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Social class, gender and ethnic differences in subjects taken at age 14

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ABSTRACT

In this paper, we identify patterns of subject and qualification choices made at age 14. Much of the previous research on 'subject choice' has focussed on the later stages of educational trajectories, particularly Higher Education. However, the choices made at early branching points can limit pupils' subsequent options, potentially contributing to educational inequalities. This paper identifies the patterns of General Certificate of Secondary Education (GCSE) subjects chosen by a cohort of young people born in 1989/1990. We make use of the Next Steps data (formerly the Longitudinal Study of Young People in England (LSYPE)) which is linked to the National Pupil Database. We develop an approach to measuring the academic selectivity of subjects and qualifications. We examine the roles of social class, parental education, income, gender and ethnicity in determining participation in these curriculum groupings. Using measures of prior attainment from age thirteen, we address the question of whether curriculum differentials simply reflect differences in prior attainment or whether they actually operate above and beyond existing inequalities. We find clear socio-economic, gender, ethnic and school-level differences in subjects studied which cannot be accounted for by prior attainment.

1. Introduction

The curriculum in England allows students to narrow their future choices at a relatively early age (Hodgson & Spours, 2008). The combination of the proliferation General Certificate of Secondary Education (GCSE) 'equivalent' qualifications with league tables of school performance under the New Labour government of 1997–2010 led to concerns regarding schools maximising their performance at the benchmark five A*–C level by entering students for 'soft' options, and avoiding more challenging subjects (Wolf, 2011). The question of whether the curriculum being offered to some young people has limited their future prospects is a vital one.

Curriculum choice at 14–16 is relatively neglected in the research literature, despite its potential importance for future educational trajectories. Vocational (applied) GCSEs were introduced in 2002. The number and variety of GCSE courses offered has been

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overwhelming, for example, one exam board in England recently offered 72 different subjects (AQA, 2015) and one of its competitors offered 76 different GCSE subjects (OCR, 2015). The subjects offered included Persian, Quantitative Methods, Public Services and Electronics (OCR, 2015). However, the direction of curriculum policy reverted to promoting a core curriculum of academic subjects with the introduction of the 'Ebacc' in 2010. The Ebacc is a school performance measure, showing school performance only according to a restricted set of academic subjects. In addition, the number of GCSEs that may be counted for school league tables was slashed in 2014. This raises important questions about the extent to which young people and their families have the knowledge and understanding to navigate their way through the range of options and, hence, make informed 'choices' (Sullivan & Unwin, 2011). We consider this issue through the lens of 'primary and secondary effects' of stratification (Boudon, 1974), exploring the potential for subject choice to exacerbate as well as reflect existing inequalities.

This paper aims to identify the extent to which socio-economic background, gender, ethnic group and school attended shaped the patterns of subject and qualification 'choices' at age 14 for a cohort that were aged 14 in 2004. It makes a novel contribution in two important ways. First, it examines curriculum choices within compulsory education, before young people are able to 'select out' of education so the sample of young people is heterogeneous and therefore represents a wider student body than studies that look at A Levels and university participation. Second, previous literature has focused on participation in individual GCSE subjects, whereas we examine the combination of all subjects chosen. We believe examining the patterns of subject choice in this way is more informative and the formation of our categories offers a unique metric to assess the subject choices made by 14–16 year olds. We compare a number of alternative approaches to describing the curriculum studied during this age range. We develop a selectivity ranking of GCSE subjects according to average prior attainment which we call 'academically demanding' subjects (although we recognise that we can only capture a proxy for this). In addition, we explore how participation in English Baccalaureate (EBacc)-eligible subjects, Science Technology Engineering and Maths (STEM) subjects and applied GCSEs varies. This enables us to identify whether the social patterning of the curriculum varies according to alternative conceptions of a prestigious or highly-valued curriculum.

2. Literature review

The existing literature shows that subject choice at age 16–18 matters for educational trajectories, income and social mobility (e.g. Chevalier, 2011; Dolton & Vignoles, 2002). However, there has been little research on the determinants of subject choice within the context of compulsory schooling. GCSEs are important in the English context because GCSE results in particular subjects may determine continuation to further and higher education in general and access to specific courses.

One important question is whether differences in subjects taken at 14 simply reflect differentials in earlier academic attainment. We exploit the distinction developed within the rational choice framework between the 'primary' effects of stratification (those which are expressed through attainment in tests or exams in the earlier stages of the school career) and 'secondary' effects of stratification (inequalities in educational transitions over and above that which can be explained by reference to prior attainment) (Boudon, 1974; Breen

& Goldthorpe, 1997; Galindo-Rueda, Marcenaro-Gutierrez, & Vignoles, 2004; Jackson, Erikson, Goldthorpe, & Yaish, 2007). If curriculum choice reflects 'secondary effects' of stratification, then it has the potential to exacerbate inequalities, rather than simply reflecting pre-existing inequalities.

Gender segregation of curricula and qualifications has persisted despite girls' increased absolute educational attainment. Jonsson (1999) argues that gender difference may persist because boys perceive a relative advantage in technical subjects (such as engineering and sciences) while girls perceive a relative advantage in humanities subjects (e.g. languages), making them a more attractive choice. Stereotyping (Francis, 2000) and differential self-concept also play a role (Sullivan, 2009).

There is also a growing body of evidence which indicates a relatively complex pattern of differences in educational attainment and participation across ethnic minority groups, and between ethnic minority groups and the majority white British population (Heath & Brinbaum, 2007; Heath, Rothon, & Kilpi, 2008; Lessard-Phillips, 2009; Plewis, 2009; Rothon, 2005). More specifically Noden, Shiner, and Modood (2014) argue that the qualifications taken by some minority ethnic groups disadvantage them in the university admissions process. However, to our knowledge, ours is the first paper to examine the relationship between ethnicity and GCSE subject choice.

There is concern that different schools increasingly provide differentiated curriculum offers, which may serve to exacerbate inequalities. The literature on school attainment suggests that the socio-economic and academic composition of the student body of the school influences individual-level attainment, such that higher SES schools provide better outcomes (Caldas & Bankston, 2012; Marks, 2015; Perry & McConney, 2010). One possible mechanism for this would be the influence of the composition of the school on the curriculum provided.

Much previous research has focused on the uptake of specific subjects, such as the physical sciences and STEM subjects in Further and Higher Education. There is extensive evidence of gender disparity in the natural sciences (Gorard & See, 2009) and STEM (Tripney et al., 2010). Gorard and See (2009) show that students from higher socio-economic backgrounds and those with higher attainment are more likely to pursue STEM subjects (Tripney et al., 2010). There are gender and ethnic differences in science participation (The Royal Society, 2008).

In summary, previous research has offered descriptions of GCSE subjects (Bell, 2001), examined students' preferences (Francis, 2000), or looked at individual subjects rather than groups of subjects chosen (e.g. Davies, Telhaj, Hutton, Adnett, & Coe, 2008). Very few studies have looked at subject choice within compulsory schooling (except Jin, Muriel, & Sibieta, 2011; Sullivan, Zimdars, & Health, 2010). We build on the small existing evidence base by exploring curriculum differentiation according to class, gender and ethnicity, looking at curriculum differentiation characterised in a number of different ways, including academically demanding subjects, EBacc-eligible subjects, STEM subjects and applied GCSEs.

2.1. Research questions

We investigate the curriculum chosen by young people from different backgrounds at age 14 in terms of: academically demanding subjects, EBacc-eligible, STEM and applied GCSEs. More specifically, we address the following research questions:

(1) What are the patterns of GCSE subjects taken according to social class, income, parental education, gender and ethnicity?
(2) Do differentials in subject choice at GCSE simply reflect differences in prior attainment, or is there evidence of an impact of social class, income, parental education, gender and ethnicity above and beyond prior attainment?
(3) What influence do schools have on subject choice?

3. Data and methods

To address these research questions, we use data from Next Steps (formerly the Longitudinal Study of Young People in England) which follows a cohort of young people born in 1989/1990, resulting in seven waves of data. This dataset can also be linked with the National Pupil Database (NPD) providing data on state school-attending participants' performance in national tests at ages 11, 14 and 16.

Next Steps began in 2004 when participants were aged between 13 and 14. This timing means that cohort members' educational experiences were extensively shaped by the education policy of the New Labour government (1997–2010), which promoted diversity and flexibility in the 14–16 curriculum. Respondents were selected to be representative of young people in England but with a stratified random sampling strategy, which deliberately over-sampled schools in deprived areas. Schools were the primary sampling units, then children within schools. These two sampling design features means that all our models are adjusted for clustering within schools and design weights.

We restrict the sample to only those students who report that they study GCSEs at age 14–15, report the subjects they chose at GCSE in Next Steps,[1] have end of Key Stage 3 (KS3) National Curriculum assessment test score data, and for whom we have school characteristics. This results in a sample size of 11,714. KS3 test scores are derived from National Curriculum assessments taken at age 14 (commonly known as SATs). These tests were abolished in 2008. Independent schools do not routinely take part in these assessments: only 12% of the Next Steps sample of pupils from independent schools has KS3 scores. For this reason, we exclude all attendees of Independent schools from the analysis.

While this dataset offers rich socio-demographic characteristics, there are inherent limitations in the self-reporting of subjects studied that are worth noting. First, there are some potential categorisation issues due to the way the questions were structured. For example, Business Studies is not explicitly listed as an option that people can report studying, while applied Business is presented. This makes it likely that most individuals studying Business, of whatever kind, are likely to be categorised as studying towards an applied subject; this is either an oversight by the survey question designers or an indication of how this subject was viewed, at least at the time. Moreover we elect not to present the proportions of young people studying a GCSE in Design and Technology (DT) as in the Next Steps sample 65% report taking a form of DT and we cannot disentangle who is taking a GCSE course and who is taking an unexamined DT course offered by many schools. Nevertheless, for the purpose of this paper as we study combinations of subjects rather than individual subjects the effect of such classification issues are diluted.

With respect to the natural sciences, for the purpose of the descriptive statistics we present whether individuals report studying each natural science subject individually, as we believe taking biology over physics, for example, is substantively interesting. However,

when we model the combinations of subjects, we also use information from a separate variable reporting whether an individual is studying towards a qualification in single, double, or separate sciences. This is an alternative approach to classification to that taken by Vidal Rodeiro (2007) potentially raising differences in interpretation. In Next Steps 10% of the sample report studying a single science; 51% take double science and 14% of the samples take triple science, this differs somewhat from the national proportions where we see 70% take double science and 11% take single awards (Vidal Rodeiro, 2007). Nevertheless, it is important to be mindful that these differences in reporting may also be associated with the individual characteristics of the young person, by socio-economic status (SES), for example. Despite some of these participation rate differences in Next Steps compared to the national intake, we believe that this approach is informative of general patterns in combinations of subjects taken.

3.1. Dependent variables

In order to examine curriculum differentiation, one must construct a classification of subjects. There are various ways in which GCSE subjects can be grouped, for example, by making a normative judgement regarding the value of some qualifications over others or by attempting to assess the relative difficulty of different subjects (Coe, Searle, Barmby, Jones, & Higgins, 2008). In this paper, we examine whether the predictors of the curriculum studied vary substantially across these four curriculum classifications:

(1) Academically demanding subjects based on average prior attainment
(2) EBacc-eligible subjects
(3) STEM subjects
(4) Applied GCSEs

English and Maths were core compulsory subjects at the time the data were collected, meaning there is no variation in studying these to be explained. Therefore these are not included in our outcome measures. We also exclude 'Other Languages' from our analysis because our data cannot differentiate between languages such as Latin and minority home languages (e.g. Bangladeshi), which are likely to be taken by very different groups of young people (Vidal Rodeiro, 2007). Such languages are also likely to be viewed differently depending upon the background of the individual, making their importance for future outcomes rather ambiguous.

We construct a measure of the perceived academic demands of the curriculum by classifying subjects according to the average prior attainment of pupils taking each subject. Coe et al. (2008) adopted a similar approach, using the NPD to compare the results of different statistical techniques to estimate the difficulty of subjects using a measure of their attainment in each subject. Their results showed remarkable consistency across methods. This approach is parsimonious, in that we do not need to make any assumptions about what constitutes difficulty. Nevertheless, from an empirical point of view, our subject ranking is similar to Coe et al.'s and Ofqual's (2015). This is perhaps unsurprising, as the extent to which a subject is taken by students with high prior attainment can reasonably be assumed to be strongly related to its *perceived* difficulty.
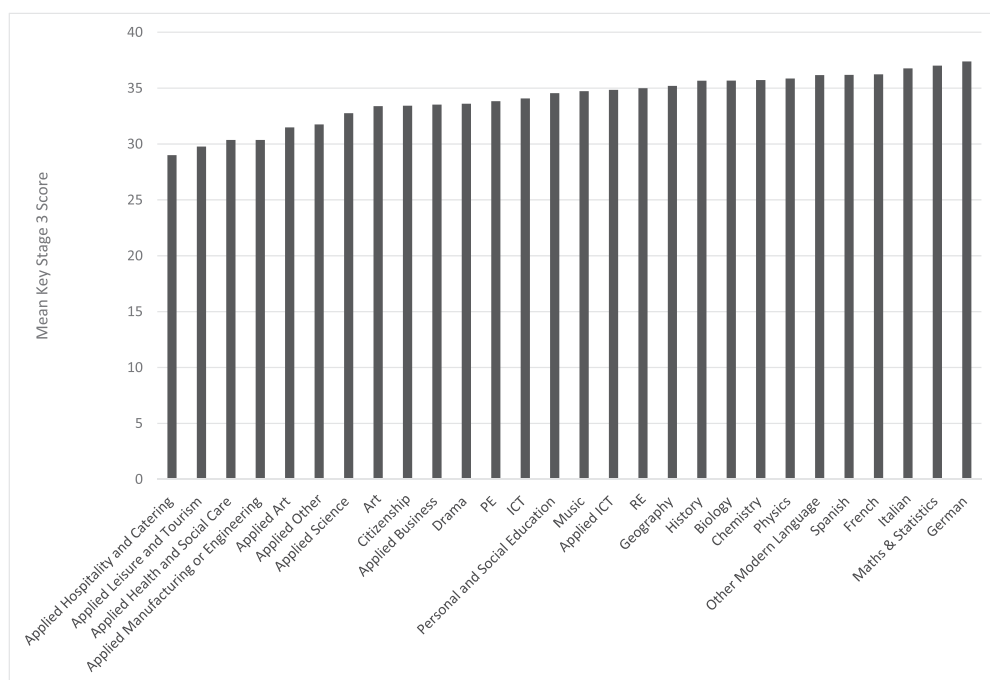
Figure 1. GCSE subjects ranked by mean Key Stage 3 score.
Notes: Analysis weighted using next steps-supplied weights to account for initial oversampling, non-response and attrition to Wave 2.Source: Next steps. The sciences are included separately in this chart.

We calculate the average prior attainment (in terms of age 14 test scores) of students who select each GCSE subject.[2] The results are shown in Figure 1. Within our sample, we find that German attracts students with the highest prior attainment and applied Hospitality and Catering attracts those with the lowest prior attainment. Next, we compose a measure of how academically demanding the curriculum choices are for each young person in the sample by summing the mean scores for the eight most academically demanding subjects each student takes, so that a higher score denotes a more-demanding curriculum. Since this capped academically demanding curriculum variable has no natural interpretation, we standardise it into a *Z*-Score, so that it has a mean of zero and a standard deviation of one.

We also examine whether there are systematic differences for EBacc subjects. In 2010, EBacc was introduced as a performance measure composed of five core subjects. Although this policy introduction succeeds this cohort, it is particularly interesting to see the antecedents of taking EBacc-eligible subjects as it signified breadth of the subjects chosen. Achieving the EBacc means getting a C grade or above in the following GCSE subjects: English, Mathematics, History or Geography, two sciences and a Modern or Ancient Language. We use a binary measure according to whether pupils have selected five EBacc subjects or not. In total, 34% of the sample select subject that would make them eligible for the EBacc.

With respect to the STEM subjects, we create a binary outcome where one is when the number of STEM subjects taken is three or more and zero is where the young person takes

fewer than three subjects (the mean score of STEM subjects taken is 2.8). In total, 62% of the sample take three or more STEM subjects. The subjects we take in Next Steps to identify as STEM are: Information and Communications Technology; Mathematics; Statistics; Biology, Chemistry or Physics, taking into account single, double or triple science.

Lastly we assess the number of applied GCSEs selected by the young people. Applied GCSEs[3] were introduced in the 2002 Education Act as part of a broader policy to increase the diversity of the 14–19 curriculum. In total, 52% of the sample do not take any applied GCSEs and 36% take just one. We create a binary outcome where one is when the number of applied GCSEs taken is greater than or equal to one (which accounts for 48% of the sample) and zero where the young person takes no applied GCSEs.

3.2. Independent variables

We make use of the first four waves to capture the main independent variables, which are: social class,[4] parental education, equivalised permanent income,[5] housing tenure, ethnicity, gender, special educational needs (SEN), KS3 scores and school characteristics. In order to avoid dropping cases with missing or unknown information on background variables we take the first available response mentioned for parental class, parental education and household tenure. The school characteristics we examine in this paper include grammar school status, proportion of young people who are eligible for FSM in the school, average class size and whether the school was single-sex or co-educational. The composition of the sample in terms of our independent variables is reported in Table 1.

Table 1. Composition of the sample.

	Variables	%
Social class background	Higher managerial	33
	Intermediate	29
	Routine	38
Highest parental qualification	Degree or higher	18
	Other HE qualification	12
	A Level	10
	GCSE A-C	35
	GCSE D-G and below	25
Household tenure	Owns property outright/mortgage	67
	rent/other	33
Ethnicity	White	68
	Mixed	5
	Indian	6
	Pakistani	6
	Bangladeshi	4
	Black Caribbean	3
	Black African	3
	Other	4
Gender	Male	50
	Female	50
Special education needs	No special education needs	93
	Special education needs	7
School type	Not grammar school	96
	Grammar school	4
School characteristics	Not single-sex school	88
	Single-sex school	12
		N = 11,714

Source: DfE (2013) First longitudinal study of young people in England: secure access.

3.3. Analytical strategy

We employ ordinary least-squares (OLS) regression models for the continuous selectivity measure and logistic regression models for our binary outcomes. We estimate sequential models which shed light on our three research questions in turn. Our first model includes measures of individual and family background characteristics, providing insight on the conditional importance of these variables for individuals' subject choices. The second model adds academic performance at age 14, thus shedding light on whether any inequalities persist once prior attainment has been taken into account. Finally, our third model includes school-level characteristics.

We minimise the problem of omitted variable bias through use of the rich background data (including prior attainment measures) available in Next Steps. Our results are not necessarily causal, but rather capture conditional relationships between pupils' backgrounds and subject choices. We account for the clustering of pupils within schools by calculating cluster-robust standard errors at school level.

4. Results

### 4.1. Descriptive statistics

Before addressing our first research question about the patterns of GCSE subjects taken according to social class, gender, ethnicity, parental education and income, we show the overall proportions of young people studying each subject (Figure 2). The most popular
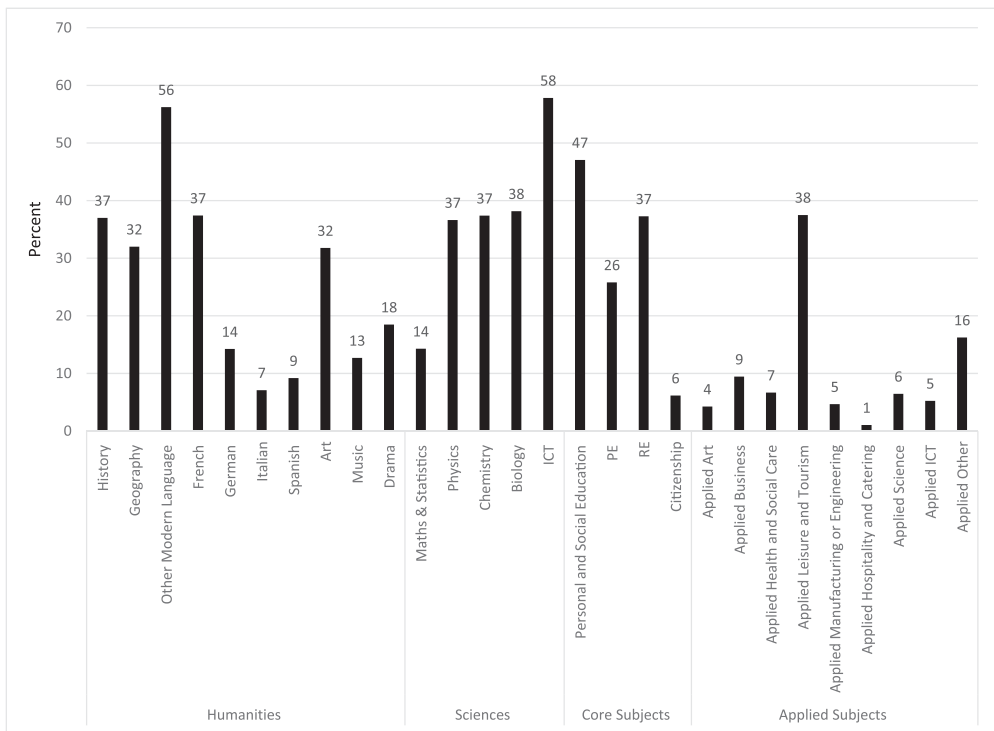
Figure 2. Proportion of young people taking each GCSE subject.
Source: DfE (2012) Next steps.
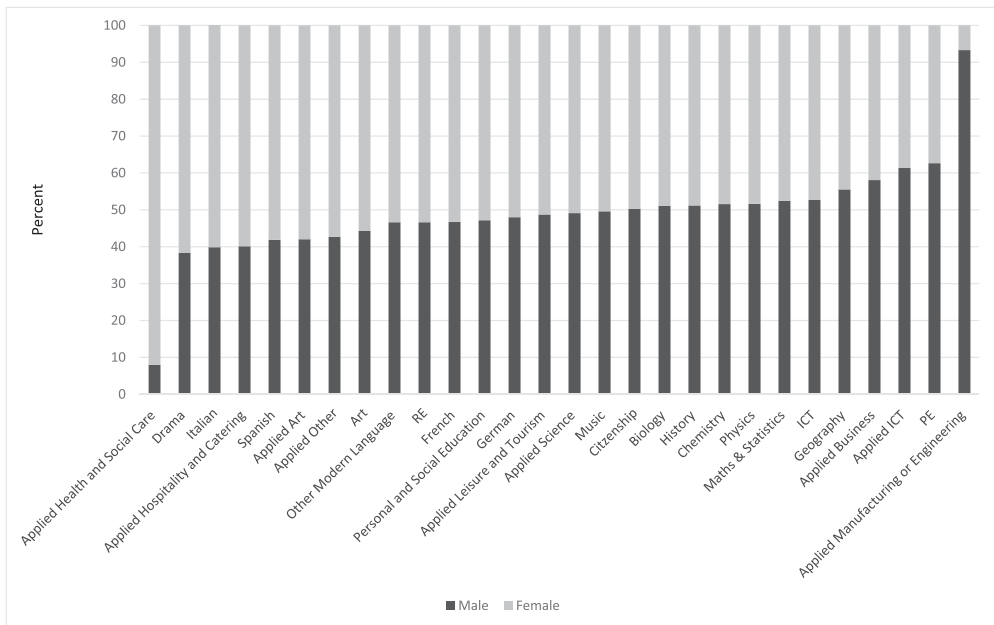
Figure 3. GCSE subjects selected by gender.
Source: DfE (2012) Next steps.

GCSE selected (recalling that English and Maths are excluded from this analysis since they are compulsory) is ICT (58%), followed by Modern Foreign Languages (56%). The least popular subject is applied Hospitality and Catering (1%).

Figure 3 shows GCSE subjects ranked by the proportion of boys taking them. The widest gender gaps occur in applied Manufacturing and Engineering which shows a higher uptake for boys and applied Health and Social Care which shows a higher uptake for girls. Figure 4 shows GCSE subjects ranked by the proportion of pupils from salariat class backgrounds. A higher proportion of young people from higher social class backgrounds take modern foreign languages including German, Italian, French and Spanish. In addition, we see larger proportion of young people with higher social class backgrounds taking music and the natural sciences,[6] while young people from routine social class backgrounds are more likely to take applied subjects As we might expect, the pattern is very similar for parental education as for income and social class. The story for subject choice by ethnicity shown in (Figure 5) is not so clear. For example, there is no particular pattern evident in the subjects favoured by white students.

4.2. Regression modelling

To address our second and third research questions, we need to explore whether these patterns persist once we take into account prior attainment and school characteristics. To shed light on this issue we turn to the results of our regression modelling.

4.2.1. Academically demanding subjects

Table 2 reports coefficients from the OLS regression predicting the academic demandingness of the GCSE curriculum studied. As noted above, the capped curriculum score has
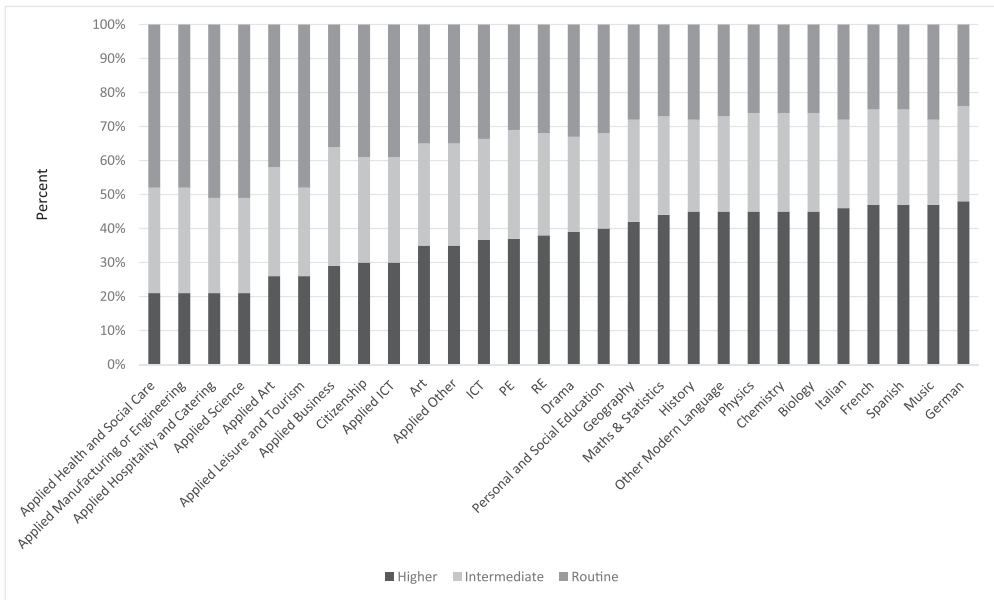
Figure 4. GCSE subjects selected by social class.
Source: DfE (2012) Next steps.
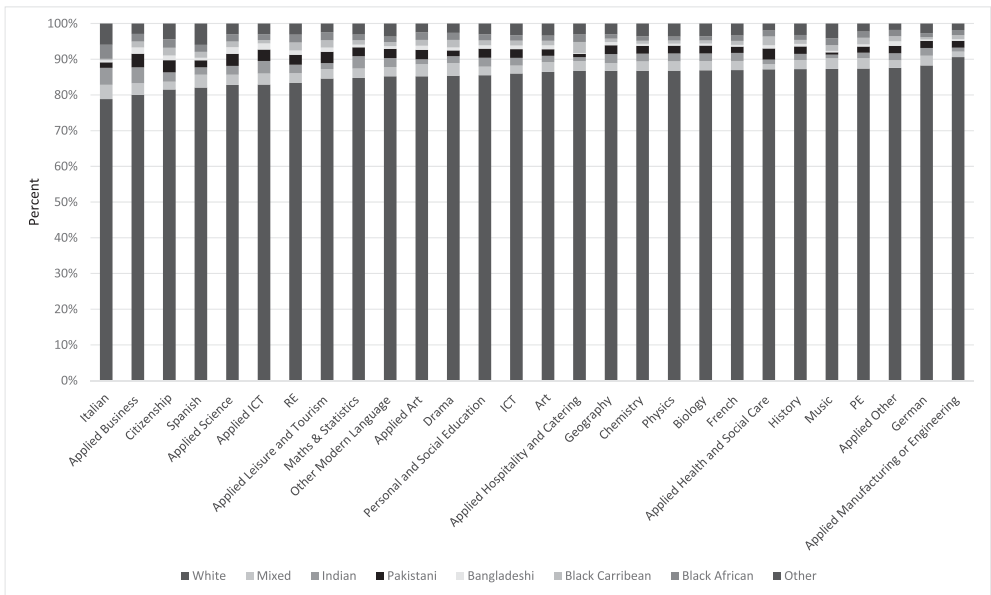
Figure 5. GCSE subjects selected by ethnicity.
Source: DfE (2012) Next steps.

Table 2. Academically demanding subjects: OLS regression results.

	Model 1		Model 2		Model 3	
	β	SE	β	SE	β	SE
Ref. higher managerial						
Intermediate	−0.06*	(0.03)	−0.03	(0.03)	−0.04	(0.03)
Routine	−0.13***	(0.03)	−0.06*	(0.03)	−0.05*	(0.03)
Ref. degree or higher						
Other HE qualification	−0.17***	(0.03)	−0.08*	(0.03)	−0.07*	(0.03)
A level	−0.17***	(0.04)	−0.08*	(0.03)	−0.06	(0.03)
GCSE A-C	−0.32***	(0.03)	−0.16***	(0.03)	−0.14***	(0.03)
GCSE D-G and below	−0.33***	(0.04)	−0.12***	(0.03)	−0.09**	(0.03)
Income (per £10,000)	0.09***	(0.01)	0.04***	(0.01)	0.03**	(0.01)
Ref. owns property outright/mortgage						
Rent/other	−0.13***	(0.02)	−0.05*	(0.02)	−0.02	(0.02)
Ref. white						
Mixed	−0.03	(0.04)	−0.03	(0.04)	−0.01	(0.04)
Indian	−0.04	(0.06)	−0.08	(0.05)	−0.05	(0.05)
Pakistani	−0.08	(0.06)	0.02	(0.06)	0.08	(0.06)
Bangladeshi	−0.15*	(0.07)	−0.15*	(0.07)	0.00	(0.08)
Black Caribbean	−0.07	(0.06)	0.04	(0.06)	0.09	(0.06)
Black African	−0.01	(0.07)	0.09	(0.06)	0.15*	(0.06)
Other	0.14**	(0.05)	0.12*	(0.05)	0.14**	(0.05)
Ref. male						
Female	0.09***	(0.02)	0.07***	(0.02)	0.07***	(0.02)
Special education needs	−0.52***	(0.05)	−0.13*	(0.05)	−0.21***	(0.04)
Key Stage 3			0.05***	(0.00)	0.05***	(0.00)
Ref. state school						
Grammar School					0.27***	(0.07)
% FSM in school (SD)					−0.10***	(0.02)
Average class size					−0.08***	(0.02)
Ref. co-ed						
Single-sex school					0.12*	(0.05)
Constant	0.26***	(0.05)	−1.65***	(0.09)	−1.52***	(0.08)
Observations	11,714		11,714		11,714	
Log likelihood	−15953		−15418		−15286	
DF	17		18		22	
Pseudo R^2	0.09		0.17		0.19	

Source: DfE (2013) First Longitudinal Study of Young People in England: Secure Access. School-level cluster-robust standard errors reported in parentheses. Statistical significance of coefficients indicated as follows: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

been standardised. As such, coefficients may be interpreted as the expected change in standard deviations of the academically demanding curriculum score associated with a one unit change in the independent variable.

Model 1 reports changes in academically demanding curriculum score associated with individual and familial characteristics, without controls for prior attainment or school attended. We find that students from wealthier backgrounds and those with relatively highly educated parents study a more academically demanding curriculum. Young people who live in rented accommodation study less demanding subjects than those who live in owner occupied or mortgaged property. We also find that those from routine and intermediate social class backgrounds take a less demanding curriculum than those from higher social class backgrounds. Girls study a more demanding curriculum than boys, and young people with SEN take less-demanding subjects. The only ethnicity coefficients which yield significant results are the Bangladeshi and other ethnic groups, Bangladeshi pupils take less-demanding subjects and 'other' pupils take more demanding subjects.

In Model 2, prior attainment at age 14 is added to the model. Unsurprisingly, prior attainment is positively and significantly associated with how academically demanding

the subjects selected are. Controlling for prior attainment, the differentials due to socio-economic factors are reduced, but significant differences remain. The ethnic and gender differences are not accounted for by prior attainment.

School characteristics are included in Model 3. We find that young people who attend grammar schools take a more demanding curriculum, so too do those who attend a single-sex school. Larger class size is associated with a decrease in the academic demands of the curriculum, as is the presence of a higher proportion of free-school meal eligible students in the school. However, the social class, parental education, income, gender and prior attainment coefficients remain statistically significant in this model, although, housing tenure is no longer significant. The pattern of results according to ethnicity changes once school factors are taken into account. Once school characteristics are controlled for, black African young people take more-demanding subjects.

4.2.2. EBacc

Table 3 shows our models of whether the young person takes the EBacc. In Model 1, parental education, income and housing tenure are all significant predictors of taking EBacc-eligible subjects. Black Caribbean and mixed race young people have lower odds of

Table 3. EBacc-eligible subjects: logistic regression results.

	Model 1		Model 2		Model 3	
	OR	SE	OR	SE	OR	SE
Ref. higher managerial						
Intermediate	0.90	(0.05)	0.96	(0.06)	0.94	(0.06)
Routine	0.77***	(0.05)	0.89	(0.06)	0.91	(0.06)
Ref. degree or higher						
Other HE qualification	0.71***	(0.05)	0.87	(0.07)	0.87	(0.07)
A Level	0.68***	(0.06)	0.83*	(0.07)	0.83*	(0.07)
GCSE A-C	0.53***	(0.04)	0.76***	(0.05)	0.78***	(0.05)
GCSE D-G and below	0.51***	(0.04)	0.79**	(0.06)	0.84*	(0.07)
Income (per £10,000)	1.22***	(0.04)	1.10***	(0.03)	1.07**	(0.03)
Ref. owns property outright/mortgage						
Rent/other	0.75***	(0.04)	0.89*	(0.05)	0.93	(0.05)
Ref. white						
Mixed	0.81*	(0.08)	0.81*	(0.09)	0.84	(0.09)
Indian	1.09	(0.13)	1.01	(0.13)	1.08	(0.14)
Pakistani	1.07	(0.12)	1.36*	(0.16)	1.62***	(0.21)
Bangladeshi	0.87	(0.12)	0.85	(0.12)	1.19	(0.19)
Black Caribbean	0.62**	(0.09)	0.79	(0.12)	0.88	(0.14)
Black African	0.87	(0.12)	1.09	(0.15)	1.24	(0.17)
Other	1.24*	(0.14)	1.19	(0.13)	1.30*	(0.15)
Ref. male						
Female	0.94	(0.05)	0.90*	(0.04)	0.91	(0.04)
Special education needs	0.43***	(0.04)	0.99	(0.11)	0.92	(0.10)
Key Stage 3			1.13***	(0.01)	1.12***	(0.01)
Ref. state school						
Grammar School					1.95**	(0.43)
% FSM in school (SD)					0.78***	(0.04)
Average class size					0.95	(0.04)
Ref. co-ed						
Single-sex school					1.26*	(0.15)
Constant	0.89	(0.09)	0.01***	(0.00)	0.01***	(0.00)
Observations	11,714		11,714		11,714	
Log likelihood	−7147		−6671		−6597	
DF	17		18		22	
Pseudo R^2	0.06		0.12		0.13	

Source: DfE (2013) First Longitudinal Study of Young People in England: Secure Access. See notes to Table 3.

taking the EBacc while 'other' ethnic groups have higher odds compared to white pupils. There is no significant gender difference.

Once prior attainment at KS3 is controlled in Model 2, parental education, income and housing tenure remain significant. The pattern according to ethnic group changes in this model, as a positive differential in favour of Pakistani pupils emerges compared to whites of the same level of prior attainment. In this model, once prior attainment is accounted for, the odds of girls doing EBacc-eligible subjects is significantly lower than for boys.

Once school characteristics are controlled in Model 3, the income, parental education and prior ability coefficients remain significant. The Pakistani advantage is increased. Attending a grammar school or a single-sex school increases the odds of taking the EBacc. As the proportion of FSM-eligible students in the school increases, the odds of doing EBacc-eligible subjects declines.

4.2.3. STEM

Table 4 shows our models predicting the odds of taking three or more STEM subjects at GCSE. Model 1 shows that household income, home ownership and higher parental education increase the odds of taking three STEM subjects. Black Caribbean, black African and

Table 4. Three or more STEM Subjects: logistic regression results.

	Model 1		Model 2		Model 3	
	OR	SE	OR	SE	OR	SE
Ref. higher managerial						
Intermediate	0.96	(0.06)	0.99	(0.06)	0.98	(0.06)
Routine	0.82**	(0.05)	0.89	(0.06)	0.91	(0.06)
Ref. degree or higher						
Other HE qualification	0.95	(0.07)	1.06	(0.08)	1.07	(0.08)
A Level	0.82*	(0.07)	0.91	(0.08)	0.92	(0.08)
GCSE A-C	0.77***	(0.06)	0.94	(0.07)	0.96	(0.07)
GCSE D-G and below	0.74***	(0.06)	0.95	(0.08)	1.00	(0.08)
Income (per £10,000)	1.08**	(0.03)	1.03	(0.03)	1.00	(0.03)
Ref. owns property outright/mortgage						
Rent/other	0.89*	(0.05)	0.97	(0.05)	1.02	(0.05)
Ref. white						
Mixed	0.74**	(0.08)	0.74**	(0.08)	0.77**	(0.08)
Indian	1.06	(0.13)	1.01	(0.13)	1.08	(0.14)
Pakistani	0.85	(0.11)	0.95	(0.12)	1.11	(0.14)
Bangladeshi	1.06	(0.17)	1.06	(0.17)	1.41*	(0.22)
Black Caribbean	0.71*	(0.10)	0.81	(0.11)	0.90	(0.12)
Black African	0.75*	(0.11)	0.83	(0.12)	0.93	(0.13)
Other	1.02	(0.13)	0.99	(0.13)	1.08	(0.14)
Ref. male						
Female	0.72***	(0.04)	0.70***	(0.04)	0.70***	(0.04)
Special education needs	0.56***	(0.06)	0.87	(0.09)	0.85	(0.09)
Key Stage 3			1.06***	(0.01)	1.05***	(0.00)
Ref. state school						
Grammar School					1.43	(0.40)
% FSM in school (SD)					0.81***	(0.04)
Average class size					1.02	(0.05)
Ref. co-ed						
Single-sex school					1.15	(0.16)
Constant	0.75**	(0.08)	0.08***	(0.02)	0.10***	(0.02)
Observations	11,714		11,714		11,714	
Log likelihood	−7200		−7070		−7028	
DF	17		18		22	
Pseudo R^2	0.02		0.04		0.05	

Source: DfE (2013) First Longitudinal Study of Young People in England: Secure Access. See notes to Table 3.

mixed race pupils all have reduced odds of taking three STEM subjects. As we expect, girls have lower odds of doing three or more STEM subjects than boys.

Model 2 shows that the inclusion of prior attainment predicts selection of three or more STEM subjects positively. Prior attainment fully explains the parental education and housing tenure differentials, and the income difference is also no longer significant. In other words, socio-economic differentials in access to STEM are largely driven by prior attainment. With the exception of mixed race young people, the ethnic differences become non-significant, suggesting that the apparent disadvantage experienced by these groups regarding STEM can also be accounted for by prior attainment. In contrast, the gender differences remain.

The negative association for girls remains once school characteristics are included in Model 3, so too does the negative association for mixed race young people compared to white young people. In contrast, the odds for Bangladeshi young people become significantly positive once school characteristics are controlled. Participation in STEM subjects does not vary by school characteristics, with the exception of the proportion of FSM in the school which is negatively associated with doing three or more STEM subjects.

4.2.4. Applied GCSEs

Table 5 shows the results predicting taking one or more applied GCSEs. In Model 1 we observe that social class is a significant predictor for studying applied GCSEs, and those from routine backgrounds are more likely to study these subjects. We also observe that children in more affluent households have lower odds of studying any applied subjects. Parental education is also significant: as the level of parental education decreases, the odds of the young person studying applied GCSEs increase. Furthermore, we see that girls are more likely than boys to study applied GCSEs, so too are those with special education needs.

Model 2 includes prior educational attainment and the statistically significant odds ratio of less than one suggests that as ability increases, the odds of doing applied GCSEs reduces. The inclusion of prior attainment explains the social class differential in taking applied subjects. None of the other statistically significant variables from Model 1 change once prior attainment is taken into account, except that the apparent influence of parental education reduces slightly and SEN become associated with lower odds of taking one or more applied GCSEs.

The results do not change substantively once school characteristics are included in Model 3. We observe that young people who attend grammar schools have significantly lower odds of taking applied GCSEs compared with those in non-selective schools. Furthermore, attending a single-sex school is associated with lower odds of studying applied subjects over and above individual characteristics. We explore school variation in more depth elsewhere (Anders, Henderson, Moulton, & Sullivan, in press).

4.2.5. The influence of socio-economic status on subject choice

In order to better understand the extent of the influence of SES on subject choice we take the first principal component from a principal component analysis (PCA) comprising parental occupation, parental education, equivalised family income and home ownership to create a summary SES measure. We convert the SES variable into quintiles, running from low levels of SES to high levels of SES. We then run a model predicting the four

Table 5. Applied GCSE: logistic regression results.

	Model 1		Model 2		Model 3	
	OR	SE	OR	SE	OR	SE
Ref. higher managerial						
Intermediate	1.11	(0.07)	1.07	(0.07)	1.08	(0.07)
Routine	1.16*	(0.07)	1.06	(0.07)	1.07	(0.07)
Ref. degree or higher						
Other HE qualification	1.33***	(0.10)	1.19*	(0.09)	1.17*	(0.09)
A level	1.30**	(0.11)	1.16	(0.09)	1.14	(0.09)
GCSE A-C	1.73***	(0.12)	1.42***	(0.10)	1.39***	(0.10)
GCSE D-G and below	1.56***	(0.12)	1.21*	(0.09)	1.22*	(0.10)
Income (per £10,000)	0.84***	(0.02)	0.89***	(0.03)	0.90***	(0.03)
Ref. owns property outright/mortgage						
Rent/other	1.13*	(0.06)	1.02	(0.05)	1.04	(0.05)
Ref. white						
Mixed	0.89	(0.09)	0.89	(0.09)	0.92	(0.09)
Indian	0.99	(0.10)	1.04	(0.10)	1.09	(0.11)
Pakistani	1.11	(0.12)	0.99	(0.11)	1.10	(0.12)
Bangladeshi	1.00	(0.15)	1.00	(0.16)	1.16	(0.17)
Black Caribbean	1.10	(0.14)	0.96	(0.12)	1.06	(0.14)
Black African	0.95	(0.12)	0.84	(0.11)	0.92	(0.12)
Other	0.70**	(0.09)	0.71**	(0.09)	0.78*	(0.10)
Ref. male						
Female	1.11*	(0.05)	1.14**	(0.05)	1.14**	(0.05)
Special education needs	1.25*	(0.11)	0.76**	(0.08)	0.82*	(0.07)
Key Stage 3			0.94***	(0.00)	0.94***	(0.00)
Ref. state school						
Grammar School					0.37***	(0.11)
% FSM in school (SD)					0.94	(0.04)
Average class size					1.07	(0.04)
Ref. co-ed						
Single-sex school					0.76*	(0.09)
Constant	0.64***	(0.07)	7.24***	(1.33)	6.15***	(1.08)
Observations	11,714		11,714		11,714	
Log likelihood	−7888		−7713		−7654	
DF	17		18		22	
Pseudo R^2	0.03		0.05		0.06	

Source: DfE (2012) First Longitudinal Study of Young People in England: Secure Access. See notes to Table 3.

curriculum combinations of interest controlling for gender, ethnicity, and special education needs. Second we include the measure of SES to identify the extent of the variance explained by social status, before including prior attainment. The variance explained is the proportion within a model which accounts for the dispersion of the data; the results are shown in Table 6. The results show that SES explains 6% of the variance[7] for academically demanding subjects; 5% of the variance for EBacc-eligible subjects; 2% of STEM subjects and only 1% for applied subjects. These are modest effects as prior attainment explains more of the variance than SES for all four curriculum metrics.[8]

5. Discussion and conclusion

We have examined the 14–16 curriculum across a range of dimensions, but some common patterns emerge. Having an advantaged social background (captured via a range of measures) is consistently linked to taking a more demanding and prestigious curriculum: taking academically demanding STEM subjects and EBacc-eligible subjects, and being less likely to take applied GCSEs. These socio-economic differences are only partly explained by differences in prior attainment at KS3. This implies that socio-economic curriculum

Table 6. Influence of socio-economic status on subject choice.

	Academically demanding						EBacc-eligible subjects						More than three STEM subjects						One or more applied subjects					
	M1		M2		M3		M1		M2		M3		M1		M2		M3		M1		M2		M3	
	β	SE	β	SE	β	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
Ref: SES Quintile 3																								
SES Q1 (Low)			−0.24***	(0.03)	−0.06*	(0.03)			0.55***	(0.04)	0.85	(0.07)			0.68***	(0.04)	0.87*	(0.06)			1.33***	(0.09)	1.06	(0.07)
SES Q2			−0.12***	(0.03)	−0.04	(0.03)			0.73***	(0.06)	0.89	(0.08)			0.83**	(0.05)	0.93	(0.06)			1.28***	(0.08)	1.16*	(0.07)
SES Q4			0.23***	(0.03)	0.13***	(0.03)			1.59***	(0.11)	1.28***	(0.09)			1.32***	(0.08)	1.16*	(0.07)			0.85**	(0.05)	0.95	(0.06)
SES Q5 (High)			0.45***	(0.03)	0.22***	(0.03)			2.86***	(0.21)	1.67***	(0.12)			1.72***	(0.12)	1.24**	(0.08)			0.51***	(0.04)	0.67***	(0.05)
Ethnicity	✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓	
Sex	✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓	
SEN	✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓	
Prior attainment					✓						✓						✓						✓	
R^2/Pseudo R^2	0.03		0.09		0.17		0.01		0.06		0.16		0.01		0.03		0.06		0.01		0.02		0.05	

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

differences are shaped by both the primary and secondary effects of stratification, where the primary effects are those due to prior attainment, and the secondary effects are those which operate over and above differences in prior attainment. The secondary effects are greatest in the case of the academically demanding curriculum score, and weakest in the case of STEM. The modest presence of secondary effects of stratification for academically demanding subjects, vocational subjects, and EBacc confirms the potential for curriculum choice at 14 to exacerbate inequalities rather than simply reflect existing inequalities. The pattern of ethnic differentials across our outcomes is not completely consistent, suggesting that ethnic patterns are rather sensitive to the particular curriculum categorisation used. Ethnic differences were also sensitive to controls for both prior attainment and school differences, suggesting that, in some instances, ethnic minority pupils studied a more academically demanding or prestigious curriculum than whites with similar prior attainment attending similar schools. This is an example of the way in which 'secondary effects', which are negative for working class pupils, are often positive for ethnic minorities (Waters, Heath, Tran, & Boliver, 2013). Girls have lower odds of taking three or more STEM subjects and higher odds of taking applied GCSEs; however, we found no significant gender difference in EBacc.[9]

The results point to an important school effect which requires more research to assess the roles of the subjects offered within schools and informal school policies which may influence which students are allowed to take particular subjects. The present analysis finds that grammar school status is positively associated with doing EBacc-eligible subjects and STEM (although for STEM subjects the results are not statistically significant) and negatively associated with doing applied GCSEs; this is not entirely explained by the higher prior attainment of those who attend such schools. Our analytical sample excludes private schools, but given the difference between comprehensive and grammar schools we can speculate that subject choice would also vary according to private school status, particularly as we find that attending a single-sex school is positively associated with studying a more demanding curriculum and EBacc-eligible subjects. We find that the proportion of FSM-eligible students in the school is negatively associated with all subject choice metrics except in the case of applied GCSEs, which is not statistically significant. This finding accords with the wider literature showing that school SES matters for individual pupil outcomes (Caldas & Bankston, 2012; Marks, 2015; Perry & McConney, 2010).

In summary, we found that even after controlling for prior attainment and school difference, young people from advantaged households take more academically demanding subjects, have higher odds of studying EBacc-eligible subjects and lower odds of taking applied GCSEs than less advantaged young people. This is likely to be partly a result of direct forms of support from parents with higher SES which leads to variation in subject choice, but we also found evidence to support an indirect effect via school differences. We found that there were important dissimilarities according to school characteristics, which may be a result of differential opportunities, subjects offered and within school policies. Our subsequent research has explored the consequences of these curriculum differences for young people's onward trajectories (Anders et al., in press; Moulton, Sullivan, Henderson, & Anders, in press).

Notes

1. We take the measure of GCSE subjects from Next Steps in order to reflect subjects chosen and studied rather than subjects which recorded a grade (as would be the case using NPD data).
2. We make use of the weights from Wave 2 to account for initial oversampling and non-response between the first and second waves.
3. During the 2000s many vocational courses were introduced into the school curriculum in England, including BTEC and other applied subjects. However the Next Steps data does not reveal much about participation in these courses aside from applied GCSEs.
4. Social class is measured using the National Statistics Socio Economic Classification (NS-SEC) which uses occupational types to capture dimensions of social class (Rose and Pevalin, 2001). We make use of the three-category NS-SEC, which consists of: Higher Managerial, administrative and professional occupations; Intermediate occupations; Routine and manual occupations. More details can be found at http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/soc2010-volume-3-ns-sec–rebased-on-soc2010–user-manual/index.html#5.
5. We take an average of the household income over the first four waves and divide by the square root of household size to provide a measure of equivalised permanent income. This has been shown to have a larger effect on young people's educational outcomes than transitory income (Jenkins and Schluter, 2002). The mean of this equivalised income variable is 1.37 with a standard deviation of 1.
6. We included the sciences individually for the descriptive statistics to understand patterns of subject choice. However for the purpose of modelling the combinations of subjects, we use the single/double/triple distinction.
7. The difference between Model 1 and Model 2.
8. The difference between Model 2 and Model 3.
9. We found little evidence of systematic interactions between gender, ethnicity and socio-economic status in determining curriculum outcomes (results not shown).

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