistani | 0.43 | 2.88 | 17% | 15.1 |
| Any Other Ethnic Group | 0.42 | 2.88 | 16% | 16.0 |
| Any Other White Background | 0.41 | 2.75 | 14% | 16.0 |
| Bangladeshi | 0.35 | 3.19 | 19% | 19.7 |
| Any Other Asian Background | 0.21 | 2.76 | 15% | 18.3 |
| Indian | 0.15 | 2.72 | 15% | 16.5 |
| Chinese | 0.08 | 3.13 | 13% | 5.9 |

Note: This table compares the experiences of exclusion of different groups of students. The first column gives a mean number of fixed-term exclusions (FTEs) per student; the second gives the average duration of FTEs; the third gives the percentage of FTEs whose duration is five days (by ethnic group); the final column gives the number of permanent exclusions per thousand exclusions. The groups are ordered in terms of experience of FTE, with those at highest risk first.

There are wide variations in the rates of exclusion across ethnic groups. It is unsurprising but noteworthy that the ordering of the groups in this table corresponds fairly accurately, but in reverse, with the progress made by different ethnic groups at secondary school according to the Department of Education's Contextual Value Added (CVA) model. The numbers in some ethnic groups at high risk (travellers and those of mixed ethnic origin) are relatively small. The larger affected groups are students of Black Caribbean origin, who suffer a high proportion of exclusions and those of Indian or Chinese origin who experience very low levels of exclusion.

If exclusion arises from a gap between the behavioural expectations of the education system and the cultural norms of different groups of students, one might expect the groups with higher rates of exclusion to have longer durations of exclusion. That explanation is consistent with the greater average durations of exclusion for boys and students eligible for FSM. However, there is no prima facie reason to expect that White British students would have the shortest average duration of exclusion of all ethnic groups and that average durations for Bangladeshi and African students would be over 20% higher. The differences between durations may seem small in that the averages only range from 2.54 to 3.26, but schools have to make special provision for students excluded for more than five days and the overwhelming majority of exclusions do not exceed this limit. The differences between average durations in Table 9 are a large part of the five day threshold and they reflect very different distributions of exclusion durations up to five days. The proportions excluded for the maximum period before special provision has to be made (i.e. five days) illustrate the point. Excluded Bangladeshi students experienced half as many again of the five day exclusions as their White British counterparts.

These cohort-based data show that children currently and previously in local authority (LA) care also experience high numbers of exclusions (an issue not identified in published statistics).

The rates of permanent exclusion for different groups of students are expressed as a rate per thousand FTEs, differences among which are quite pronounced, particularly among ethnic groups. Although too much should not be made of the ratios for the Chinese and travellers of Irish heritage groups as they are based on small numbers, the numbers of permanent exclusions relative to the number of FTEs for Bangladeshi, Caribbean and Other Black children are based on large numbers and are markedly higher than those for White British students. The figures in Table 9 suggest, but do not conclusively demonstrate, that students with different characteristics have different experiences of exclusion prior to a permanent exclusion. To address whether there are characteristics that are associated with permanent exclusion *over and above* any association with fixed term exclusion, we present in Table 10 statistics on the experiences of different groups of FTE prior to a permanent exclusion.

The breakdowns by gender, eligibility for FSM and being in local authority care do not exhibit substantively important differences in the number and duration of FTEs preceding a permanent exclusion. The breakdown by ethnic category tells a different story. As with Table 9, too much should not be read into figures for individual ethnic groups, particularly as the whole table is based on data for slightly less than 4,000 permanent exclusions, but there are wide ranges in the numbers and durations of FTEs preceding a permanent exclusion. Nearly every ethnic minority group reaches a permanent exclusion on average after fewer FTEs than White British students and all but the Irish students reach a permanent exclusion having experienced FTEs of longer average duration than the White British students. These data are consistent with a degree of systemic discrimination.

We investigate factors associated specifically with the decision permanently to exclude using logistic regression on all exclusions later.

Table 10: Permanent Exclusion and Student Characteristics

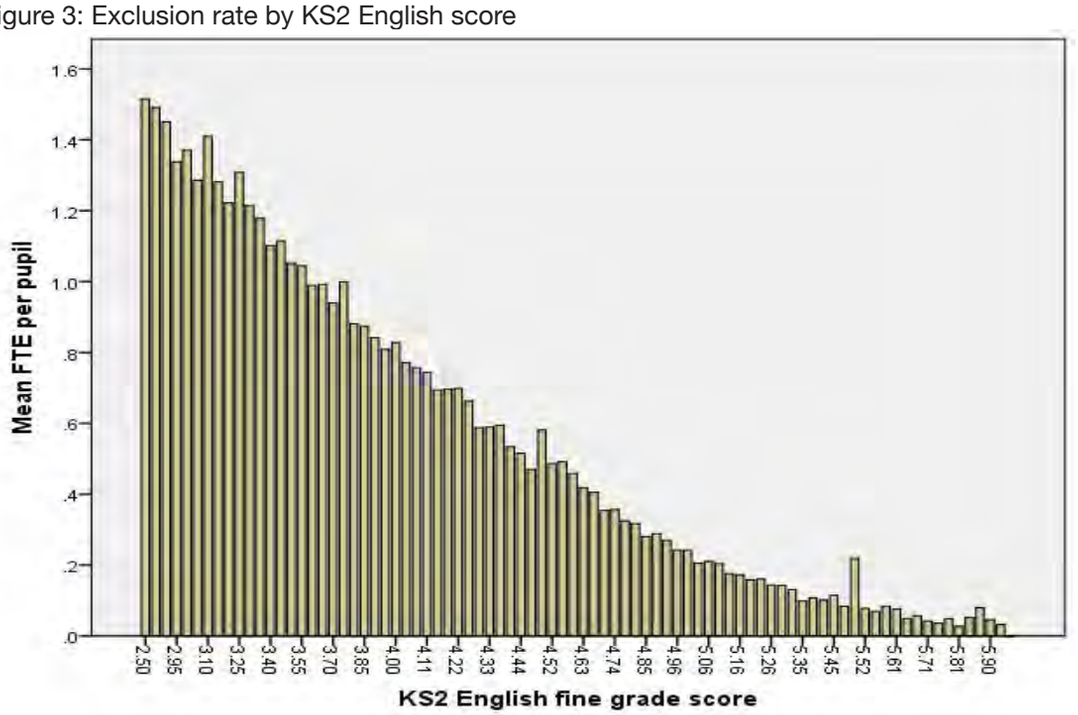
| Risk factor | PEs per thousand students | FTEs preceding Permanent Exclusion | | |
|---|---|---|---|---|
| | | Number | Total duration (days) | Average duration (days) |
| Male | 10.1 | 5.4 | 36.4 | 6.7 |
| Female | 3.4 | 5.3 | 32.9 | 6.2 |
| Eligible for FSM | 17.5 | 5.5 | 36.8 | 6.7 |
| Not eligible for FSM | 4.8 | 5.4 | 34.6 | 6.4 |
| Previously in LA care | 27.0 | 5.6 | 35.1 | 6.2 |
| Currently in LA care | 19.4 | 6.2 | 40.5 | 6.5 |
| Chinese | 0.5 | 2.0 | 20.0 | 10.0 |
| Bangladeshi | 6.8 | 2.3 | 19.4 | 8.5 |
| White and Black African | 9.9 | 2.8 | 26.4 | 9.5 |
| African | 8.6 | 3.3 | 26.7 | 8.0 |
| Any Other Asian Background | 3.8 | 3.4 | 25.8 | 7.5 |
| Indian | 2.5 | 3.5 | 27.2 | 7.8 |
| Any Other Ethnic Group | 6.8 | 3.6 | 28.6 | 8.0 |
| White and Asian | 7.5 | 3.8 | 25.6 | 6.8 |
| Traveller of Irish Heritage | 3.5 | 4.0 | 26.0 | 6.5 |
| Any Other Black Background | 17.8 | 4.1 | 30.8 | 7.5 |
| Pakistani | 6.5 | 4.3 | 32.7 | 7.6 |
| Any Other White Background | 6.6 | 4.5 | 31.3 | 7.0 |
| Irish | 4.4 | 4.6 | 25.9 | 5.7 |
| Caribbean | 20.6 | 4.6 | 37.0 | 8.1 |
| Refused | 8.8 | 4.6 | 30.1 | 6.5 |
| Information Not Obtained | 12.8 | 4.8 | 33.2 | 6.9 |
| Gypsy / Romany | 30.4 | 4.8 | 31.6 | 6.5 |
| White and Black Caribbean | 17.1 | 5.3 | 36.4 | 6.9 |
| White British | 6.4 | 5.8 | 37 | 6.3 |
| Any Other Mixed Background | 7.8 | 6.1 | 41.8 | 6.8 |

Note: This table provides statistics on experience of exclusion preceding a permanent exclusion for groups of students with different characteristics. The three right hand columns show the average number of fixed-term exclusions, the number of sessions excluded (summed for each student but averaged across the group) and the average duration of all FTEs preceding a permanent exclusion. The ethnic groups have been ordered on the second column.

### *Exclusion and Prior Attainment*

We should expect attainment at age 11 to be a powerful predictor of future exclusion because it is likely to be related to a range of determinants of exclusion, including the socio-demographic characteristics discussed above but also being related to behaviour in primary school.

Figure 3: Exclusion rate by KS2 English score




Note: This chart shows the mean number of fixed-term exclusions per student at different scores on the overall KS2 English test. Based on 539,046 students with valid KS2 English scores at age 11. Population mean KS2 English score= 4.5, SD=0.75.

Figure 3 illustrates the strong relationship between exclusion in secondary school and score in the KS2 English test at the end of primary school. Bar charts involving a range of test scores at KS2 show a similar relationship, with reading the component most strongly related to exclusion but overall score in English is a better predictor than any single component.

### *Reasons for Exclusion*

A potentially important explanatory factor behind exclusion, its duration and the decision permanently to exclude, is the severity of the disciplinary infraction. The data on exclusions include reasons, and breakdowns of fixed-term and permanent exclusions by reason are set out in Table 11.

Four of the twelve reasons account for over 80% of FTEs and over 70% of PEs. The large variation in the number of PEs per thousand FTEs is consistent with clear differences in schools' perceptions of the seriousness of these different categories of infraction and with their use of exclusion as a tool for maintaining a climate conducive to learning.

As with SEN, whether reason for exclusion would aid interpretation of outputs from a model that sought to identify differences in students' experiences of exclusion is uncertain. In the ensuing models, it is omitted.

Table 11: Exclusions by Reason

| Reason | Number of FTEs | Percentage of FTEs | Number of PEs | Percentage of PEs | PEs per thousand FTEs |
|---|---|---|---|---|---|
| Disruptive behaviour | 70,294 | 23.3% | 1197 | 30.5% | 17.0 |
| Verbal abuse on an adult | 66,815 | 22.1% | 445 | 11.3% | 6.7 |
| Physical assault on a pupil | 56,517 | 18.7% | 627 | 16.0% | 11.1 |
| Other | 55,466 | 18.4% | 607 | 15.5% | 10.9 |
| Verbal abuse on a pupil | 11,472 | 3.8% | 172 | 4.4% | 15.0 |
| Physical assault on an adult | 8,337 | 2.8% | 347 | 8.8% | 41.6 |
| Drug and alcohol related | 8,215 | 2.7% | 246 | 6.3% | 29.9 |
| Damage | 7,531 | 2.5% | 55 | 1.4% | 7.3 |
| Theft | 6,514 | 2.2% | 85 | 2.2% | 13.0 |
| Bullying | 4,675 | 1.5% | 45 | 1.1% | 9.6 |
| Racist abuse | 3,354 | 1.1% | 20 | 0.5% | 6.0 |
| Sexual misconduct | 2,952 | 1.0% | 75 | 1.9% | 25.4 |

Note: This table shows distributions of FTEs and PEs by category of special educational need (SEN). Students are grouped in rows according to their primary SEN and the rows are ordered by the number of FTEs. The final column shows the incidence of PEs relative to FTEs (and scaled by a factor of 1,000).

### *Cox Regression on First Fixed-term Exclusion*

Table shows how the explanatory power of a Cox regression model for time to a first exclusion increased as new blocks of explanatory variables were added. Measures of statistical significance are not shown here and elsewhere as they are meaningless when based on over half a million students.

Table 12: Propensity to First exclusion – Explanatory Power of Cox Regression Model

| Block | Block chi-square | Degrees of freedom | Model chi-square | Nagelkerke pseudo R2 |
|---|---|---|---|---|
| KS2 English | 28,493 | 1 | 33,284 | 5.0% |
| KS2 Maths and Science | 329 | 2 | 33,670 | 5.0% |
| Student socio-demographics* | 20,334 | 19 | 57,267 | 8.4% |
| IDACI | 2,083 | 1 | 59,238 | 8.8% |
| Interaction of FSM and ethnicity | 526 | 15 | 60,107 | 8.8% |
| School characteristics† | 855 | 13 | 60,899 | 9.0% |
| Absences | 2,420 | 6 | 66,622 | 9.4% |

Note: This table shows the explanatory power of the Cox regression model for first exclusion, successively as factors were added to the model in 'blocks'. * = gender, FSM, whether in LA care and ethnic group. † = school type, student teacher ratio and four variables that describe composition of a school's student population.

Overall, the explanatory power of the final model was only moderate but the addition of performance in KS2 English and socio-demographic characteristics to the model made the most substantial contributions. The inclusion of maths and science test scores had marginal impact and the school characteristics block also made only a small contribution. Although Table suggests that performance in the English exam is the characteristic most strongly associated with exclusion, the relative importance of the explanatory variables in the final model tells a different story.

Table 13 sets out the overall contributions of different characteristics to the prediction of a first exclusion based on the full model, ordered by the size of Wald statistics in the model. Gender is the predominant factor in the explanation of exclusion, being as powerful a predictor as the next three variables combined. Absence from school in the first two terms of secondary education makes a substantial contribution to the model. Poverty has an impact of a similar size, combined over FSM and IDACI, to attendance. Ethnic group and KS2 English prior attainment have impacts of a similar size. Being in Local Authority care is the last sizeable risk factor. The impact of school type, composition or the ethnic * FSM interaction are negligible.

Table 13: Propensity to First Exclusion: Contributions of Different Factors

| Explanatory Factor | Wald statistic | Odds Ratio (OR) |
|---|---|---|
| Gender (boys) | 9,391 | 2.18 |
| Absence from school (normalised) | 4,483 | 1.28 |
| Poverty – Entitled to free school meals (FSM) | 3,249 | 1.62 |
| Income Deprivation Affecting Children Index IDACI (1 SD change) † | 1,769 | 1.22 |
| Ethnic group | 2,277 | - |
| KS2 attainment (NC fine-grade level)* | 2,144 | 0.74 |
| In local authority care | 1,528 | 2.90 |
| School type | 504 | - |
| Interaction of FSM and ethnicity | 402 | - |
| School composition | 317 | - |

Note: This table shows the contribution of different characteristics to the prediction of a first exclusion in the final model. Some of the entries represent several variables whose Wald statistics have been summed, but the different orders of magnitude are a reasonable guide to the relative importance of different factors. †Variables such as IDACI have been standardized to make their odds ratios more comparable with those of dichotomous variables such as FSM. * Effect of a 1 level increase in KS2 decimalised score. Wald statistics provide the best basis for comparisons of relative effect.

Ethnicity makes a significant contribution in the full model although about half the size of the combined poverty measures (FSM & IDACI). Although ethnicity is not the most important contributor to the model, the coefficients for some ethnic groups are very high. Table shows that the hazard rate for Black Caribbean and Mixed White and Black Caribbean students is nearly twice as high as for White British students, while that for Chinese students is three times lower. It might be thought that the inclusion of better measures of SES in the model would further attenuate the relationship between ethnicity and exclusion, but ethnic groups in this table are not ordered in a way that would support this. Bangladeshi families, for instance, are among the poorest and yet have one of the lowest odds of FTE.

Coefficients on the interaction terms between ethnicity and FSM were small – the coefficients for students entitled to FSM are not greatly different from those for students not entitled to FSM.

Reductions in the 'protective' effect of being Chinese and the disadvantage suffered by African students are the most pronounced differences between the pairs of columns in Table.

Table 14: Propensity to First Exclusion – Ethnicity Coefficients

| | Not Eligible for FSM | | Eligible for FSM | |
|---|---|---|---|---|
| Ethnic group | Coefficient | Odds ratio | Coefficient | Odds ratio |
| Black Caribbean | 0.688 | 1.99 | .544 | 1.72 |
| Mixed White & Caribbean | 0.638 | 1.89 | .556 | 1.74 |
| Mixed White & African | 0.365 | 1.44 | .422 | 1.52 |
| Black African | 0.350 | 1.42 | .030 | 1.03 |
| Mixed White & other groups | 0.213 | 1.24 | .335 | 1.40 |
| Other | 0.145 | 1.16 | .023 | 1.02 |
| Unknown | 0.136 | 1.15 | .194 | 1.21 |
| Mixed White & Asian | 0.127 | 1.14 | .138 | 1.15 |
| White Irish | 0.008 | 1.01 | .244 | 1.28 |
| White British (base) | 0 | 1.00 | 0 | 1.00 |
| Pakistani | -0.041 | 0.96 | -.263 | 0.77 |
| White other groups | -0.142 | 0.87 | -.214 | 0.81 |
| Bangladeshi | -0.198 | 0.82 | -.414 | 0.66 |
| Asian, other | -0.546 | 0.58 | -.418 | 0.66 |
| Indian | -0.601 | 0.55 | -.574 | 0.56 |
| Chinese | -1.155 | 0.31 | -.808 | 0.45 |

Note: This table shows the coefficients for all ethnic groups in the Cox regression model for first fixed-term exclusion, relative to the White British group, and having taken account of all other explanatory variables. Each pair of columns comprises a set of coefficients and their exponents. The first pair of columns relates to students who are not eligible for FSM and the second to students who are.

### *School Characteristics*

Estimates of coefficients relating to characteristics of schools are shown in Table. The full model included three types of school characteristics: school type, school resources (in the form of the student-teacher ratio) and school composition (in terms of ethnicity and poverty measured by FSM). Most of the school-level predictors are of marginal relevance but there are large coefficients on certain school types (especially Grammar). The small coefficients on the school composition variables do not, of themselves, signify that composition is unimportant, but these variables and the student-teacher ratio barely achieved significance even though this model did not take account of clustering.

It requires a multilevel model to estimate the amount of variability in rates of exclusion among schools and to have more confidence about the significance of any coefficients. The results of such a model, which applied ordinal regression to the number of FTEs, are discussed later.

Table 15: Cox Regression on First Fixed-term Exclusion - School Characteristics

| School characteristic | B Coefficient | Odds ratio |
|---|---|---|
| School type | | |
| Grammar | -.539 | 0.583 |
| Academy | .208 | 1.231 |
| Modern | .156 | 1.169 |
| Middle | -.150 | 0.860 |
| Maintained Special | .473 | 1.605 |
| Comprehensive all-through 11-16 | -.061 | .941 |
| Other | -.032 | 0.969 |
| School resources | | |
| Student-teacher ratio | .005 | 1.005 |
| School composition (percentages of students) | | |
| Eligible for FSM | -.009 | 0.991 |
| White British | -.002 | 0.998 |
| Black Caribbean | -.004 | 0.996 |
| Chinese | -.001 | 0.999 |

Note: This table shows the coefficients for school characteristics in the Cox regression model for first fixed-term exclusion. The first seven rows relate to different school types, all compared with the most common type: 'Comprehensive all-through 11-18'; the bottom five rows are socio-demographic compositional characteristics.

In summary, gender, family deprivation, ethnicity, being in care and neighbourhood deprivation all play a significant role in relation to FTE. Low attainment (particularly in English) at the end of Y6 and poor attendance early in autumn/spring Y7 also appear to play an important mediating role but becomes less important predictors of FTE in a model that contains a range of socio-cultural variables.

***Cox Regression on Subsequent Fixed-term Exclusions***

To test the hypothesis that differential rates of *successive* exclusions are related to student characteristics, we fitted further Cox regression models to second and third exclusions and compared the coefficients in the three regressions. The estimated coefficients from those three models are given in Table 16. Factors that did not make a substantively important contribution, including all the school-level variables and the interaction terms between ethnicity and FSM, are omitted from the table. The most significant feature of the table is the smaller coefficients in the models for second (and third) FTEs than for the first. Once prior exclusion is taken into account (as it is for the models for second and third FTEs), the odds ratios for pupil background factors are substantially lower. The additional risk suffered by boys, students from poor families and some ethnic groups *over and above* their higher risk of a first exclusion adds another dimension to the issue of differential exclusion. However only Mixed White & Black Caribbean students (OR=1.14) remain slightly more likely to have a second exclusion conditional on already having experienced a first. However we should remember that this group of 88,594 students who have experienced at least one FTE are already highly skewed including over 30% of Black Caribbean and Mixed White and Black Caribbean students compared to just 15% of White British students.

Table 16: Propensity to Successive Exclusions: Student-level Coefficients

| | First exclusion | | Second exclusion | | Third exclusion | |
|---|---|---|---|---|---|---|
| Variable | Coeff. | OR | Coeff. | OR | Coeff. | OR |
| Gender (Boy) | .763 | 2.14 | 0.17 | 1.19 | -0.09 | 0.91 |
| Entitled FSM | .460 | 1.58 | 0.19 | 1.21 | 0.00 | 1.00 |
| IDACI (normalised) | .174 | 1.19 | 0.05 | 1.05 | -0.02 | 0.98 |
| KS2 English (fine-grade) | -.300 | 0.74 | -0.11 | 0.90 | 0.02 | 1.02 |
| KS2 maths (fine-grade) | -.101 | 0.90 | -0.03 | 0.97 | 0.00 | 1.00 |
| KS2 Science (fine-grade) | -.111 | 0.90 | -0.05 | 0.95 | 0.03 | 1.03 |
| Looked after (anytime) | 1.044 | 2.84 | 0.42 | 1.52 | -0.16 | 0.86 |
| Absence (normalised) | .247 | 1.28 | 0.11 | 1.11 | -0.04 | 0.96 |
| White Irish | .048 | 1.05 | -0.02 | 0.98 | 0.08 | 1.08 |
| White other | -.195 | 0.82 | -0.18 | 0.83 | 0.07 | 1.07 |
| Mixed White & African | .343 | 1.41 | 0.06 | 1.06 | -0.11 | 0.89 |
| Mixed White & Caribbean | .542 | 1.72 | 0.13 | 1.14 | 0.05 | 1.06 |
| Mixed White & Asian | .072 | 1.07 | -0.07 | 0.93 | 0.13 | 1.14 |
| Mixed other heritage | .218 | 1.24 | -0.04 | 0.96 | -0.08 | 0.92 |
| Indian | -.592 | 0.55 | -0.52 | 0.59 | 0.24 | 1.27 |
| Pakistani | -.427 | 0.65 | -0.37 | 0.69 | 0.14 | 1.15 |
| Bangladeshi | -.427 | 0.65 | -0.37 | 0.69 | 0.14 | 1.15 |
| Asian other groups | -1.06 | 0.35 | -0.36 | 0.70 | 0.34 | 1.41 |
| Chinese | -.514 | 0.60 | -0.46 | 0.63 | 0.43 | 1.54 |
| Black African | .196 | 1.22 | -0.19 | 0.83 | 0.18 | 1.20 |
| Black Caribbean | .626 | 1.87 | 0.03 | 1.03 | 0.03 | 1.03 |
| Any Other Group | .086 | 1.09 | -0.07 | 0.93 | 0.07 | 1.08 |
| N (R squared) | 543,191 (14.9%) | | 88,594 (6.1%) | | 49,395 (2.6%) | |

None of the coefficients in the model for the third FTE is significantly different (in a statistical sense) from the corresponding coefficients in the model for second FTE. The smaller coefficients in the two latter models are matched by less explanatory power: where the adjusted R-squared for first FTE is a little over 15%, the adjusted R-squared for second (6.1%) and third FTEs (2.6%) are considerably lower.

We did not continue to fit models to later exclusions but it seems highly likely (as the standard errors of the estimates increase with the declining number of successive exclusions) that none of the coefficients will differ significantly in models for subsequent exclusions. We cannot know whether differential deterrence of FTE or the differential effects of disciplinary policies and practices is the reason but these estimates suggest that the differential experience of exclusion for White British and Caribbean students (for instance) continues to widen during secondary school. This is important when we investigate differential experience of permanent exclusion. We saw in Table 5 how the proportion of students permanently excluded rose sharply with the number of FTEs they had experienced. The explanation for certain groups of students being much more prone to permanent exclusion could lie primarily with the process that determines their broader experience of the exclusion process, rather than something specific to a decision about permanent exclusion.

***Ordinal Regression on All Exclusions (FTE and PE Combined)***

Having separate regression models for successive exclusions is inelegant. A more parsimonious approach would be to assume that a latent propensity to perceived misbehaviour, which has student, family, neighbourhood and school dimensions, explains students' experiences of exclusion. If such a model were appropriate, one statistical model that might be fitted to the exclusions data would be ordinal regression on the total number of exclusions.

Table 17: Comparison of Coefficients in Two Logistic Regression Models

| | One exclusion versus none | | Two exclusions versus zero or one | |
|---|---|---|---|---|
| Explanatory variable | Coefficient | Standard error | Coefficient | Standard error |
| Gender = Male | .976 | .010 | 1.017 | .013 |
| FSM | .978 | .012 | 1.016 | .013 |
| IDACI | 1.561 | .027 | 1.562 | .032 |
| Ethnicity | | | | |
| Mixed White & Black Caribbean | .965 | .047 | .939 | .055 |
| Black Caribbean | .912 | .045 | .853 | .052 |
| Mixed White & Black African | .641 | .080 | .630 | .093 |
| Unknown | .524 | .046 | .507 | .054 |
| Mixed other heritage | .418 | .054 | .432 | .063 |
| White British | .363 | .033 | .389 | .040 |
| White Irish | .299 | .086 | .216 | .104 |
| Any Other ethnic group | .277 | .047 | .188 | .056 |
| Mixed White & Asian | .213 | .070 | .199 | .084 |
| Black African | .178 | .044 | -.007 | .053 |
| Pakistani | -.072 | .044 | -.267 | .054 |
| Bangladeshi | -.588 | .059 | -.777 | .075 |
| Asian other groups | -.670 | .082 | -.930 | .110 |
| Indian | -.787 | .063 | -1.030 | .083 |
| Chinese | -1.433 | .186 | -1.751 | .263 |
| Constant | -2.847 | .034 | -3.274 | .040 |

Note: This table shows estimated coefficients and standard errors from two logistic regressions whose outcome variables are defined by thresholds on the number of exclusions. Coefficients in the left hand columns show estimates from a model whose outcome is the binary variable, whether a student has at least one exclusion; the right hand columns give corresponding estimates when the threshold is two exclusions.

In their analysis of data for one US school district, Sullivan *et al*. (2013) concluded that ordinal regression was inappropriate because the critical assumption of parallel odds was not met. Table 17 applies this test, showing coefficients and standard errors for two logistic regressions involving the most powerful explanatory variables from the models for FTEs. It is inevitable with such a large data set that most of the differences between the pairs of estimates are highly significant but none of the differences here is substantively important.

It is doubtful that constraining the coefficients to be equal for every exclusion by applying ordinal regression will lead to enormous reductions in goodness of fit (or bias in parameter estimates). We used a cumulative logit link function in the ordinal regression. We tried the same model with a complementary log-log function but the fit was worse (e.g. adjusted $R^2$ of 9.75%, compared with 12.6%). Estimates of student-level coefficients from the ordinal regression are provided in Table.

The student-level coefficients are similar to those obtained in the Cox regression for first FTE. The Wald statistics are generally, and as expected, larger (e.g. for FSM, 5,292 vs. 3,249 in Table 13), but so too is the adjusted $R^2$, at 12.6% compared with 9.4%. The interaction terms between ethnicity and FSM are a little different to those in the Cox regression for first FTE, all of them being negative. This suggests that ethnic minority groups are less affected by poverty (in terms of greater exclusion), than their White British counterparts.

Table 18: Ordinal Regression on Number of Exclusions – Student-level Estimates

| Explanatory variable | Coefficient | Wald statistic | Interaction terms with FSM | |
|---|---|---|---|---|
| Gender = Male | .863 | 10,240 | | |
| FSM | 1.246 | 5,292 | | |
| IDACI | 1.211 | 2,167 | | |
| Fine grade score in KS2 English | -.377 | 2,086 | | |
| Fine grade score in KS2 Maths | -.138 | 283 | Coefficient | Wald statistic |
| Fine grade score in KS2 Science | -.160 | 286 | | |
| Mixed White & Black Caribbean | .719 | 239 | -.275 | 12 |
| Black Caribbean | .697 | 259 | -.396 | 27 |
| Mixed White & Black African | .362 | 20 | -.181 | 2 |
| Black African | .258 | 35 | -.704 | 97 |
| Mixed other groups | .214 | 17 | -.107 | 1 |
| Unknown | .148 | 12 | -.123 | 2 |
| Mixed White & Asian | .112 | 3 | -.252 | 4 |
| Other | .111 | 5 | -.462 | 35 |
| White Irish | .033 | 0 | -.025 | 0 |
| Pakistani | -.127 | 9 | -.580 | 66 |
| White other groups | -.187 | 19 | -.432 | 30 |
| Bangladeshi | -.286 | 23 | -.596 | 44 |
| Asian other groups | -.679 | 99 | -.237 | 4 |
| Indian | -.721 | 215 | -.314 | 9 |
| Chinese | -1.312 | 88 | -.019 | 0 |

Estimates of school-level coefficients from the ordinal regression are shown in Table 19. The message is substantively the same as the Cox regression for first FTE: grammar schools and schools with higher intakes from poor families seem to exclude fewer students. The coefficients are somewhat different from those in Table 15, with the grammar school effect appearing to be smaller and that of more deprived intakes appearing to be larger. More robust conclusions about school-level coefficients require the multilevel model that we apply in the next section.

Table 19: Single Level Ordinal Regression – School-Level Coefficients

| School characteristic | Coefficient | Wald statistic |
|---|---|---|
| School type | | |
| Grammar | -0.469 | 6 |
| Academy | 0.315 | 3 |
| Modern | 0.252 | 2 |
| Middle | -0.086 | 0 |
| Maintained Special | 0.418 | 0 |
| Comprehensive all-through 11-18 | 0.005 | 0 |
| Other | -0.041 | 0 |
| School resources | | |
| Student-teacher ratio | .007 | 20 |
| School composition (% students) | | |
| Eligible for FSM | -.012 | 144 |
| White British students | -.002 | 0 |
| Black Caribbean students | -.005 | 10 |
| Chinese students | .000 | 0 |

Note: This table shows school-level coefficients and Wald statistics from an ordinal regression of number of exclusions experienced by each student. Wald statistics provide a benchmark for comparing effects but are not a guide to statistical significance without a multilevel model.

***Variation in Rates of Fixed-Term Exclusion at the School Level***

Testing the significance of school level coefficients with a multilevel generalized linear model was not feasible with the full dataset and full set of explanatory variables. A three-level model (local authority, school and student) was fitted using a subset of the data and of the explanatory variables. The model used was ordinal regression with number of exclusions during secondary education as the dependent variable. The data subset comprised the students in the cohort whose local authority (LA) code ended with zero or five, (157,267 students in 1,012 schools in 35 LAs). The pupil-level explanatory variables that were substantively important in the Cox regression models were used (Gender, KS2 English score, FSM, neighbourhood deprivation index, ethnicity and whether in LA care). There were convergence problems when all of the school-level variables were used, so different subsets were tried and results are reported for the only school-level variable that achieved significance. The multilevel model yields estimates of variance components at two levels of clustering. With variance at the student level scaled to 1, the residual variances at the school and LA levels were .265 and .089 (19.6% and 6.6% of the total respectively). Both are substantial. Whether local authorities have genuine influence on disciplinary policy in schools in their area or the explanation lies in a wider environment (for instance relating to regional economic disparities) cannot be known from this analysis. However, as compositional aggregates at the school level do not make a significant contribution to the model, there is no reason to expect such effects to matter at the LA level. We might speculate as well that if contextual factors accounted for disparities in the education system at the LA level, the disparities would be proportionally similar for academic progress and for exclusion, but in fact the variation in exclusion rates at the LA level here is much greater than the one per cent of residual variation in academic progress between KS2 and KS4 that LAs account for.

Estimates of the school level coefficients are shown in Table. The coefficient on the percentage of students eligible for FSM is highly significant, though by no means large – a ten point change in the percentage of students eligible for FSM would only change to odds ratio by a factor of 0.92. It may seem counter-intuitive that the rate of exclusion should be lower in schools with a higher proportion of children from poorer families. However, the higher rate of exclusion for

students entitled to FSM is already taken into account in the model, and even if there were a contextual effect associated with local poverty, it might be captured by the positive coefficient on the neighbourhood deprivation variable derived from each student's address. Consequently, a compositional effect might capture a tendency of schools that teach more children from poorer families to accept as culturally normal behaviours that might trigger disciplinary processes in other schools. Caution should be exercise in drawing inferences from significant coefficients on contextual terms because they can arise for a number of reasons (Harker and Tymms, 2004).

Table 20: Multilevel Ordinal Regression – School-Level Coefficients

| School characteristic | Coefficient | Odds ratio | Standard error (se) |
|---|---|---|---|
| **School type** | | | |
| Academy | 0.335 | 1.40 | 0.628 |
| Comprehensive all-through 11-18 | 0.009 | 1.01 | 0.609 |
| Grammar | -0.599 | 0.55 | 0.621 |
| Modern | 0.170 | 1.06 | 0.635 |
| Other | -0.098 | 0.91 | 0.594 |
| **School resources** | | | |
| Student-teacher ratio | -0.009 | 0.99 | 0.013 |
| **School composition** | | | |
| % Eligible for FSM | -0.008 | 0.99 | 0.003*** |
| % White British students | 0.002 | 1.00 | 0.002 |

Note: This table provides estimates of the school level coefficients from a multilevel ordinal regression model with number of exclusions during secondary school as the outcome variable. Only two of the school composition terms were tested and maintained special schools were merged with other in this model. *** = p<.001, assessed by dividing the coefficient by the se

There is little point in scrutinising the student-level coefficients from the multilevel model. They do not tell a substantively different story, but being estimated from a subset of the data and having omitted some of the explanatory variables, they differ from earlier models.

***Factors Associated with Permanent Exclusion: Cox's Regression***

Estimates of coefficients for risk factors associated with permanent exclusion (PE) employed a Cox's logistic regression with one record per student with the binary outcome being (1) if the student had experienced a PE by the end of Y11 and (0) if there had been no PE. With around 3,650 permanent exclusions this represents only 0.67% of students, so some of the subsets of students for whom coefficients are being estimated (e.g. Chinese boys not eligible for free school meals) are relatively small. Nevertheless as a full national cohort this reflects the actual incidence of PE. The analysis addresses two questions: (i) How do the risks for PE compare to the risks for FTE? Are the same risk factors indicated and to the same extent? (ii) Taking account of the unique longitudinal dataset built in this analysis, to what extent can any raised risk of PE be accounted for by greater experience of FTE? Is the former just a reflection of the later, or are there additional considerations in determining who becomes PE? Estimates from the models are given in Table 21.

Table 21: Cox Regression for Permanent Exclusion – Student-level Coefficients

| | Before accounting for prior FTE | | | After accounting for prior FTE | | |
|---|---|---|---|---|---|---|
| Variable | B | SE | OR | B | SE | OR |
| White Irish | -.51 | .354 | .60 | -.27 | .35 | .76 |
| White other | -.04 | .106 | .96 | .15 | .11 | 1.17 |
| Mixed White & Caribbean | .49 | .237 | 1.63 | .62 | .24 | 1.86 |
| Mixed White & African | .66 | .102 | 1.93 | .56 | .10 | 1.76 |
| Mixed White & Asian | .27 | .194 | 1.32 | .19 | .20 | 1.21 |
| Mixed other heritage | .00 | .160 | 1.00 | 0.3 | .16 | 1.03 |
| Indian | -.63 | .181 | .53 | -.36 | .18 | .70 |
| Pakistani | -.37 | .107 | .69 | -.09 | .11 | .91 |
| Bangladeshi | -.36 | .156 | .70 | -.03 | .16 | .97 |
| Asian other groups | -1.89 | 1.000 | .15 | -1.67 | 1.00 | .19 |
| Chinese | -.49 | .244 | .61 | -.16 | .24 | .86 |
| Black African | -.03 | .108 | .97 | .21 | .11 | 1.24 |
| Black Caribbean | .95 | .085 | 2.58 | .89 | .09 | 2.44 |
| Any Other Group | .23 | .075 | 1.26 | .32 | .07 | 1.38 |
| Gender (Boy) | .99 | .041 | 2.70 | .71 | .04 | 2.04 |
| Entitled FSM | .66 | .039 | 1.94 | .39 | .04 | 1.48 |
| IDACI (normal score) | .24 | .021 | 1.27 | .18 | .02 | 1.20 |
| KS2 English points | -.38 | .034 | .69 | -.22 | .03 | .80 |
| KS2 maths points | -.03 | .035 | .97 | -.09 | .03 | .92 |
| KS2 Science points | -.15 | .038 | .86 | -.09 | .04 | .92 |
| CLA | 1.00 | .115 | 2.72 | .49 | .12 | 1.63 |
| Absence Y7 (normal score) | .42 | .018 | 1.52 | .33 | .02 | 1.39 |
| School %FSM | .00 | .002 | 1.00 | .00 | .00 | 1.00 |
| No of previous FTEs | | | | .05 | .00 | 1.05 |
| Total number of days FTE | | | | .02 | .00 | 1.02 |
| Nagelkerke $R^2$ | | | 10.0% | | | 24.7% |

Note: Based on 543,986 unique pupils with 3,652 PEs (using only the first PE for the 150 students with more than one PE). The table shows two sets of estimates from a Cox's regression model both before and after previous number and duration of FTEs are taken into account. White British is the reference category for ethnicity. B= coefficient, SE= Standard Error, OR= Odds Ratio. Nagelkerke R2 taken from binary logistic regression as equivalent statistic not produced from Cox's regression. Number of Previous FTEs from 0-5 encompasses 97.5% of observations and number of days FTE from 0-24 encompasses 97.5% of observations.

It is clear that, just as with FTE, the same pupil background variables are associated with increased risk of PE. Being a boy, entitled to FSM, living in a deprived neighbourhood (IDACI), being in Local Authority Care (CLA), having low attainment in national tests (particularly in English) at the end of primary school and poor attendance in Y7 are all associated with substantial increase in the risks of PE. Importantly even controlling for all these factors, Black Caribbean (OR=2.6), Mixed White and Black African (OE=1.93) and Mixed White and Black Caribbean (OE=1.63) students are still substantially over-represented among those experiencing PE relative to White British students, while Other Asian (OR=0.19), Indian (OR=0.53), Chinese

(OR=0.61), Pakistani (OR=0.69) and Bangladeshi (OR=0.70) students are all under-represented relative to White British students.

The point of departure for the right hand columns is to ask whether the over-representation among ethnic minority groups for PE can be accounted for by their higher risk of FTE (the raised risk on FTE was demonstrated in Table 16). Prior FTE was accounted for by both the number of previous FTEs and the total numbers of days of FTE experienced. Both had a strong positive association with the incidence of PE and indeed were the strongest predictors of PE, raising the amount of variance in PE explained from 10% to almost 25%. However it is notable that Black Caribbean (OR=2.44), Mixed White and Black Caribbean (OR=1.86) and Mixed White and Black African (OE=1.76) students still have substantially higher odds of a PE even after accounting for the higher levels of FTE in these groups relative to White British students. This confirms the message emerging from the simple descriptive statistics in Table 10. Overall Black Caribbean students have on average twice as many instance of FTE and twice as many days of FTE as White British students. However among the sub-set of students experiencing PE, Black Caribbean students on average received fewer instance of FTE and equivalent numbers of days of FTE to White British students. The raised risk of PE for these ethnic groups is therefore not accounted for by any demographic controls or by past history of FTE. These data are consistent with a degree of systematic bias in the PE process.

# Discussion

The questions raised in the introduction concerned the strengths of relationships between exclusion and various factors when a wide range of variables are taken into account. A factor widely discussed in the literature was ethnicity, while prior attainment and absences were candidates for early identification of individuals prone to exclusion. We also drew attention to the dearth of evidence about the role of school and neighbourhood. Whether the relative risks were the same for successive fixed-term exclusions and for permanent exclusion added further dimensions to these questions. We addressed these questions using Cox's regression, ordinal regression, multilevel ordinal regression and multilevel logistic regression (the latter two using the Generalized Linear Mixed Model in SPSS). We applied these methods to a very large data set taken from the English NPD.

The regression models confirmed the pre-eminence of gender as the variable that accounts for the largest part of differences in rates of fixed-term exclusion. Low attainment, particularly in English, at the end of primary school and poor attendance during the first two terms of secondary school are important risk factors for exclusion. However the socio-demographic variables continue to have strong impact even after control for such factors. For example we found strong evidence that children in local authority care and students who live in deprived neighbourhoods have substantively more experience of exclusion, again when other factors are taken into account. Where some US authors (Achilles *et al*., 2007; Theriot *et al*., 2010) had raised questions about the significance of ethnicity when SES is taken into account, we showed that ethnic groups experience substantively different amounts of exclusion even when other factors are taken into account. The extent to which Black Caribbean students and those from a Mixed White & Black Caribbean background were more at risk of fixed-term exclusions, or to which Chinese and Indian students were less at risk than other groups, was only slightly affected by taking account of other factors such as SES. This is congruent with other analyses of the NPD that identified the odds of Black Caribbean and Mixed White & Black Caribbean students being identified with Behavioural, Emotional and Social Difficulties (BESD) are over twice as high as the odds for White British students, and that the raised odds continue to be significant after adjustment for student background (Strand & Lindsay, 2009). These two ethnic groups are also those most at risk of low educational achievement in England (e.g. Strand 2014a, 2014b). We made no strong inferences about the interaction of ethnicity and eligibility for FSM because those interactions were relatively weak, although this may partly reflect the fact that neighbourhood deprivation was also included in the model. This result indicates that Black Caribbean and Mixed White & Black Caribbean students were over-represented relative to White British to the same extent among those on FSM and those not entitled to FSM. There has been considerable debate as to whether the drivers of this over-representation are genuine differences in the behaviour of these students or arise from the greater perceptions of misbehaviour by teachers or school staff (e.g. Gillborn, 1990; DfES, 2006). Our data cannot distinguish between these competing interpretations, and indeed we suspect no dataset would be able to conclusively rule out either interpretation. However insofar as one driver of exclusion may be perceptions of misbehaviour, and if the aim were to reduce the differentials, schools should consider whether their reward and sanction processes and systems are applied consistently and fairly for all ethnic groups within the school.

A salient feature of the analysis of second and third FTEs, and of permanent exclusions was the explanatory power of previous experience of exclusion. While FTE seems to 'work' for 44% of students, in that they experience one and only one FTE, over half of students experiencing one FTE go on to experience at least a second or more further FTEs. A reasonable interpretation is that exclusion arises from misbehaviour, and past misbehaviour is strongly predictive of future misbehaviour. If that is the case, a focus on exclusion beyond the first FTE is likely to have only a marginal impact on differential exclusion.

This study raises potential avenues for further research. The substantive importance of a geographical measure of deprivation (IDACI) in the regression models for both FTE and PE draws attention to the potential role of neighbourhood in shaping children's behaviours at

school or the perceptions teachers may form based on where children live. It might be helpful to refine the estimates relating to neighbourhood by reviewing the relevance of the definition of deprivation or the geographical areas for which the index is calculated. However, the greater need is to separate and refine estimates of the effects of family and neighbourhood. It is impossible to know the extent to which neighbourhood deprivation acts as a proxy for family structure and circumstances in the regression analyses we conducted. On the one hand, the importance of eligibility for FSM only serves to highlight the paucity of relevant information about the family in the NPD. On the other, statistical analysis of an administrative database cannot identify processes operating at a neighbourhood level, such as crime or gang culture, that might be a factor in exclusion. A deeper investigation of these issues requires a richer data source, such as the Longitudinal Study of Young People in England, and encompassing this issue within a more qualitative study might also be beneficial.

The amount of variability in rates of exclusion among schools was high. There may be a case for making disciplinary procedures more consistent across the education system (though, of itself, that would have a small impact on the differentials we see at the student level). The poor predictive power of school-level variables is unsurprising – notwithstanding our scepticism about research in the field, governance and ethos seem more plausible explanations for school-level differences in rates of exclusion than, for instance, ethnic composition (after student-level ethnicity has been factored out). The one significant coefficient we found at the school level was a negative coefficient on percentage of students eligible for FSM, which contrasts with Raffaele-Mendez *et al.* (2002) and strongly suggests that their finding may be simply a function of student characteristics and say nothing of significance about schools. In the wider context of evaluating education policy around academies, relative exclusion rates in academies as a whole and variation in exclusion rates among academies may merit further investigation.

A question that transcends those we have investigated is whether the unequal application of exclusion is unfair. The broader research need is to better understand the benefits and the negative consequences not only for the individuals excluded but also and for the wider class or school community and the education system as a whole.

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# Appendix A

***The time dimension in Cox's regression***

The measures of elapsed days prior to FTE were unevenly distributed, particularly due to school holidays at Christmas, Easter and summer. Exclusion dates were therefore expressed as elapsed school days. Each school year consists of approximately 229 days, so over the 5 years from start of Y7 to the end of Y11, school days would range from 1 to 1,144. Exclusions were sorted by date with lowest date allocated 1 and the highest allocated 1144. There were >302,000 exclusions over the 1144 days or on average over 300 exclusions per school day.

***Table 1: Numbers of cases with different subsets of variables***

| | Pupils | FTEs |
|---|---|---|
| 2007 Spring census | 573,873 | 302,146 |
| plus school level data | 573,867 | 302,146 |
| plus key stage 2 results | 562,890 | 297,360 |
| plus absence data | 543,506 | 285,541 |

***Table 2: Distribution of durations of fixed-term exclusions***

| Duration | Number of exclusions | Percentage of exclusions |
|---|---|---|
| Up to one day | 109,003 | 36.1% |
| Over 1 and up to 2 days | 76,333 | 25.3% |
| Over 2 and up to 3 days | 52,022 | 17.2% |
| Over 3 and up to 4 days | 12,437 | 4.1% |
| Over 4 and up to 5 days | 40,664 | 13.5% |
| Over 1 week and up to 2 | 7,845 | 2.6% |
| Over 2 weeks and up to 3 | 2,569 | 0.9% |
| Over 3 weeks and up to 4 | 758 | 0.3% |
| Over 4 weeks and up to 6 | 515 | 0.2% |
| Total | 302,146 | |

*Table 3: Multilevel ordinal regression – pupil-level coefficients*

| Variable | Estimate | Standard error |
|---|---|---|
| Gender = Male | 0.817 | 0.038 |
| KS2 English | -0.444 | 0.021 |
| FSM | 0.513 | 0.037 |
| IDACI | 0.870 | 0.091 |
| Ethnicity | | |
| African | -0.421 | 0.137 |
| Bangladeshi | 0.630 | 0.081 |
| Caribbean | -0.149 | 0.062 |
| Chinese | 1.131 | 0.248 |
| Indian | -1.089 | 0.112 |
| Irish | -0.522 | 0.149 |
| Mixed, African | 0.411 | 0.101 |
| Mixed, Asian | 0.717 | 0.157 |
| Mixed, Caribbean | 0.199 | 0.07 |
| Mixed, other | 1.015 | 0.073 |
| Other | 0.622 | 0.07 |
| Pakistani | -0.023 | 0.107 |
| Unknown | 0.673 | 0.091 |
| White British | 0.460 | 0.051 |
| White, other (reference) | 0 | |
| Not looked after | -1.047 | 0.148 |
| Previously looked after | -0.103 | 0.333 |
| Currently looked after (reference) | 0 | |