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Article Title: Ethnic Disproportionality in Special Education: Evidence From an English Population Study

Year of publication: 2008

Link to published version:

<http://dx.doi.org/10.1177/0022466908320461>

Publisher statement: None

Ethnic disproportionality in special education: Evidence from an English population study.

Please cite the published version (as given below) if you quote from this pre-print:

Strand, S. & Lindsay, G. (2009). Ethnic disproportionality in special education: Evidence from an English population study. *Journal of Special Education* (expected publication in 2009).

Keywords

Ethnic group, special educational needs, disproportionality, special education, identification, over-representation

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Abstract

Differences in the proportion of students identified as having Special Educational Needs (SEN) across different ethnic groups has historically been of concern both in the UK and US. However the absence of student level data has hindered the investigation of the reasons for such disproportionality. This paper presents an analysis of the 2005 Pupil Level Annual School Census for 6.5 million students aged 5-16 in England. Logistic regression analyses were completed to calculate the odds-ratios of having an identified SEN both before and after adjusting for the influence of age, gender and socio-economic disadvantage (poverty). Poverty and gender had stronger associations than ethnicity with the overall prevalence of SEN. However, after controlling for these effects significant over- and under-representation of different minority ethnic groups relative to White British students remained. The nature and degree of these disproportionalities varied across category of SEN and minority ethnic group and were not restricted to judgmental categories of SEN.

Introduction

The disproportionate representation of minority ethnic students in special education has been a cause for concern for over 30 years in both the US (Dunn, 1968) and the UK (Coard, 1971). Initially the analyses focused on the disproportionate percentages of minority ethnic students but more recently attention has turned to exploring interactions between several factors including ethnicity, type of disability (special educational needs (SEN) the term used in England) and poverty (socio-economic disadvantage) (Donovan & Cross, 2002; Hosp & Reschly, 2004). Most of this research has been undertaken within the US where there have been a number of large-scale quantitative studies. Studies in the UK have typically been small scale and qualitative. They have also tended to focus on attempts to investigate the reasons for disproportionality, in particular the classroom practices of teachers and organisation factors concerned with schools and local authorities (school districts) an approach which has also been undertaken in the US but on a larger scale (Harry & Klinger, 2006). This paper reports the first large scale quantitative study in England that investigated disproportionality with respect to ethnicity, taking account also of socio-economic disadvantage, gender and age.

Background

There is now substantial US evidence for ethnic disproportionality with respect to SEN (Artiles, Aguirre-Munoz, & Abedi, 1998; Coutinho & Oswald, 2002; Donovan & Cross, 2002; Eitle, 2002; Skiba et al, 2004). The greatest levels of over-representation have been found for the categories of Mental Retardation and Emotional Disturbance and with respect to ethnic groups, for African American and American Indian students. For example Donovan & Cross (2002) analysed the US Department of Education Office for Civil Rights (OCR) and Office of Special Education Programmes (OSEP) surveys and report that Black American students are up to two-and-a-half times more likely than White students to be identified among those with Mental Retardation, and 1.6 times more likely to be identified in relation to Emotional Disturbance. In contrast Hispanic students are under-represented in both these categories in the ratio 0.8:1 and 0.6:1 respectively. Neither ethnic group differed markedly from Whites in regard to the category of Learning Disabilities (Donovan & Cross, 2002). Both over- and under-representation of minority ethnic groups are potentially of importance when considering disproportionality but most interest has focused on the former.

Both over- and under-representation are problematic if they are associated with reduced access to the most appropriate forms of education, whether by inappropriate placement in special education programmes for students who do not need such support and who may then miss out on a mainstream curriculum; or lack of support for students who would benefit from special education provision. In either case, inappropriate match may reduce a student's

educational opportunities. Furthermore, the attribution of a designation of having a disability or special educational needs (SEN) carries with it a value judgment. Mental Retardation and Emotional Disturbance, in particular, are associated with negative attributions of inferiority and antisocial behaviour. Invalid evidence of over-representation of minority ethnic groups therefore is associated with inappropriate, negative value judgments about the groups specified (Reed & Knight, 2006).

Recent research has indicated that disproportionality may vary within groups and by age. In a study of English Language Learners (ELLs) in Californian urban school settings, disproportionalities varied among ELLs in a complex pattern related to disability category, age and language proficiency status, as well as type of provision. For example, the odds ratios for ELLs compared with English Proficient peers indicated under-representation in special education placements in Grades K-5 but considerable over-representation at secondary level (Artiles, Rueda, Salazar, & Higareda, 2005). Furthermore, whereas ELLs with limited competence in both their first language and English were almost four times more likely to be placed in Language and Special Impairment (LAs) programmes at elementary level, this rose to 46 times more likely at secondary level.

Examination of ethnic disproportionality with respect to SEN must take account of the overlap between ethnicity, SEN and poverty. Absolute differences in rates of poverty among different ethnic groups have been well established in both the US and in the UK. The US Census reports 8% of Whites living in poverty compared to 11% of Asians, 22% of Hispanics and 25% of both Blacks and Native Americans (US Census Bureau, 2006). In England 14% of White British students are eligible for a free school meal (a commonly used indicator of poverty) compared to 29% of Black Caribbean, 34% of Pakistani, 42% of Black African and 47% of Bangladeshi students (Department for Education and Skills, 2006). Socioeconomic disadvantage may have a direct influence on children's development, for example, through limited resources, and increased risk of a range of health and developmental problems, including low birth weight and increased risk of injuries and ill health (Spencer, 1996); and an indirect influence through parental education, expectations and quality of school (e.g., Phillips et al, 1998).

Disproportionality for SEN is also related to socio-economic disadvantage although the relationship is contested. Donovan and Cross (2002) highlight the importance of poverty both as a direct influence and also as a factor mediating risk of biological and social factors. This position has been challenged by O'Connor & Fernandez (2006) who argue that disproportionality 'plagues judgmental but not non-judgmental categories of special education' (p.6). Furthermore, it has been argued that poverty, rather than ethnic status is the main factor and that ethnicity (race) is in essence a proxy for poverty. However, a more complex relationship is evident when the interaction with different categories of disability are considered (Hosp & Reschly, 2004). Furthermore, Skiba et al, (2005) argue that no reliable relationship

between disproportionate placement in special education and rate of poverty was found in their study using district level data.

Special educational needs and ethnicity in England

Education in the UK is administered by each of the constituent countries (England, Wales, Scotland and Northern Ireland). This study took place in England where the Department for Education and Skills is the responsible government department. Assessment of special educational needs (SEN) is a staged process (Department for Education and Skills, 2001) and focuses on children's additional needs as a result of 'a learning difficulty which calls for special educational provision to be made for them' (Section 312, Education Act 1996). The responsibility for assessment rests with each local authority subject to national guidance. Students with severe and complex SEN are made subject of a statement of special educational needs which must specify the nature of those needs and the provision to be made to meet them. About 3% of students have a statement of whom about 60% are educated in mainstream schools (House of Commons Committee on Educational and Skills, 2006).

There are very different histories with respect to ethnicity between the UK and US. The largest minority ethnic groups immigrated into England from the British Commonwealth, especially over the past 60-70 years and primarily from the Caribbean and Indian Sub-continent (India, Pakistan and Bangladesh). The other main reasons for immigration are similar in the UK and US, to escape political persecution (for example Nazi Germany in the 1930s and conflict zones in Africa and Eastern Europe more recently) and economic migration. More recently, immigration into the UK has also been related to the enlargement of the European Union which has opened up entry to citizens from new member states in Eastern Europe.

Although the profile of the minority ethnic population is very different from the US, studies of relative achievement and disproportionality with respect to SEN have suggested the importance of direct and indirect bias, including teacher attitudes and behaviors, as key factors. Low expectations of black students in particular has been suggested. For example, Black Caribbean students have been shown to be disproportionately more likely than White and other minority ethnic groups to be placed in special education (Coard, 1971) and in lower classes for maths and science so limiting the grades achievable, independent of prior achievement (Strand, 2007). Lack of awareness of cultural variations and the higher levels of socioeconomic disadvantage among minority ethnic groups have also been identified (Green et al, 2005; Strand, 1999). Further evidence for teacher and school systemic factors has also been produced by studies of schools where minority ethnic students do not underachieve (Lindsay & Muijs, 2006) and from the *Aiming High* initiative to improve achievement of African Caribbean students in English schools (Tikly, Haynes, Caballero, Hill, & Gillborn, 2006).

Analysing the relationship between ethnic disproportionality and special educational needs

Many studies to date have been limited by one or more of the following factors. First, the number of categories of SEN has often been limited with a main focus on Mental Retardation,

Emotional Disturbance and Learning Disabilities (but see Donovan and Cross, 2002, who present data on 13 categories). Second, the number of ethnic groups has been limited, so combining possibly coherent subgroups into a superordinate category that has limited salience. For example, the category Asian/Pacific Islander subsumes a vast range of subgroups. Third, there have been various approaches to defining disproportionality, in particular the use of the Composition Index, Risk Index and Relative Risk Ratio. The latter, which compares the odds of a student in a particular minority ethnic group having a particular category of SEN compared with the odds of a member of a comparator group (typically the White majority group or 'all other' students) is the recommended approach in the US and was the method used in the present study.

Fourth, in nearly all large scale studies the data are based not on individual observations of race, SEN and poverty but on rates of occurrence of these variables at the district level (Hosp & Reschly, 2004; Oswald et al, 1999; Skiba et al, 2005). The difficulty with using aggregated data to explore phenomena at an individual level is the 'ecological fallacy' which lies in thinking that relationships that hold for groups necessarily hold for individuals. For example Robinson (1950) computed for each US state the percentage of the population who were foreign born and the percentage who were literate in American English. The correlation between the pairs was .53. This appears to indicate a positive association between foreign birth and literacy in English. In reality the association is negative: the correlation computed at the individual level was -.11. The aggregate level data give the wrong inference. The positive correlation arises because the foreign-born tend to live in states where the native-born are relatively literate. For a more recent example of the same phenomenon see Freedman (1999).

Fifth, there is a benefit in considering other factors known to interact with SEN, in particular gender and age. There is a substantial body of research showing that boys tend to be over-represented relative to girls for many categories of SEN. In England in January 2005, the incidence of pupils with a formal statement of SEN was twice as high for boys as it was for girls (Department for Education and Skills, 2005). Similarly in the US substantial gender differences have been reported, for example Coutinho and Oswald (2005) report US national data indicating that boys were 1.3 times more than likely than girls to be identified with Mental Retardation, twice as likely to identified with a Learning Disability and 3.4 times more likely to be identified with a Serious Emotional Disturbance, while Donovan and Cross (2002) report that boys constitute 80% of all children identified with Emotional Disturbance, 70% of those identified with Learning Disabilities and 60% of those with Mental Retardation. Research into educational attainment and progress at school has also suggested that gender differences may vary across ethnic groups. For example, Strand (1999) identified a gender-ethnicity interaction among students who made particularly poor progress during their earliest years at school (age 4-7 years): among students of Black Caribbean heritage this group was more likely to comprise boys whereas among students of Pakistani heritage girls predominated.. It is important

therefore to consider the main effect of gender and also to test for interactions between ethnicity and gender. Sixth, the major large scale studies of ethnic disproportionality for SEN have been conducted in the US. There is a benefit in examining the degree to which findings are generalisable across different countries, although this is not straightforward. In the case of the UK, different categories are used for both SEN and ethnicity and the legal system for identification, assessment and decision-making also differs.

In the present study, the relationship between ethnicity and SEN was examined using individual student data for the total student population of compulsory school age (5 – 16 years) in English state schools (about 6.5 million students). The study used recent (2005) data and included covariates of both SEN and ethnicity, namely poverty, gender and age. Our research questions were:

1. What are the odds ratios of identification for particular categories of SEN for each minority ethnic group compared with White British students?
2. What are the effects on unadjusted odds ratios when socioeconomic disadvantage, gender and age are taken into account?
3. What is the relative importance of ethnicity compared with socioeconomic disadvantage, gender and age in explaining any differences in odds ratios for particular categories of SEN?

METHOD

Sample

This study utilised the January 2005 Pupil Level Annual School Census (PLASC). PLASC is completed each January for all students attending state maintained schools in England. This includes the vast majority (93%) of all children aged 5-16 in England, excluding only the small minority of students attending fee-paying private schools which are independent of the state system. The sample totalled 6,480,048 individual student records.

Data elements

A wide range of data is collected at student level through PLASC. For the purpose of this analysis the key data (described in detail below) comprise ethnic group, gender, year group as a proxy for age, SEN stage, SEN type, and two measures of socioeconomic disadvantage namely entitlement to a free school meal (FSM) and the Income Deprivation Affecting Children Index (IDACI) score. In addition to gender the following data were analysed.

Ethnic Group:

The Department for Education and Skills (DfES) uses 17 main ethnic codes including categories of mixed heritage, for example Mixed White and Black Caribbean (Table 1) plus 'don't know' or 'refused'. These categories are not synonymous with those used in the US. For example, there are five Black categories depending on whether the student or their family define their heritage as Caribbean, African, or another area, or whether the student is Mixed White and Black Caribbean or Mixed White and Black African (see Table 1). The data are

gathered from the students' parents or from the students themselves. It is possible for schools to ascribe ethnic background in circumstances where the response rate from parents may be low, but this happens infrequently (85% of data originates from parents and/or students). Traveller groups, which constitute less than 0.1% of the population, have been excluded from the present paper (full details can be found in Lindsay, Pather, & Strand, 2006).

Year Group:

The year group was recorded ranging from Reception year (age 4/5 years) and Year 1 (age 5/6) through to Year 11 (age 15/16).

Level of Special Educational Need:

PLASC records the severity of SEN on a four-point scale, related to the degree of additional provision made for the student. School Action (SA) indicates that a special educational need has been identified (the child has a learning difficulty which calls for special educational provision to be made for them) but can be met within school resources. School Action Plus (SAP) indicates students who: *'have educational provision which is additional to, or different from, the educational provision made generally for children of their age (and) support has been sought from external sources'*. (Department for Education and Skills, 2003, p2). Above this are students who are undergoing full assessment for a statutory statement of SEN (Stage 3), and those who already have a statement (Stage 4). In this paper we focus only on those students identified at SAP or above (8.6% of the population) as schools were only required by the DfES to identify the type of SEN (see below) for students at SAP or above. This is because there is substantial variation between schools in the proportion of students identified at SA which does not relate consistently to other demographic factors of the school population (Audit Commission, 2002) and suggests that identification at SA is informed as much by the policy of the school as by the relative needs of the individual students.

Type of Special Educational Need:

Schools are asked to identify the primary nature of the student's educational need, and a secondary need if relevant, for each student identified at SAP or above. There are 11 types of primary need, plus a generic 'other need' group. The largest categories comprise students with Moderate Learning Difficulties (MLD: 29.7% of those with SEN), Behavioral, Emotional and Social Difficulties (BESD: 22.4%) and Specific Learning Difficulties (SpLD: 14.6%) comparable to the categories Mental Retardation, Emotional Disturbance and Learning Disabilities respectively in the US. Guidance on the classification of SEN is provided by the Department for Education and Skills (2001, 2003) so making available a national system, unlike the US where some states use categories that differ from the federal categories (Donovan & Cross, 2002).

Entitlement to a Free School (FSM):

Entitlement to free school meals (FSM) is a commonly collected dichotomous indicator of poverty, since only families on state-benefits or with very low income are entitled to FSM, 17% of students nationally. The group are relatively homogeneous with regard to levels of

economic deprivation, since all come from families who experience severe levels of socioeconomic disadvantage. However the group not entitled to FSM (around 83% of the school population) is very heterogeneous. It includes some families who are only just above the threshold for entitlement to FSM, right through to those from extremely affluent homes. It is, therefore, a 'blunt instrument' in estimating the extent of socio-economic disadvantage across the whole distribution of students.

Income Deprivation Affecting Children Index (IDACI)

The IDACI¹ measures the proportion of children under the age of 16 in an area living in low income households. The measure focuses on socioeconomic disadvantage, but has a wider base than FSM entitlement including families in receipt of income support, job seekers allowance, and working families tax credit/disabled persons tax credit, if below 60% of national median income. The indicator is available for very small localised areas called super output areas (SOA), of which there are 32,000 in England, each containing approximately 200 children ($SD = 70$). To simplify interpretation, IDACI score has been subject to a normal score transformation to give a mean of 0 ($SD = 1$). High scores indicate more disadvantaged circumstances.

In sum, entitlement to FSM has the advantage of being a direct measure of the student's family circumstances but is blunt, while IDACI score is a more differentiated measure but describes the local area rather than the family directly. However each measure explains some unique part of the variation in SEN outcomes, so using the combination of both entitlement to FSM and IDACI score greatly increases the purchase possible on the influence of socioeconomic disadvantage.

Definition of under- or over-representation

The study utilized the odds ratio (OR) as the measure of disproportionality. The OR compares the odds of being identified with a particular category of SEN for each minority ethnic group against the odds for being identified with that category of SEN for the majority White British group. The formula is:

$$\text{Odds Ratio} = \frac{\frac{\text{Number of students of ethnicity X in SEN category Y}}{\text{Number of students of ethnicity X not in SEN category Y}}}{\frac{\text{Number of White British students in SEN category Y}}{\text{Number of White British students not in SEN category Y}}}$$

The odds ratio is conceptually the same as the *relative risk ratio*, and indicates how much more (or less) likely an outcome is for one group rather than a comparator group, in this case White British students. The odds ratio has many advantages over simple percentage measures such as the *composition index* and *risk index* (Hosp & Reschly, 2004; Parrish, 2002; Skiba et al, 2005), although the measure does require careful interpretation. For example there

is no absolute level at which an odds ratios may be considered significant in an educational sense. Given a sample size of almost 6.5 million, statistical significance is not a good guide to educational significance since most analyses will be statistically significant as a result of sample size. In this study instances were highlighted where students from a minority ethnic group were 1.5 times more likely to be identified with a particular category of SEN (ratio of 1.5:1 or above), consistent with Skiba et. al. (2004), or conversely 1.5 times less likely (ratio of 0.67:1 or less) relative to White British students. The latter differed from the level selected by Skiba et al. (0.75:1) but has the advantage of symmetry.

Statistical modeling

In order to identify the association of SEN with ethnicity, both directly and after adjusting for other factors such as poverty, binary logistic regressions² were completed for two nested analytic models:

1. Unadjusted: The initial model includes only ethnic group as an explanatory variable in order to assess the simple odds ratios for identification associated with each ethnic group, relative to the White British majority group;
2. Adjusted: A second model was created by adding year group, gender, entitlement to FSM and IDACI score to determine how the ethnic group odds ratios change after accounting for the associations with these factors.

The same approach is used consistently for the analysis of all the different SEN types.

Results

Descriptive data

Ethnic group

Ethnicity was given for virtually all (97.7%) of the population (Table 1). With respect to those of known ethnicity the vast majority (82%) were from the White British group. The largest minority groups were Pakistani (2.8%), Indian (2.2%), White Other groups (2.2%), Black African (2.0%), and Black Caribbean (1.5%). The largest group of mixed heritage were Mixed White and Black Caribbean students.

< Table 1 here >

Type of need

Overall, 8.6% of the population had an identified SEN at SAP or above (Table 2). The most frequent needs were Moderate Learning Difficulties (MLD) and Behavioral, Emotional & Social Difficulties (BESD) which together represent the primary need of over 50% of all students identified with SEN.

<Table 2 here>

Year group

There were large variations across year groups in the prevalence of different categories of SEN. For example, the proportion of students with BESD increased systematically from

around 2% of the population in Reception up to 5% at Year 11 (Y11). In contrast MLD had an inverted 'U' shape curve, starting at 2% in reception, peaking at 9% in Y5/Y6 and declining to 5.5% in Y11. Further details can be found in Lindsay et al (2006).

Socio-economic disadvantage

While 14% of White British students were entitled to FSM, this more than doubled to 30% for Black Caribbean students and tripled to 44% of Black African and 47% of Bangladeshi students (Table 3). The mean IDACI scores, with higher scores indicating greater disadvantage, reveal a similar picture of mean differences between ethnic groups.

<Table 3 here>

Analysis of over and under-representation

The first analysis examines the identification rate (students at SAP or with statements) for any type of SEN. Gender has a very strong association with SEN, with a odds ratio of 0.4:1 for girls relative to boys (Table 4) that is, boys are 2.5 times more likely to be identified than girls. Socio-economic disadvantage is also strongly related to SEN. When FSM and IDACI are used together both measures have strong and independent associations with SEN. Students entitled to FSM were twice as likely to have an identified SEN as those not entitled to FSM³, and a two standard deviation increase in the IDACI increased the likelihood of an identified SEN by 1.6:1⁴. Compared to Y1, the rate of identification of SEN exceeded 1.5:1 in Y3 and peaked at 1.78:1 in Y6. The rate dropped back slightly through secondary school to 1.5:1 in Y11.

<Table 4 here>

Table 4 also compares the odds ratios for each ethnic group, relative to White British, both unadjusted and after adjustment for the impact of the other background factors. Before adjusting for any background factors, Chinese, Indian and Asian Other groups were around half as likely as White British students to have an identified SEN, and Black Caribbean students were more likely than White British students to have an identified SEN (1.52:1). After adjusting for year group, gender and poverty, Bangladeshi (0.48:1) and Black African students (0.63:1) were also under-represented relative to White British at the cut-off selected. No minority ethnic group was over-represented relative to White British; Black Caribbean students were identified at a similar rate as White British (1.1:1).

Allowing for interactions between ethnicity and the other factors did not substantially increase the explanatory power of the model, increasing the proportion of explained variation in SEN by only 0.1% (Nagelkerke R^2). While this increase was statistically significant because of the huge sample size, the minimal increase in R^2 did not justify the greatly increased complexity of the resulting model.

Analyses by primary type of SEN

Further analyses were conducted to explore the odds ratios for each ethnic group relative to White British students for each category of SEN both before (Table 5) and after

adjusting for age, gender and poverty (Table 6). Only statistically significant ($p < .01$) odds ratios are shown. Odds ratios meeting the criteria for educational significance ($> 1.5:1$ or $< 0.67:1$) are highlighted.

< Tables 5 and 6 here >

The unadjusted odds ratios (Table 5) indicate that Black Caribbean students had a substantially higher likelihood of identified BESD (2.28:1), SLCN (1.66:1) and Profound and Multiple Learning Difficulties (PMLD) (1.55:1) relative to White British students. Black African students were not over-represented for BESD, but were over-represented for SLCN (1.95:1). The Black Other group were over-represented for BESD (1.85:1) and SLCN (1.82:1). No Black groups were over-represented relative to White British for MLD. Pakistani students had a greater likelihood of visual impairment (VI) (2.85:1) hearing impairment (HI) (2.71:1) and multisensory impairment (MSI, 2.66:1); and of both severe learning difficulties (SLD 1.62:1) and of profound and multiple learning difficulties (PMLD: 2.70:1). Bangladeshi students share part of this profile. Chinese students were overrepresented only for SLCN (2.09:1). All South Asian groups (Indian, Pakistani and Bangladeshi) and Chinese students showed lower odds ratios for specific learning difficulties (SpLD) and for BESD.

The odds ratios adjusted for socioeconomic disadvantage, gender and age show a general reduction in size with fewer above the selected cut-off of 1.5:1, and more below the cut-off of 0.67:1 (Table 6). All minority ethnic groups except Pakistani, Black Caribbean, and Mixed White and Black Caribbean show a significantly lower likelihood for MLD than White British students. The only category where Black Caribbean students have a higher likelihood is BESD (1.5:1) while no other Black group has a higher likelihood for any category. Pakistani students, however, maintain their higher likelihood of VI (2.52:1), HI (2.46:1) MSI (2.19:1), and PMLD (2.39:1). Bangladeshi students retain their higher likelihood for hearing impairment (1.67:1). Chinese students continue to show a higher likelihood of SLCN: (2.16:1). The categories of SpLD, BESD and autistic spectrum disorder (ASD) all show lower likelihoods for South Asian and Chinese students, as low as 0.17:1 for Chinese students and BESD.

The specific impacts of socioeconomic disadvantage and gender on the odds ratios show similar directions but differences in strength. Free school meal entitlement has a substantial impact for MLD (2.28:1), SLD (2.30:1), PMLD (1.90:1) and especially BESD (2.42:1). Both MSI (1.50:1) and PD (1.61:1) show significant but lower levels. The IDACI shows a significant impact for MLD (1.95:1) and BESD (1.97:1).

There were gender effects indicating girls are less likely to have SEN in all categories, with six categories showing significant effects: MLD (0.56:1), SLD (0.58:1), SpLD (0.40:1), BESD (0.24:1), SLCN (0.43:1) and ASD (0.17:1). However, no significant gender effects were found for any sensory impairment, physical disabilities or PMLD.

Relative importance of ethnicity and other factors

Forward stepwise logistic regression was conducted to explore the relative contributions of ethnicity, gender, socioeconomic disadvantage and age to different categories of SEN. Variables were entered one at a time in order of decreasing amounts of variance explained, and hence of influence. Table 7 shows the results of the stepwise analyses for the two highest frequency SEN types, MLD and BESD, and for overall rate of SEN identification. For MLD ethnic group was the last variable to be entered, after entitlement to a FSM, gender, IDACI score and year group. After these variables were accounted for, ethnic group explained only an additional 0.5% of the variance in MLD. For BESD, the stepwise regression shows that gender was the single best predictor of BESD, explaining 4.2% of the variance. This was followed by entitlement to FSM and year group. Only then did ethnic group add any further to the model, explaining an additional 1% of the variance in BESD. IDACI score (including a squared term⁵) added a further 1.1%. Similar results are reported for overall SEN identification with gender and poverty (both entitlement to FSM and IDACI score) being the strongest predictors. In summary, while ethnic group explains some additional and independent part of the variance in SEN outcomes it is in fact one of the less influential of the measured variables.

<Table 7 here >

Discussion

The existence of ethnic disproportionality in the prevalence of students with special educational needs (SEN) has been well established by large scale studies in the US (Donovan & Cross, 2002; MacMillan & Reschly, 1998). The UK government for England has also reported ethnic group differences in the prevalence of SEN (Department for Education and Skills, 2005). The reasons for this disproportionality have been explored by recent studies in the US with a particular interest in the influence of socioeconomic disadvantage (poverty) (Oswald, Coutinho, Best & Singh, 1999; Skiba et al, 2005). The present study sought to extend this research by using a dataset comprising individual student data for 6.5 million students in English state (public) schools. Furthermore, the study sought to broaden the evidence base by using a wider range of both SEN and ethnic categories.

Judgmental categories

The general US finding that Black American students are up to two-and-a-half times more likely than White students to be identified among those with Mental Retardation (Donovan & Cross, 2002; Oswald et al, 1999, Skiba et al, 2004) was not replicated for Black Caribbean or Black African students in the present study. Neither group was over-represented for Moderate Learning Difficulties at the level selected for this study to indicate educational significance (1.5:1), nor were Mixed White and Black Caribbean, Mixed White and Black African or Black Other groups. Indeed, the adjusted odds ratios showed *under*-representation for both Black African and Black Other groups; Mixed White and Black Caribbean students were just above this cut-off for under-representation.

The present data also suggest important differences with respect to Moderate Learning Difficulties *within* the Black groups in England, with higher odds ratios for Black Caribbean than for Black African students. For the unadjusted odds ratios, although neither reaches the cut-off set for this study, Black Caribbean students were over-represented (1.32:1) whereas Black African students were *under*-represented (0.84:1). This differential relationship was repeated in the adjusted odds ratios (0.85:1 for Black Caribbean compared with 0.47:1 for Black African). Inspection of the data for Mixed White and Black Caribbean compared with Mixed White and African students reveals a similar pattern of odds for Moderate Learning Difficulties for these two mixed heritage groups.

Black Caribbean, Mixed White and Black Caribbean and Black Other students in the English sample were over-represented around 2:1 relative to White British students for Behavioural Emotional and Social Difficulties, comparable to US findings for Black American students and Emotional Disturbance which range from 1.6:1 (Donovan & Cross, 2002, Oswald et al. 1999) to 2.6:1 (Skiba et al, 2004). However, of these three groups only Black Caribbean students remained over-represented when poverty, gender and age were taken into account (1.50:1). Black African and Mixed White and African students in the present study were not over-represented in unadjusted ratios and Black African students were actually under-represented in the adjusted ratios (0.60:1). A similar pattern is presented by UK national statistics that indicate that Black Caribbean, Mixed White and Black Caribbean and Black Other students in England are more likely to be permanently excluded from school than White British students (odds ratios of 2.6, 2.3 and 2.2:1 respectively) but that the odds ratios for Mixed White and African (1.6:1) and Black African (0.8:1) students are substantially lower (Parsons et al, 2005).

This study also highlights different profiles for students of Asian heritage. Indian, Pakistani, Bangladeshi and Other Asian students all had lower odds ratios than White students for Behavioural Emotional and Social Difficulties and for Specific Learning Difficulties. For Moderate Learning Difficulties there was greater variation between Asian groups, with Indian and Other Asian groups under-represented relative to White British, Bangladeshi students not significantly different from White British, and Pakistani pupils approaching the threshold for over-representation (1.46:1). After adjusting for poverty, gender and age, all four ethnic groups were under-represented relative to White British on all three types of SEN, with the single exception of Pakistani pupils for Moderate Learning Difficulties where there was no difference in identification rates compared to White British. These findings are similar to those found in the US for Mental Retardation, Emotional Disturbance and Learning Disabilities where Asian/Pacific Islanders show lower odds ratios than White students (Donovan & Cross, 2002). However, comparisons are complicated by two factors. First, the category 'Asian/Pacific Islander' used in many US studies confounds results from Asian and Pacific Islanders. Second, where subdivisions of 'Asian' are reported in US studies these typically refer to different

minority ethnic groups than England. For example, KewalRamani, et al (2007) report data on Korean, Vietnamese, Chinese, Japanese, Filipino, Asian Indian and Other Asians within their category 'Asian'. When such subdivisions are analysed evidence for differential educational outcomes among this 'Asian' group are evident (KewalRamani et al., 2007).

Socioeconomic disadvantage

The importance of socioeconomic disadvantage for disproportionality has been reinforced by this study. Students eligible for a free school meal were over twice as likely to be identified with SEN, and the Income Deprivation Affecting Children Index (IDACI) showed that students scoring one *SD* above the mean were 1.6 times more likely to have SEN than students scoring one *SD* below the mean. Skiba et al. (2005) have commented that "poverty was found to be a weak and inconsistent predictor of disproportionality" (p. 35), as their district level poverty measure did not correlate with district level variation in African American disproportionality for moderate mental retardation or emotional disturbance. The individual student data available here show clearly that poverty does explain some element of disproportionality; hence the adjusted ORs for Black Caribbean students for Moderate Learning Difficulties and Behavioural Emotional and Social Difficulties are reduced relative to the unadjusted ORs⁶. It is possible that even more of the disproportionality might have been explained had further socio-economic indicators, such as mother's education level, been available. However poverty as measured in this study does not account for the phenomenon of disproportionality since there are still significant coefficients for some minority groups for some types of SEN.

Nonjudgmental categories

In this section we consider the results for ethnic disproportionality for non-judgmental categories of SEN/disability. These typically have a substantial physiological basis, often identifiable pre- or perinatally or as a result of a subsequent trauma such as an illness (e.g. meningitis) or accident. Donovan and Cross (2002) suggest that in most of these categories 'few would question the professional judgment or accuracy of diagnosis' (p.55). However, while accepting the importance of medical diagnosis we would argue that these categories are *relatively* non-judgmental as diagnostic criteria may vary or be differentially applied and neither type nor level of disability is simply correlated with need. Nevertheless, in cases of significant hearing impairment, for example, objective and physiological assessments ensure a high level of correct identification.

The pattern of ethnic disproportionalities for nonjudgmental categories differs from that for judgmental categories. Students of Pakistani heritage in the present study show significant over-representation (adjusted odds ratios) for hearing impairment (2.46:1), visual impairment (2.52:1), multisensory impairment (2.19:1) and profound and multiple learning difficulties (2.39:1). Bangladeshi students are also over-represented for hearing impairment (1.67). No other minority ethnic group has this pattern.

The increased risks differ from the US national data on Asian/Pacific Islanders reported by Donovan and Cross (2002) where hearing impairment has a slightly higher odds ratio (1.21:1) but visual impairment has a lower odds ratio (0.71:1) and developmental delay shows substantial under-representation (0.21:1). Only deaf-blind (comparable to the English Multi-sensory Impairment) shows high over-representation (2.88:1).

Risk in non-judgmental disabilities is related to socioeconomic disadvantage (Newacheck, Stein, Bauman, & Hung, 2005; Spencer, 1996) but that cannot be the full explanation here as the adjusted odds ratios took this factor into account. Less access to screening procedures and early health provision have also been identified as possible factors in the US (Sheakman, Vagel, Brooks, Wegener, & Naff, 2001). However, English studies have indicated the identification of higher levels of neurodisability among very young children of Pakistani heritage, suggesting appropriate access to screening and early assessment (Morton, Sharma, Nicholson, Broderick, & Poyser, 2002). Because the UK has a National Health Service access to health screening is free and close to universal. However, subsequent take up of health services by members of minority ethnic groups is more variable. This is affected by language and cultural factors (Summers & Johns, 2004) which in the case of young children particularly concerns their mothers: language barriers, negative attitudes by health professionals and racism have been identified as impediments to accessing healthcare (Mir, Nocon, Ahmad, & Jones, 2001). However, equity in use of health services by children and young people, on the basis of need and independent of socioeconomic status and ethnicity, has been reported from a large scale English study (Saxena, Eliahoo & Majeed, 2002). Furthermore, national policy renders free education available to all children with significant disabilities from age two, and typically local authorities and health trusts provide support for children from a much earlier age.

The increased risk of sensory and severe intellectual impairment among Pakistani and Bangladeshi children in England has been linked with genetic factors associated with consanguineous marriages (Morton et al, 2002; Yoong, Feltblower, Spencer, & McKinney 2005; Yoong & Spencer, 2005). For example, Morton et al report genetic disease causing disability as 10 times more common among children of Pakistani heritage than other groups in one English health authority. Support for this contributing factor also comes from a large scale study in Pakistan (Durkin et al, 2000).

Relative importance of ethnicity

The present study also explored the relative contribution of ethnicity to SEN. In three different analyses (Moderate Learning Difficulties, Behavioural Emotional and Social Difficulties and overall Special Educational Needs) ethnicity was found to be of less importance than gender and socioeconomic disadvantage, adding only between 0.5 and 1 per cent to variance explained. This contrasts with the importance attributed to ethnic disproportionality in SEN as a phenomenon. This has high socio-political significance and the body of research on its

existence is now a basis for concerted action (Skiba et al, 2004). In England in the 1970s the over-representation of Black Caribbean students in schools for the 'educationally subnormal' (the term in use at that time now approximated by Moderate Learning Difficulties) led to two government reports to investigate the issue, its causes and possible actions (Great Britain: Committee of Enquiry into the Education of Children from Ethnic Minority Groups, 1981; 1985). Furthermore, there is substantial evidence that academic underachievement as well as SEN also shows ethnic disproportionality. More recently there has been a focus in the UK on large scale intervention programmes to support schools with high percentages of minority ethnic students, for example the *Aiming High* initiative for African Caribbean students (Tikly et al, 2006), mainly to address underachievement.

Implications for the conceptualisation of disproportionality

Two hypotheses posed by Coutinho and Oswald (2000) capture the main approaches to conceptualising disproportionality. The first argues that ethnic groups are differentially at risk of educational disability (for example through higher levels of poverty). The second focuses on the special education system and argues that "special education referral, assessment, and eligibility rely on processes and instruments that are culturally and linguistically loaded and that measure and interpret ability, achievement, and the behavior of students differently across ethnic groups" (p.147).

The former has been criticised as misspecifying the factors that put minority ethnic students at risk (O'Connor & Fernandez, 2006). However, a number of studies have identified the increased risk associated with both socioeconomic disadvantage and certain ethnic groups (Drews, Yeargin-Allsopp, Decoufle, & Murphy, 1995; Green et al, 2005; Kramer, Allen & Gergen, 1995). The increased risk of hearing impairment for students of Pakistani or Bangladeshi heritage in this English sample appears to have a biological basis, at least in part, with consanguineous marriages proposed as a contributory factor.

However, lack of parental concern about their children's education among Black parents, a view held by many practitioners, has been challenged in the UK by studies that have found *higher* levels of parental support among minority ethnic parents compared with White British parents, with the highest level among Black African parents (Moon & Ivins, 2004; Strand, 2007).

Support for the second hypothesis has been argued in both the US and UK on the basis of several main sources of evidence:. There is substantial evidence from both the US and UK that teacher attitudes and expectations are important factors influencing referral for special education assessment. These are wide-ranging influences that may also have an impact on various fundamental processes including classroom tuition, school organisation and decision-making regarding the nature of and suitable provision for a student's SEN (Gillborn, 1990; Osler, Watling, Busher, Cole & White; Weinstein, Gregory & Stambler, 2005).

Both direct and indirect bias, even racism, have been identified but also evident is the gap between the evidence produced by researchers and its translation into policy and decision-making at classroom or school level. For example, ethnic bias in identification and assessment for SEN (Knotec, 2003) and disproportionate referral to special education provision of students from socioeconomically disadvantaged or minority ethnic groups have been viewed as problematic and a concern by researchers and policy makers. However teachers and professionals such as psychologists assessing the student may view special education as a positive goal (Harry & Klingler, 2006; Skiba, Simmons, Ritter, Kohler, Henderson, & Wu, 2006). These views may be a function of practitioners struggling with inadequate preparation, an inappropriate curriculum and pedagogy (Blanchett, 2006) as well as inadequate resources. Nevertheless, strong leadership and a raft of interventions to tackle these many different factors can turn round practices leading to improved performance by minority ethnic students (Demie, 2005; Lindsay & Muijs, 2006; Tikly et al, 2006).

The present study suggests that non-child factors are likely to have differential impact on the causality of different types of SEN, those that are relatively socially constructed (judgmental) compared with those having a clearer biological basis (nonjudgmental). For example, Moderate Learning Difficulties and Behavioural Emotional and Social Difficulties are normative in nature and dependent upon interpretations of student's behavior in a context, including the demands of the curriculum and school rules. However, ethnic disproportionalities have also been found for SEN categories with a clear biological basis, particularly the over-representation in England of students of Pakistani origin for hearing and for profound and multiple learning difficulties. Further research is needed to identify the mechanisms for this group (and to a lesser extent Bangladeshi students). Current evidence suggests genetic factors are important, a sensitive issue which relates to cultural marriage practices. Furthermore the differential pattern of odds for the judgmental categories of Moderate Learning Difficulties and Behavioural Emotional and Social Difficulties, among the different Black groups in England suggests the need for more fine-grained analysis of the social and systemic factors. These findings suggest it is important both to undertake in-depth case studies to explore the experiences of sub-groups for differences in the operation of teacher, school and school district processes but also to extend research into genetic factors and take up of health care.

A separate issue, however, concerns the value placed on an SEN designation. The major trend has been to consider this a negative experience, especially for the most common categories of Moderate Learning Difficulties and Behavioural Emotional and Social Difficulties. Specific Learning Difficulties and Autistic Spectrum Disorder, however, may be seen as positive categorizations in the UK context and these represent a large percentage of parental appeals to the Special Educational Needs and Disability Tribunal in England with parents actively seeking these designations (Special Educational Needs and Disability Tribunal, 2007). Consequently, although some disproportionalities for SEN designation may arise despite resistance, from

parents for example, others may be a function of positive action to secure particular SEN designations as a means to secure resources. A similar phenomenon has been identified in the US (Reid & Knight, 2006).

We should consider the extent to which the current results are comparable with those from US studies. The designation of SEN status in each country varies, subject to different statutes. US studies of disproportionality are typically limited to students who have been formally identified. This study used data on students who either had a statement of SEN or were at School Action Plus. The former have had a statutory assessment whereas the latter have been defined by a non-statutory assessment by the school supported by assessment from educational (school) psychologists and other SEN professionals (e.g. speech and language therapists). However, the analyses reported here were also run on the statemented group alone, producing comparable results, which suggests that the effects reported are very similar for both the statemented and School Action Plus groups.

Conclusions

Ethnic disproportionality with respect to special educational needs has been demonstrated in an English population but the results only partially replicate studies in the US. The greater number of ethnic groups and SEN categories and the use of student level data in the present study have enabled substantial evidence to be presented that indicates the complex interaction between ethnicity and types of SEN. No evidence was found in this English sample of high levels of overrepresentation of any Black group of students for Moderate Learning Difficulties although increased likelihood for Behavioral Emotional and Social Difficulties was found for Black Caribbean students after other factors were taken into account. South Asian and Chinese students showed under-representation for judgmental categories of SEN but there was substantial over-representation of students of Pakistani origin for sensory impairment and for profound and multiple learning difficulties. The differential prevalence across types of SEN with respect to different ethnic groups suggests it is important to consider a range of causal mechanisms. The different findings for Black Caribbean compared with Black African groups raise particularly interesting challenges for interpretation, especially as the pattern within this study shows differences both between Black groups within the UK sample, and also between these groups and the US African American data.

There are a number of implications for policy, practice and research in the UK, US and elsewhere following from this study. First the use of pupil rather than district level data has advantages and we recommend its greater use in future research. Second, there are also benefits in a disaggregation of ethnic categories. This is not only a research issue; as school districts have different ethnic profiles there are benefits to policy and practice in having greater specificity. Third, there is therefore a need to collect and analyse data at both local and national level in order to identify patterns comprehensively; furthermore, the need for comparative international studies is indicated in order to examine generalisability of findings and the

importance of cultural variations. Fourth, the relative importance of ethnicity, poverty and gender needs to be taken into account when devising policies. Fifth, there is a need to distinguish the relative importance of different causal factors, biological and environmental, and their interaction. For example, research is needed to explore the interaction of ethnicity and school factors, including teacher attitudes and pedagogy. This also raises the question of differential susceptibility to different forms of risk, and differential resilience. Finally, it is important when formulating policy to take account of the complex interactions and not focus on one factor alone.

Notes

1. The IDACI is not included with PLASC but was provided separately by the Department for Education and Skills.
2. The outcome could be considered to have three levels (No special educational needs (SEN)/School Action (SA) vs. School Action Plus (SAP) vs. Statemented). However for all types of SEN the proportions within the latter two groups were extremely small, causing significant problems of empty cells in analyses that attempted to simultaneously evaluate the association between ethnicity, gender, socio-economic disadvantage and SEN type. Pre-testing using separate models for SAP and for statemented students indicated a similar pattern of results for both cases, supporting the validity of combining these two outcomes.
3. If entitlement to FSM were the only measure of socio-economic disadvantage (i.e. if IDACI were not simultaneously included) entitlement to a FSM was associated with a threefold increase in the likelihood of identified SEN.
4. Because IDACI is a continuous variable, the effect size is estimated by comparing the probabilities for a student scoring one SD below the mean with the probabilities for a student scoring one SD above the mean, i.e. a two standard deviation (2SD) range (see Strand, 2004).
5. A square term was included to model non-linearity in the relationship between poverty and SEN.
6. Poverty also increased the disproportionality for some ethnic groups, for example Black African students were more likely to be *under*-identified relative to White British when poverty was included.

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Table 1: Ethnic composition of the sample

Ethnic Group	<i>N</i>	% of all students	% of known ethnicity
White British	5,191,517	80.1	82.0
White Irish	23,963	0.4	0.4
Any other white groups	137,756	2.1	2.2
Mixed White & Black African	18,908	0.3	0.3
Mixed White & Black Caribbean	67,975	1.0	1.1
Mixed White & Asian	37,064	0.6	0.6
Any other mixed background	63,908	1.0	1.0
Indian	141,858	2.2	2.2
Pakistani	180,203	2.8	2.8
Bangladeshi	73,779	1.1	1.2
Any other Asian	48,782	0.8	0.8
Black African	129,552	2.0	2.0
Black Caribbean	93,121	1.4	1.5
Black Other	28,038	0.4	0.4
Chinese	21,692	0.3	0.3
Any other ethnic group	60,703	0.9	1.0
Unclassified	150,294	2.3	-
Total students	6,480,048		

Table 2: Percentage of students at School Action Plus (SAP) or Statemented by category of primary need

Primary category of SEN	number of students	% population	% primary category
Not SAP or statemented	5,923,047	91.4	-
Moderate Learning Difficulty	165,383	2.6	29.7
Behavior, Emotional & Social Difficulties	124,844	1.9	22.4
Specific Learning Difficulty	81,277	1.3	14.6
Speech, Language & Communication Needs	60,633	0.9	10.9
Autistic Spectrum Disorder	30,860	0.5	5.5
Severe Learning Difficulty	24,639	0.4	4.4
Physical Disability	21,147	0.3	3.8
Hearing Impairment	11,819	0.2	2.1
Visual Impairment	6,485	0.1	1.2
Profound & Multiple Learning Difficulty	5,735	0.1	1.0
Multi-Sensory Impairment	769	0.0	0.1
Other Difficulty/Disability	22,791	0.4	4.1
Total at SAP or with a Statement	556,497	8.6	
Total Roll	6,479,544		

Table 3: Socioeconomic disadvantage by ethnic group

Ethnic Group	% FSM	(IDACI) ^(a)	
		Mean	SD
White British	14.1	-0.11	0.97
White Irish	20.5	0.13	1.04
White Other groups	21.3	0.14	1.07
Mixed White & Black African	28.8	0.43	1.00
Mixed White & Black Caribbean	32.8	0.51	0.95
Mixed White & Asian	19.1	-0.03	1.02
Any other mixed background	24.1	0.25	1.02
Indian	11.9	0.15	0.84
Pakistani	33.8	0.67	0.73
Bangladeshi	47.1	1.08	0.82
Any other Asian	21.2	0.29	0.92
Black African	43.8	0.95	0.83
Black Caribbean	30.0	0.85	0.82
Black Other groups	35.9	0.82	0.89
Chinese	11.0	0.04	1.07
Any other ethnic group	38.5	0.63	1.02
Unclassified	16.8	-0.07	0.95
TOTAL	16.8	0.00	1.00

^(a) IDACI scores have been normalised to a mean of zero (SD 1), higher scores indicate greater disadvantage.

Note: FSM: entitled to free school meal

IDACI: Income Deprivation Affecting Children Index

Table 4: Logistic regression analysis for identification of any type of SEN (SAP or statemented)

Variables	Values	Unadjusted odds ratio	Adjusted odds ratio
Ethnicity	White Irish	1.07	0.96
	White Other groups	0.85	0.75
	Mixed White & African	0.99	0.79
	Mixed White & Caribbean	1.23	0.93
	Mixed White & Asian	0.73	0.69
	Any other mixed background	0.99	0.83
	Indian	<i>0.52</i>	<i>0.50</i>
	Pakistani	1.03	0.74
	Bangladeshi	0.81	<i>0.48</i>
	Any other Asian	<i>0.60</i>	<i>0.50</i>
	Black African	1.00	<i>0.63</i>
	Black Caribbean	<i>1.52</i>	1.10
	Black Other groups	1.33	0.90
	Chinese	<i>0.56</i>	<i>0.54</i>
	Any other ethnic group	0.80	<i>0.54</i>
	Unclassified	1.18	1.12
Year Group	Y2 vs. Y1	-	1.31
	Y3 vs. Y1	-	1.50
	Y4 vs. Y1	-	1.63
	Y5 vs. Y1	-	1.73
	Y6 vs. Y1	-	1.78
	Y7 vs. Y1	-	1.57
	Y8 vs. Y1	-	1.56
	Y9 vs. Y1	-	1.53
	Y10 vs. Y1	-	1.53
	Y11 vs. Y1	-	1.48
Gender	Girls vs. boys	-	0.40
FSM	Entitled to Free School Meal	-	2.09
IDACI	Income Deprivation Affecting Children (2SD)	-	1.60

Note:1. Proportion of variance accounted for (Nagelkerke R^2) =7.3%. All coefficients except White Irish are statistically significant at $p<.001$. Goodness of fit tests are not reported because the inclusion of a continuous explanatory variable (IDACI) creates a large number of cells (ethnic (19) x year (9) x gender (2) x FSM (2) x IDACI (100) X SEN (2) = 167,200) many with zero or small expected values. In this situation it is not possible to provide a dependable goodness of fit test (Norusis, 2005, p78).

Note 2: Odds ratios > 1.5 or < .67 are in bold italics.

Table 5: Unadjusted odds ratios by type of SEN for ethnic groups compared with White British

Unadjusted odds ratios relative to White British	Cognition & Learning Needs				Behavior, Emotional & Social Difficulties	Communication & Interaction Needs	Sensory and/or Physical Needs				
	MLD	SLD	PMLD	SpLD	BESD	SLCN	ASD	VI	HI	MSI	PD
Ethnic Group	MLD	SLD	PMLD	SpLD	BESD	SLCN	ASD	VI	HI	MSI	PD
White Irish	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
White other groups	0.77	0.76	ns	0.84	0.72	1.37	ns	ns	ns	ns	0.73
Mixed White & African	0.76	ns	ns	0.75	1.46	ns	ns	ns	ns	ns	ns
Mixed White & Caribbean	ns	ns	ns	Ns	2.03	ns	ns	ns	ns	ns	0.83
Mixed White & Asian	0.64	ns	ns	0.56	0.69	ns	ns	ns	ns	ns	ns
Any other mixed background	0.79	ns	ns	0.78	1.23	1.24	1.25	ns	ns	ns	ns
Indian	0.67	0.83	ns	0.32	0.23	0.81	0.43	ns	ns	ns	0.84
Pakistani	1.46	1.62	2.70	0.42	0.45	1.30	0.46	2.85	2.71	2.66	1.37
Bangladeshi	ns	1.34	1.71	0.54	0.35	1.62	0.38	ns	1.97	ns	0.69
Any other Asian	0.56	ns	1.46	0.34	0.31	1.30	0.61	ns	ns	ns	0.77
Black African	0.84	1.23	1.36	0.56	ns	1.95	ns	ns	ns	1.97	0.74
Black Caribbean	1.32	1.17	1.55	ns	2.28	1.66	ns	ns	ns	ns	0.74
Black Other groups	ns	1.35	ns	ns	1.85	1.82	1.36	ns	ns	ns	0.63
Chinese	0.31	ns	ns	0.29	0.18	2.09	ns	ns	ns	ns	0.36
Any other ethnic group	0.81	ns	1.46	0.56	0.63	1.45	0.53	ns	1.29	ns	0.76
Unclassified	1.09	ns	ns	1.25	1.39	1.13	ns	ns	ns	ns	0.84

Notes: 1. Ratios >1.5:1 in italics, ratios < 0.67:1 in bold. 2. ns= non-significant odds ratio (p>.01).

3. MLD : Moderate Learning Difficulties; SLD : Severe Learning Difficulties ; PMLD : Profound and Multiple Learning Difficulties ; SpLD : Specific Learning Difficulties ; BESD : Behavioral, Emotional and Social Difficulties ; SLCN : Speech, Language and Communication Needs ; ASD : Autistic Spectrum Disorder ; VI : Visual Impairment ; HI : Hearing Impairment ; MSI : Multi-sensory Impairment ; PD : Physical Disability

Table 6: Odds ratios adjusted for year group, gender and socio-economic disadvantage by type of SEN and ethnic group.

Adjusted Odds Ratios relative to White British	Cognition & Learning Needs				Behavior, Emotional & Social Difficulties	Communication & Interaction Needs	Sensory and/or Physical Needs				
	MLD	SLD	PMLD	SpLD	BESD	SLCN	ASD	VI	HI	MSI	PD
Ethnic Group											
White Irish	0.86	ns	ns	Ns	0.91	ns	1.25	ns	ns	ns	ns
White other groups	<i>0.65</i>	0.69	ns	0.82	<i>0.61</i>	1.19	ns	ns	ns	ns	0.70
Mixed White & African	<i>0.56</i>	ns	ns	0.71	1.14	ns	ns	<i>0.41</i>	ns	ns	0.71
Mixed White & Caribbean	0.68	0.74	ns	0.87	1.48	0.82	ns	ns	ns	ns	0.75
Mixed White & Asian	<i>0.60</i>	0.74	ns	<i>0.57</i>	<i>0.67</i>	ns	ns	ns	ns	ns	ns
Any other mixed background	<i>0.63</i>	ns	ns	0.74	ns	ns	1.22	ns	ns	ns	0.87
Indian	<i>0.65</i>	0.83	1.20	<i>0.31</i>	<i>0.22</i>	0.78	<i>0.44</i>	ns	ns	ns	0.85
Pakistani	ns	1.25	<i>2.39</i>	<i>0.36</i>	<i>0.29</i>	ns	<i>0.46</i>	<i>2.52</i>	<i>2.46</i>	<i>2.19</i>	1.23
Bangladeshi	<i>0.51</i>	0.90	1.41	<i>0.43</i>	<i>0.18</i>	1.12	<i>0.39</i>	ns	<i>1.67</i>	ns	<i>0.58</i>
Any other Asian	<i>0.46</i>	ns	1.39	<i>0.32</i>	<i>0.25</i>	1.13	<i>0.60</i>	ns	ns	ns	0.73
Black African	<i>0.47</i>	0.85	ns	<i>0.47</i>	<i>0.60</i>	1.38	1.12	0.74	ns	1.49	<i>0.63</i>
Black Caribbean	0.85	ns	1.43	0.92	<i>1.50</i>	1.38	1.15	ns	ns	ns	0.68
Black Other groups	<i>0.58</i>	ns	ns	0.80	1.11	1.42	1.39	<i>0.55</i>	ns	ns	<i>0.56</i>
Chinese	<i>0.30</i>	ns	ns	<i>0.29</i>	<i>0.17</i>	<i>2.16</i>	ns	ns	ns	ns	<i>0.37</i>
Any other ethnic group	<i>0.50</i>	0.74	ns	<i>0.48</i>	<i>0.38</i>	1.11	<i>0.53</i>	ns	ns	ns	<i>0.67</i>
Unclassified	ns	ns	ns	1.17	1.24	1.25	ns	ns	ns	ns	0.83
Girls	<i>0.56</i>	<i>0.58</i>	0.80	<i>0.40</i>	<i>0.24</i>	<i>0.43</i>	<i>0.17</i>	0.74	0.94	0.74	0.74
FSM	<i>2.28</i>	<i>2.30</i>	<i>1.90</i>	1.42	<i>2.42</i>	1.49	1.08	1.36	1.30	<i>1.50</i>	<i>1.61</i>
IDACI (2 SD range)	<i>1.95</i>	1.19	0.91	1.23	<i>1.97</i>	1.31	0.87	1.18	1.16	1.25	ns
% of variance accounted for (Nagelkerke R ²)	5.8%	2.0%	0.9%	4.2%	9.8%	5.3%	5.2%	0.7%	0.6%	1.1%	0.6%

Notes: 1. Ratios >1.5:1 in italics, ratios < 0.67:1 in bold. 2. ns = non-significant odds ratio (p>.01). 3. Abbreviations as Table 5.

Table 7: Stepwise logistic regressions for BESD, MLD and overall SEN.

Step	Variable entered	Cumulative amount of variance explained (R ²)	stepwise increase in R ²
MLD			
1	Entitlement to a FSM	2.8%	2.8%
2	Gender	3.7%	0.9%
3	IDACI score	4.5%	0.8%
4	Year group	5.3%	0.8%
5	Ethnic group	5.8%	0.5%
6	IDACI squared term	5.9%	0.1%
BESD			
1	Gender	4.2%	4.2%
2	Entitlement to a FSM	6.8%	2.6%
3	Year group	7.8%	1.0%
4	Ethnic group	8.8%	1.0%
5	IDACI score	9.8%	1.0%
6	IDACI squared term	9.9%	0.1%
All SEN			
1	Gender	3.2%	3.2%
2	Entitlement to FSM	5.8%	2.6%
3	IDACI score	6.4%	0.6%
4	Ethnicity	6.9%	0.5%
5	Year group	7.3%	0.3%
6	IDACI squared term	7.3%	0.0%

Note. 1 Each step includes all variables entered on previous step. 2. MLD: Moderate learning Difficulties; BESD: Behavioral, Emotional and Social Difficulties; SEN: Special educational Needs; FSM: Free school meals; IDACI: Income Deprivation Affecting Children Index