Institute of Education

Social Class, Gender and Ethnic Differences in Subjects Taken at Age 14

By Morag Henderson[1], Alice Sullivan[1], Jake Anders[2] and Vanessa Moulton[1]

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Contact the author
Morag Henderson
Co-Investigator for Next Steps
Centre for Longitudinal Studies
UCL Institute of Education
morag.henderson@ucl.ac.uk

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[1] Centre for Longitudinal Studies, UCL Institute of Education
[2] Department of Learning and Leadership, UCL Institute of Education

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UCL Institute of Education
University College London
20 Bedford Way
London WC1H 0AL
www.cls.ioe.ac.uk

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tel: +44 (0)20 7612 6875
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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.

Non-technical summary

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 data from a longitudinal survey of these individuals linked to administrative data on their academic attainment. We examine the roles of social class, parental education, income, gender and ethnicity in determining participation in various 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.

As expected, prior attainment is consistently positively associated with taking a more selective set of subjects, facilitating subjects, STEM subjects and EBacc-eligible subjects, while it is negatively associated with taking applied GCSEs. However, associations according to parental socio-economic background remain once these are held constant. The presence of these confirms the potential for curriculum choice at 14 to exacerbate inequalities rather than simply reflect existing inequalities. 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 or facilitating subjects.

We find that the proportion of free school meal 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. 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.

Introduction

The curriculum in England allows students to narrow their future choices at a relatively early age (Hodgson and Spours, 2008). The combination of the proliferation GCSE 'equivalent' qualifications with league tables of school performance 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 is limiting their future prospects is a vital one. As stated in a recent report for the Social Mobility and Child Poverty Commission "*the period between Key Stage 2 and Key Stage 4 appears to be a crucial time to ensure the higher-achieving pupils from poor backgrounds remain on a high achievement trajectory*" (Crawford et al., 2014, p9).

Curriculum choice at 14-16 is relatively neglected in the research literature, despite its potential importance for future educational trajectories. The number and variety of GCSE courses offered is overwhelming, for example one exam board in England currently offers 72 different subjects (AQA, 2015) and one of its competitors offers 76 different GCSE subjects (OCR, 2015). The subjects offered include Persian, Quantitative Methods, Public Services and Electronics (OCR, 2015). Vocational (applied) GCSEs were introduced in 2002. 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 and Unwin 2011).

This paper aims to identify the extent to which socio-economic background, gender, ethnic group and school attended shape the patterns of subject and qualification 'choices' at age 14. We compare a number of alternative approaches to describing the curriculum studied by 14-16 year olds. We develop a selectivity ranking of GCSE subjects according to average prior attainment. In addition, we explore how participation in 'facilitating subjects', 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.

Review of Literature

The existing literature shows that subject choice at age 16-18 matters for educational trajectories, income and social mobility (for example Chevalier, 2011; Dolton and 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 A Level study and participation in particular subjects, participation in vocational training, acceptance to a sixth form or college and suitability for particular university courses. GCSE performance is also used as a government benchmark to assess school quality.

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 and Goldthorpe 1997); (Galindo-Rueda, Marcenaro-Gutierrez and Vignoles 2004; Jackson et al. 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 (Rothon, 2005; Heath and Brinbaum, 2007; Heath, Rothon et al. 2008; Lessard-Phillips, 2009; Plewis, 2009). More specifically Noden et al. (2014) argue that the qualifications taken by some minority ethnic groups disadvantage them in the university admissions process. However, there is, to our knowledge, no existing literature which examines the relationship between ethnicity and GCSE subject choice groupings directly.

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 school provide better outcomes (Marks, 2015; Perry and McConney, 2010;

Caldas and Bankston, 2012). 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 Science, Technology, Engineering and Mathematics (STEM) subjects in Further and Higher Education. There is extensive evidence of gender disparity in the natural sciences (Gorard and See, 2009) and STEM (Tripney et al., 2010). Gorard and See (2009) show that students from less prestigious socio-economic backgrounds are also less likely to pursue the physical sciences and those with higher attainment are more likely to pursue STEM subjects (Tripney et al. 2010). There are differences by gender and ethnicity with respect to science participation (The Royal Society, 2008). In addition to an interest in STEM participation, we are also interest in the predictors of participation in non-academic GCSEs[1], as well as substantive differences in participation in academic programmes of study, such as academic selectivity, EBacc eligible subjects and facilitating subjects.

In summary, previous research has offered descriptions of GCSE subjects (Bell, 2001), looked at intentions of students (Francis, 2000) or looked at individual subjects rather than groups of subjects chosen (for example Davies et al. 2008). Very few studies have looked at subject choice within compulsory schooling (except Sullivan, Zimdars and Heath, 2010; Jin et. al., 2011). 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 curriculum selectivity, EBacc, 'facilitating subjects', STEM subjects and Applied GCSEs. This paper makes a novel contribution in a number of ways. Firstly it examines the 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. Moreover previous literature which has focused on participation in the individual GCSEs rather than the combination of all subjects chosen in combination. 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.

Research Questions

We investigate the subjects chosen at GCSE by young people from different backgrounds. 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?

[1] 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.

3. What influence do schools have on subject choice?

We address each of the questions above using five curriculum outcomes: curriculum selectivity, facilitating subjects, EBacc, STEM and applied GCSEs.

Data and Methods

We use Next Steps (formerly the Longitudinal Study of Young People in England) which follows a cohort of children born in 1989/1990, resulting in seven waves of data. This cohort of young people can be linked with the National Pupil Database (NPD) which provides a census of children attending state schools in England.

Next Steps began in 2004 when the sample members were aged between 13 and 14. The timing of this cohort means that the young people were affected by New Labour education policy, which promoted diversity and flexibility in the 14-16 curriculum. Respondents were selected to be representative of young people in England using a stratified random sample, with disproportionate sampling for deprived schools. Schools were the primary sampling units, then children within schools. The two-stage sampling design that Next Steps uses presents a possible clustering effect due to between-school differences; therefore, all models are adjusted for school clusters 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, who have Key Stage 3 score data[2] and those for whom we have school characteristics[3]. This results in a sample size of 11,714.

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 selectivity of different subjects (Coe et al., 2008). In this paper, we examine whether the predictors of the curriculum studied vary substantially across these five curriculum classifications:

1. Curriculum selectivity based on average prior attainment
2. Facilitating subjects
3. English Baccalaureate
4. STEM subjects

[2] Key Stage Three scores are derived from a Standard Assessment Test (SAT) taken at age 14. This test was abolished in 2008. Students were tested on the core curriculum which includes English, Maths, Science, History, Geography etc. Independent schools do not routinely test students at age 14 which result in the Key Stage 3 test scores. Only 12% of the independent schools sample has Key Stage 3 scores. Therefore, we exclude these young people from the analysis in order to reduce the potential for bias.

[3] This figure does not include early entries.

5. Applied GCSEs

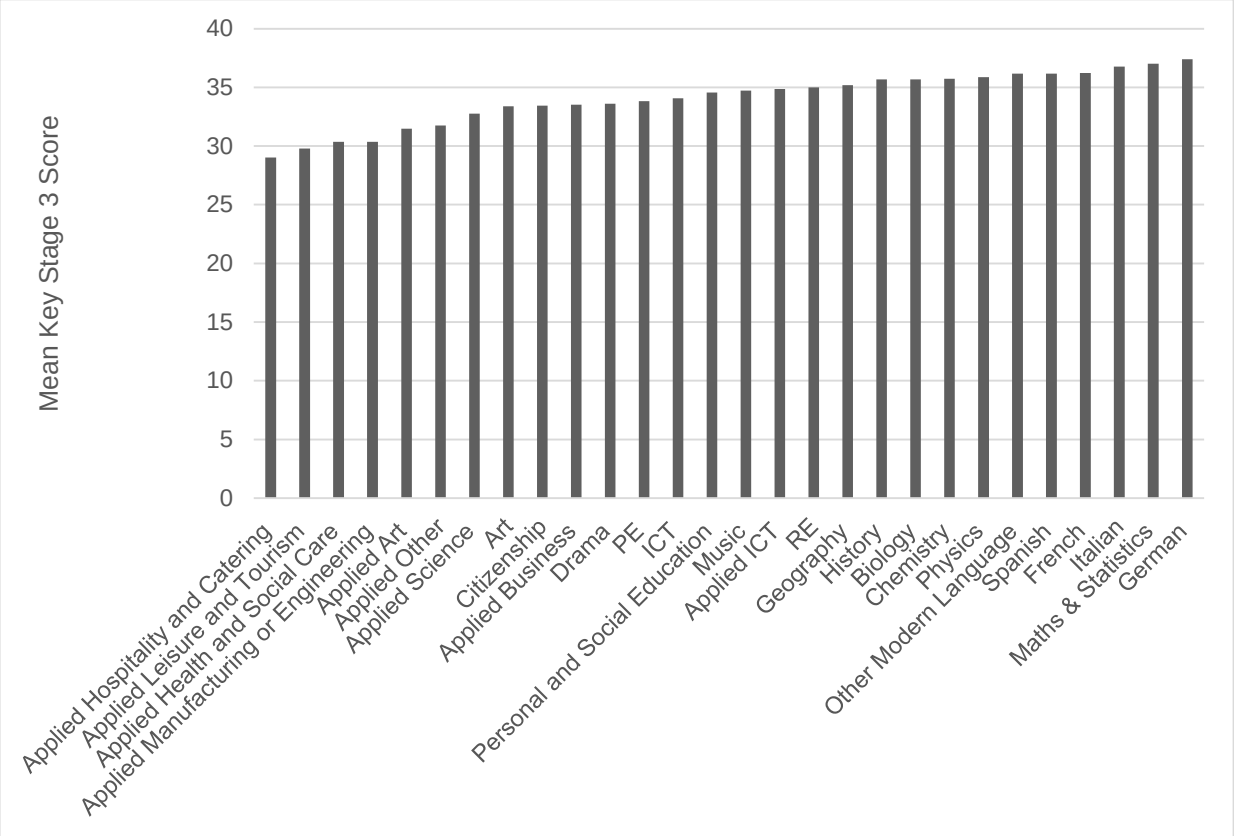
English and Maths were core compulsory subjects at the time the data was collected, therefore aside from the descriptive statistics, these are not included in the modelling strategy. We also do not include 'Other Language' in our analysis because it does not differentiate between languages such as Latin and minority home languages (e.g. Bangladeshi), which are likely to be taken by very different groups of young people. Such languages are also likely to be viewed differently depending upon the background of the individual, making their importance for future outcomes rather ambiguous.

To determine curriculum selectivity, we pursue a simple data-driven strategy, classifying subjects according to the average prior attainment of pupils taking each subject. Coe et al. (2008) adopted a similar approach, using the National Pupil Database 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 the remarkable consistency across methods, which included Aggregated Subject Pairs Analysis, Common Examiner Linear Models, Latent Trait Models, Reference Tests and 'Value Added' Models. Our approach is distinctive in that we are not attempting to assess the difficulty of subjects, but their level of academic selectivity, which is relatively straightforward to determine. Nevertheless, from an empirical point of view, our subject ranking is similar to Coe et al.'s (2008).[4] This is perhaps unsurprising, as the academic selectivity of a subject can reasonably be assumed to be strongly related to its *perceived* difficulty.

We compose the selectivity measure by taking an average of the prior attainment (at Key Stage 3) of students who select each GCSE subject.[5] The results are shown in Figure 1. We find that German is the most academically selective subject and Applied Hospitality and Catering is the least selective. Next we compose a measure of how selective the curriculum is for each young person in the sample. In order to do this, we total the mean scores for the eight most difficult subjects each student takes, so that a low score denotes a less-selective curriculum and a high score denotes a more-selective curriculum. Since this capped curriculum selectivity 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.

[4] Similar work on inter-subject comparability has been carried out by Ofqual (2015), who also report broadly similar findings to Coe et al. (2008).
[5] We make use of the weights from Wave 2 to account for initial oversampling and non-response between the first and second waves.

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: EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545) . The sciences are included separately in this chart.

For young people there are a number of sources of advice for choosing subjects for GCSE and A Levels.[6] In 2011 a collaboration between Russell Group universities[7] and The Institute of Career Guidance produced a guide which proves advice regarding the best subject combinations to enable young people to keep their options open or in relation to a specific university course. They cite their main aim as to provide all students, but particularly those from disadvantaged background, with the best information and guidance about their choices to maximise their opportunities and avoid disadvantaging themselves by choosing a combination of subjects which is inappropriate for further study. This guide is updated annually and the current advice relates to 'facilitating subjects' which they in the past called 'hard subjects'. The most recent version of Informed Choices (2014/15) notes that universities may ask for a specific number of GCSEs at a particular grade, for example for medicine universities often asked for five or more A* grades at GCSE. Most university courses require a C in English and Maths or equivalent at least (for science, engineering, business and

[6] The General Certificate (GCE) of Education Advanced Level (or more commonly A Level) are worked towards after the completion of GCSEs. The first part of the A Level is known as the Advanced Subsidiary (AS) Level. The second part is known as the A2 Level and combined they form the complete A Level.

[7] An elite group of 20 research universities in the United Kingdom. Today there are 24 institutions that are considered Russell Group universities.

psychology a B in GCSE English or Maths is needed). We create a binary variable which reflects a threshold of three or more facilitating subjects, including Biology, Chemistry, Physics, English, History, Modern languages, Geography and Maths. We select three as the threshold because the facilitating subjects mean is 2.8 and we are interested in young people who take more than the average number. 61% of the sample take three or more facilitating subjects including English and Maths.

We also examine whether there are systematic differences for English Baccalaureate (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 achieving 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 the five EBacc subjects or not. 27% of the sample select subjects 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). 62% of the sample take three or more STEM subjects.

Lastly we count the number of applied GCSEs selected by the young people. Applied GCSEs were introduced in the 2002 Education Act by the Blair government, as part of a broader policy to increase the diversity of the 14-19 curriculum. We find that 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.

Independent variables

We make use of the first four waves to capture the main independent variables, which are: social class,[8] parental education, equivalised permanent income,[9] housing tenure, ethnicity, gender, special educational needs (SEN), Key Stage 3 (KS3) scores and school characteristics. The school characteristics we examine in this

[8] 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.

[9] 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).

paper include grammar school status, proportion of young people who are eligible for free school meals in the school (FSM), average class size and whether the school was a single-sex school or not. We do not include measures to capture 'neighbourhood effects' as previous research has failed to show significant associations with educational and other outcomes, which Lupton (2003) attributes to difficulties in conceptualisation and measurement. Observations are included in the analytic models when the dependent variable response have no missing data. However, some independent variables also suffer from item non-response. 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 main advantages of this approach are avoiding the loss of statistical power due to reduced N and reducing bias.

Analytical strategy

We make use of logistic regression models when the outcome is binary and Ordinary Least Squares (OLS) regressions are used for the continuous selectivity measure. We acknowledge that our modelling strategy is vulnerable to omitted variable bias, since our independent variables of interest, such as parental socio-economic status, are likely to be correlated with many individual- and school-level factors affecting a student's ability, although we do try to minimise this issue through use of the rich background data (including prior attainment measures) available in Next Steps. Nevertheless, we do not view our results as truly causal, but rather capturing conditional relationships between background and subject choices. In addition, we account for the fact that observations are not truly independent from others attending the same school by calculating cluster-robust standard errors at school-level to conduct appropriate statistical inference. The frequencies for the variables are reported in Table 1.

Table 1. Frequency Table

	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

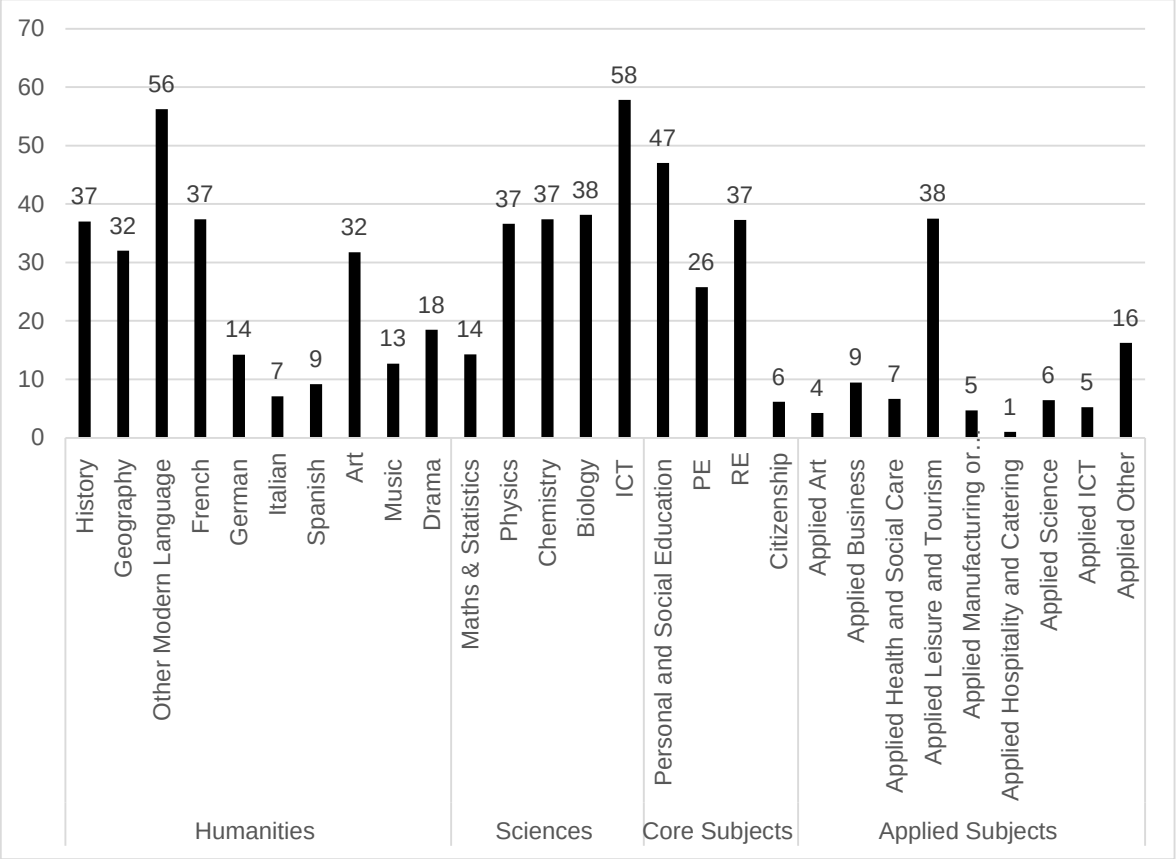
Source:EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545)

Results

Descriptive statistics

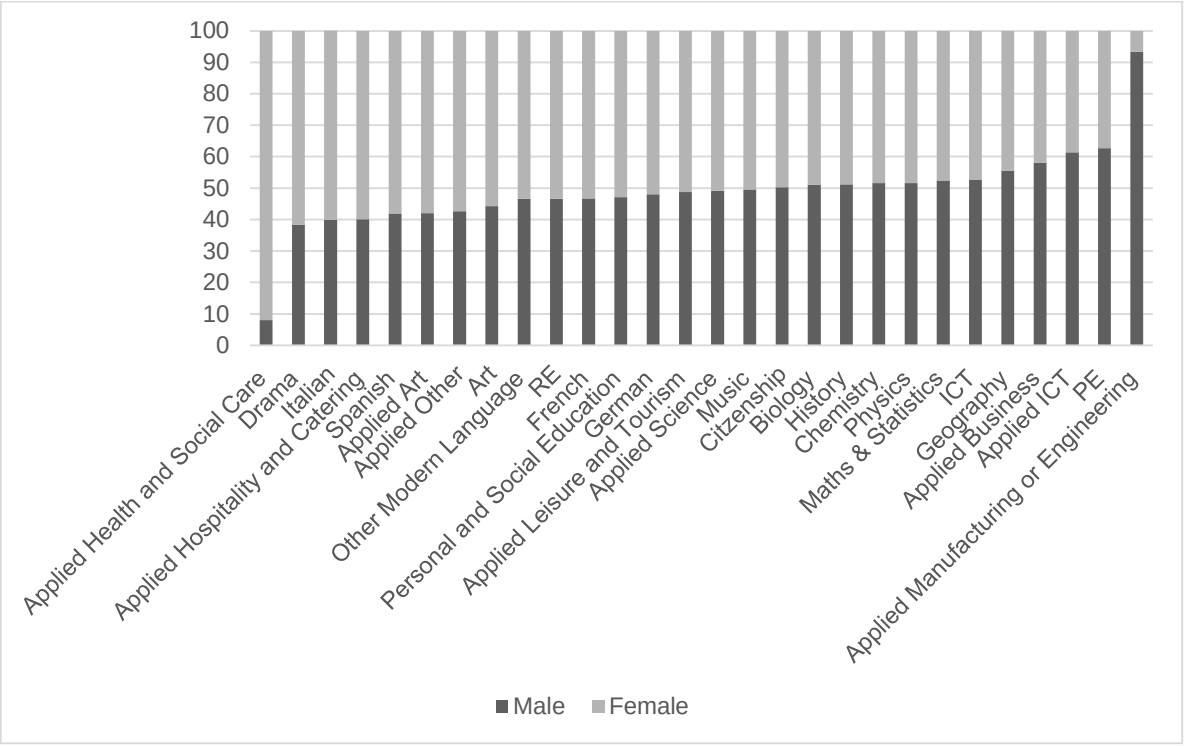
The first research question addresses the patterns of GCSE subjects taken according to social class, gender, ethnicity, parental education and income. Figure 2 shows the proportion of young people selecting particular GCSE subjects. The most popular GCSE selected is ICT (58%), followed by Modern Foreign Languages (56%). The least popular subject is Applied Hospitality and Catering (1%). Figure 3 shows the gender differences in subjects chosen at GCSE. 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 the relationship between subject choice and class background. 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, while young people from routine social class backgrounds are more often found in the applied subjects. A greater proportion of young people who are in the highest income quartiles do modern foreign languages, music and maths and statistics and a smaller proportion do applied subjects (Figure 5). As we might expect, the pattern is very similar for parental education as for income and social class (Figure 6). The story for subject choice by ethnicity shown in Figure 7 is not so clear. For example, there is no particular pattern evident in the subjects favoured by white students.

Figure 2. Proportion of Young People by GCSE Subjects Selected



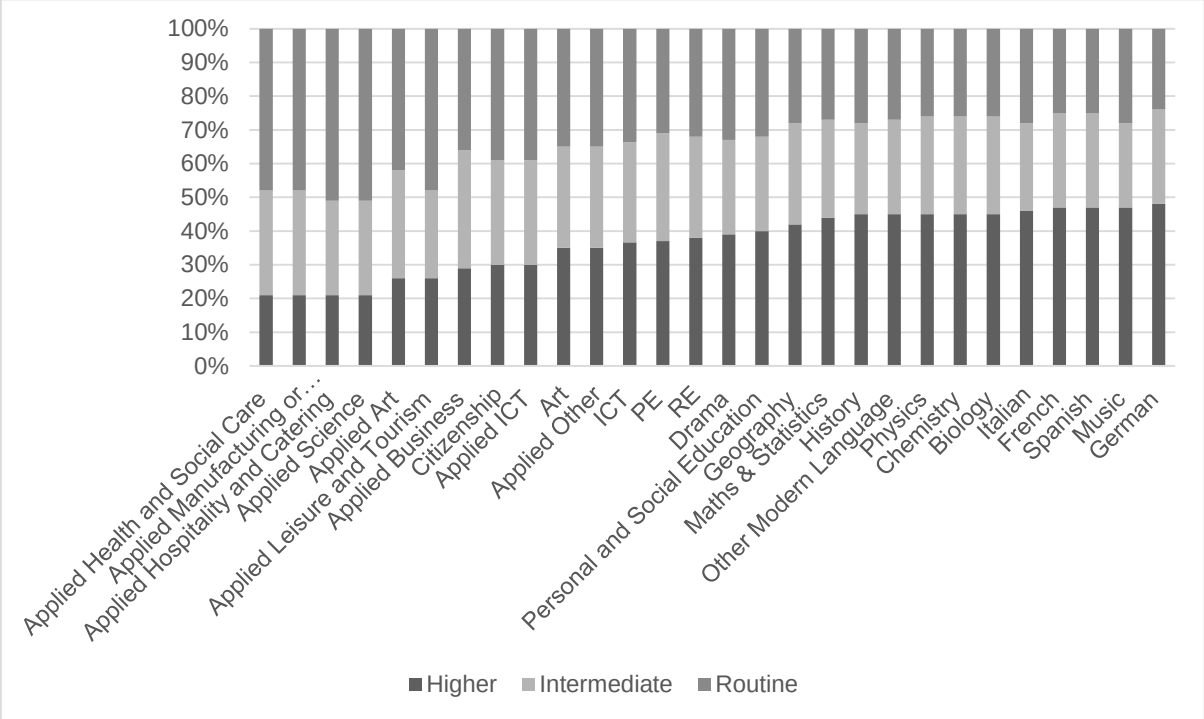
Source:EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545)

Figure 3. GCSE Subjects Selected by Gender



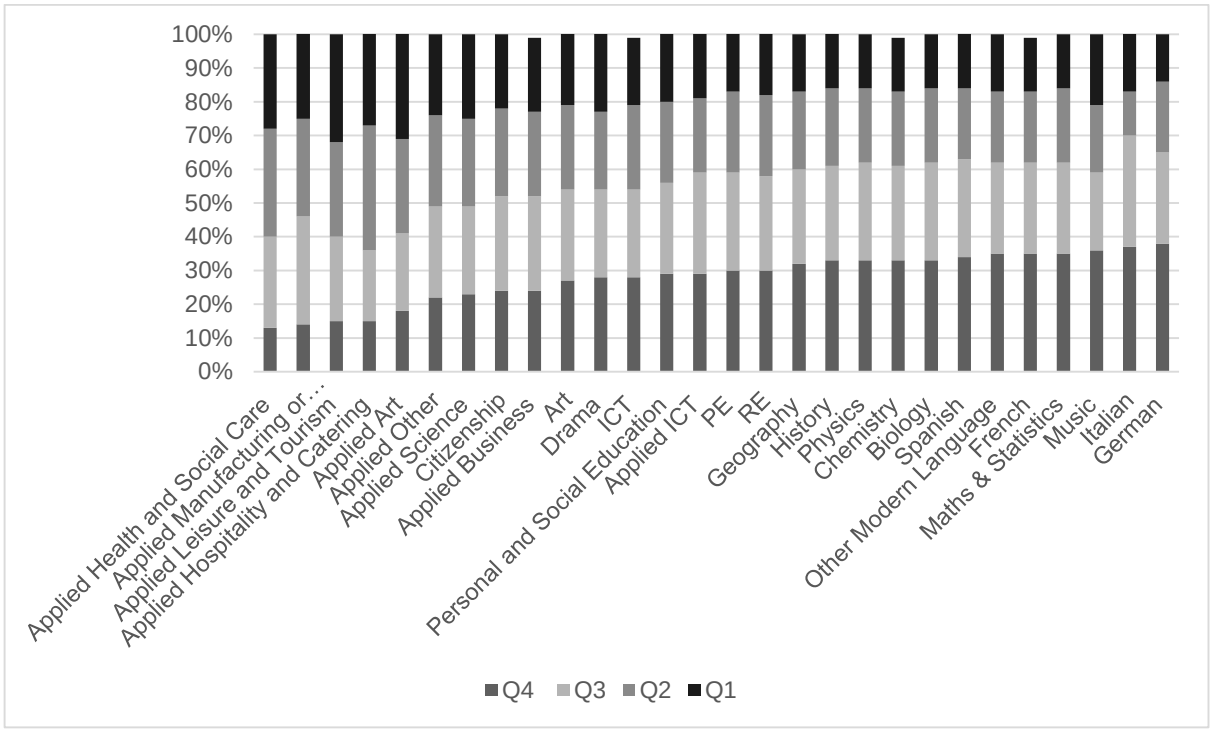
Source:EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545)

Figure 4. GCSE Subjects Selected by Social Class



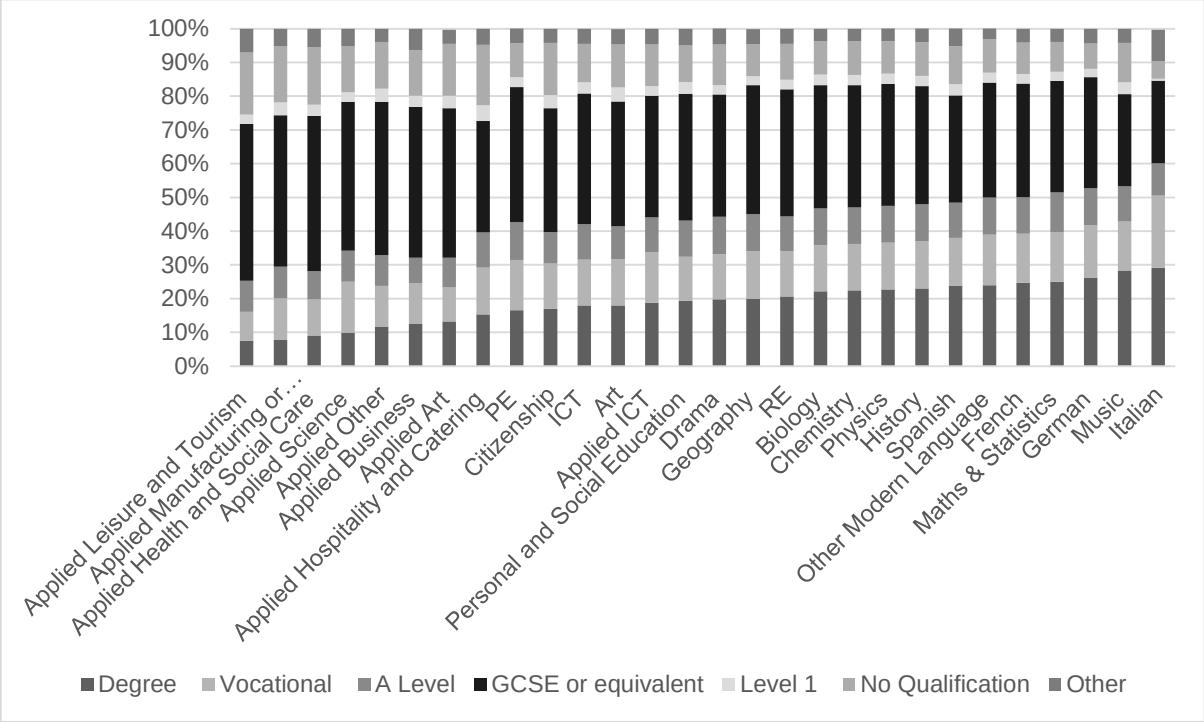
Source:EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545)

Figure 5. GCSE Subjects Selected by Income Quartiles



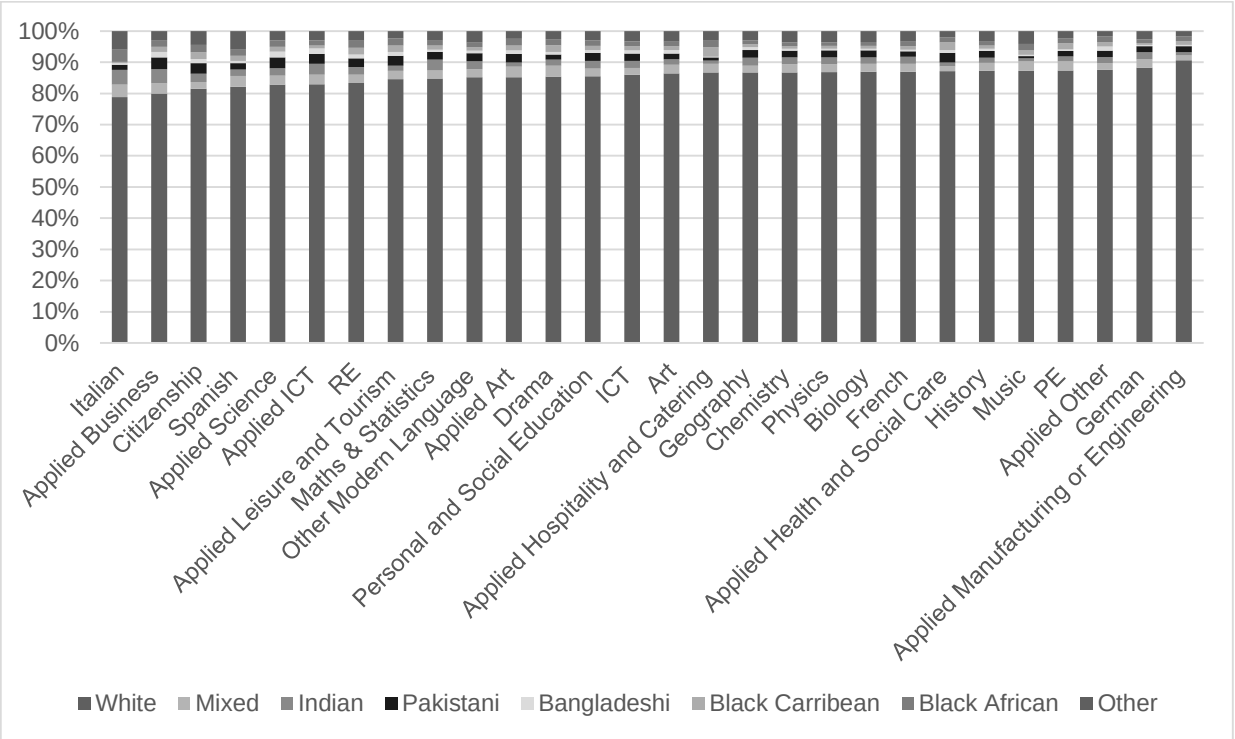
Source: First Longitudinal Study of Young People in England

Figure 6. GCSE Subjects Selected by Parental Education



Source:EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545)

Figure 7. GCSE Subjects Selected by Ethnicity



Source:EUL, First Longitudinal Study of Young People in England, Wave One to Seven, 2004-2010 (SN5545)

Curriculum selectivity

Table 2: OLS Regression Predicting Subject Selectivity

	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)
Observations	11,714	11,714	11,714
Log likelihood	-15953	-15418	-15286
DF	17	18	22
Pseudo R-squared	0.09	0.17	0.19

School-level cluster-robust SE reported in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Source: Secure Lab: First Longitudinal Study of Young People in England, Waves One to Seven, 2004-2010, Secure Access (SN7104).

Table 2 shows the results from the OLS regression predicting the selectivity of the GCSE curriculum studied. As noted above, the capped selectivity score has been standardised to have a standard deviation. As such, coefficients may be interpreted as the expected change in standard deviations of the selectivity score associated with a one unit change in the independent variable.

Model 1 shows the individual and familial characteristics, without controls for prior attainment or school attended. We find that students from wealthier backgrounds, and young people who have parents with higher levels of education study a more selective curriculum. Young people who live in rented accommodation also study less selective subjects then those who live in owner occupied or mortgaged property. There is also evidence that those from routine and intermediate backgrounds take a less selective curriculum than those from higher social class backgrounds. Girls study a more selective curriculum than boys, and young people with special educational needs take less-selective subjects. The only ethnicity coefficients which yield significant results are the Bangladeshi and other ethnic groups, Bangladeshi pupils take less-selective subjects and 'other' pupils take more selective subjects.

In Model 2, prior attainment at Key Stage 3 is introduced. Unsurprisingly, prior attainment is positively and significantly associated with the selectivity of subjects selected. 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.

Once school characteristics are included in Model 3, the results do not change substantively, the class, parental education, income, gender and ability coefficients remain statistically significant. However, housing tenure is no longer significant and the ethnicity coefficients change. We see that black African young people take more-selective subjects, once school characteristics are controlled for. Some of the school variables are also of interest, in particular we find that young people who attend grammar schools take a more selective curriculum, so too do those who attend a

single-sex schools. Larger class size is associated with a decrease in the selectivity of the curricula, as is a higher proportion of free-school meal eligible students in the school.

Table 3: Logistic Regression Predicting Three or More Facilitating Subjects

	Model 1		Model 2		Model 3	
	OR	SE	OR	SE	OR	SE
Ref. Higher Managerial						
Intermediate	0.98	(0.06)	1.05	(0.07)	1.04	(0.07)
Routine	0.83**	(0.06)	0.98	(0.07)	1.00	(0.07)
Ref. Degree or Higher						
Other HE qualification	0.69***	(0.06)	0.84*	(0.07)	0.84*	(0.07)
A Level	0.69***	(0.06)	0.85+	(0.07)	0.84+	(0.07)
GCSE A-C	0.51***	(0.04)	0.73***	(0.05)	0.74***	(0.06)
GCSE D-G and below	0.48***	(0.04)	0.77**	(0.06)	0.80*	(0.07)
Income (per £10,000)	1.20***	(0.04)	1.12***	(0.03)	1.08**	(0.03)
Ref. Owns Property Outright/Mortgage						
Rent/Other	0.77***	(0.04)	0.92+	(0.05)	0.95	(0.05)
Ref. White						
Mixed	0.80*	(0.08)	0.79*	(0.08)	0.83+	(0.09)
Indian	1.46**	(0.18)	1.38*	(0.18)	1.48**	(0.20)
Pakistani	1.18	(0.14)	1.55***	(0.18)	1.83***	(0.23)
Bangladeshi	1.17	(0.15)	1.18	(0.15)	1.57**	(0.23)
Black Caribbean	0.73*	(0.09)	0.93	(0.12)	1.04	(0.14)
Black African	1.13	(0.15)	1.47**	(0.20)	1.68***	(0.24)
Other	1.31*	(0.15)	1.27*	(0.15)	1.39**	(0.17)
Ref. Male						
Female	0.99	(0.04)	0.93	(0.04)	0.93+	(0.04)
Special Education Needs	0.35***	(0.03)	0.87	(0.08)	0.83*	(0.08)
Key Stage 3			1.14***	(0.01)	1.13***	(0.01)
Ref. State school						
Grammar School					1.40+	(0.27)
% FSM in school (SD)					0.82***	(0.03)
Average Class Size					0.99	(0.04)
Ref. Co-ed						
Single-sex school					1.18	(0.12)
Observations	11,714		11,714		11,714	

Log likelihood	-7733	-6761	-6728
DF	17	18	22
Pseudo R-squared	0.06	0.13	0.14

School-level cluster-robust SE reported in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Source: Secure Lab: First Longitudinal Study of Young People in England, Waves One to Seven, 2004-2010, Secure Access (SN7104).

Facilitating Subjects

Table 3 shows the results predicting taking three or more facilitating subjects. Odds ratios are presented to identify the relative importance of exposure to various predictors. An odds ratio of one means that the exposure to a given predictor does not affect the outcome; an odds ratio of greater than one means higher odds of the outcome, while an odds ratio of less than one means lower odds of an outcome. Model 1 shows that equivalised household income is positively associated with taking three or more facilitating subjects, there is also evidence from this model that young people from lower social class backgrounds have lower odds, so too do young people whose parents have lower levels of education. Living in rented accommodation is associated with lower odds of taking facilitating subjects. With respect to ethnicity, there is some variation, namely that mixed race young people and black Caribbean young people have lower odds, while Indian and 'other' young people have higher odds of taking facilitating subjects.

Model 2 shows that prior attainment is positively associated with taking three or more facilitating subjects and accounting for this renders the social class difference non-significant, but significant differences remain according to parental education, income and ethnic group. The inclusion of prior attainment renders the coefficient for black Caribbean insignificant and the Pakistani and Black African groups positively associated and significant. When school characteristics are included in Model 3, some of the results change further, for example Bangladeshi young people are significantly more likely than whites to take three or more facilitating subjects. Income and prior attainment remain significant predictors for taking three or more facilitating subjects, controlling for school characteristics. Attending a grammar school is weakly associated with an increase in odds of doing three or more facilitating subjects, while single-sex schooling is not significantly different from co-educational schooling.[10] As the proportion of FSM eligible students in the school increases, the odds of doing three or more facilitating subjects decreases. There is no significant effect found for average class sizes.

[10] Interactions between single sex school and gender do not yield significant results.

EBacc

Table 4: Logistic Regression Predicting Ebacc-eligible subjects

	Model 1		Model 2		Model 3	
	OR	SE	OR	SE	OR	SE
Ref. Higher Managerial						
Intermediate	1.00	(0.08)	1.09	(0.09)	1.05	(0.09)
Routine	0.98	(0.08)	1.17+	(0.10)	1.22*	(0.11)
Ref. Degree or Higher						
Other HE qualification	0.67***	(0.07)	0.87	(0.09)	0.87	(0.09)
A Level	0.75**	(0.08)	0.99	(0.10)	1.00	(0.11)
GCSE A-C	0.47***	(0.05)	0.74***	(0.07)	0.75**	(0.07)
GCSE D-G and below	0.51***	(0.06)	0.86	(0.09)	0.93	(0.10)
Income (per £10,000)	1.31***	(0.05)	1.20***	(0.04)	1.16***	(0.04)
Ref. Owns Property Outright/Mortgage						
Rent/Other	0.60***	(0.05)	0.75***	(0.06)	0.81**	(0.06)
Ref. White						
Mixed	0.99	(0.13)	1.02	(0.14)	1.06	(0.15)
Indian	0.96	(0.15)	0.88	(0.13)	0.92	(0.15)
Pakistani	1.12	(0.18)	1.49*	(0.24)	1.85***	(0.32)
Bangladeshi	0.54*	(0.15)	0.53*	(0.15)	0.84	(0.25)
Black Caribbean	0.60*	(0.12)	0.82	(0.17)	0.90	(0.18)
Black African	0.90	(0.18)	1.16	(0.23)	1.32	(0.27)
Other	1.35+	(0.24)	1.27	(0.22)	1.38+	(0.24)
Ref. Male						
Female	0.93	(0.08)	0.89	(0.07)	0.94	(0.06)
Special Education Needs	0.35***	(0.06)	0.78	(0.14)	0.70*	(0.13)
Key Stage 3			1.16***	(0.01)	1.12***	(0.01)
Ref. State school						
Grammar School					2.47***	(0.44)
% FSM in school (SD)					0.68***	(0.05)
Average Class Size					0.88*	(0.06)
Ref. Co-ed						
Single-sex school					1.34*	(0.19)
Observations	11,714		11,714		11,714	
Log likelihood	-4231		-3928		-3810	
DF	17		18		22	

Pseudo R-squared	0.07	0.14	0.16

Robust standard error in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Source: Secure Lab: First Longitudinal Study of Young People in England, Waves One to Seven, 2004-2010, Secure Access (SN7104).

Table 4 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-eligble subjects. Black Caribbean and Bangladeshi young people have lower odds of taking the EBacc while 'other' have higher odds compared to white pupils. There is no significant gender difference found and having special education needs lowers the odds of taking EBacc-eligible subjects before controlling for prior attainment and school characteristics..

Once prior attainment at key stage 3 is controlled in Model 2 income and housing tenure remain significant, however the relationship between parental education and EBacc participation weakens. 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, the odds remain significant and lower for Bangladeshi young people, but are no longer significant for Black Caribbean young people. Unsurprisingly there is a strong and positive relationship between prior attainment and choosing EBacc-eligible subjects.

Once school characteristics are controlled in Model 3, income, parental education, housing tenure and prior ability coefficients do not change compared with Model 2. The Pakistani advantage is increased once school type is included. Attending a grammar school or a single-sex school increases the odds of taking the EBacc. Moreover we find that as the proportion of FSM-eligible students in the school increases, the odds of doing EBacc-eligible subjects declines and that as the average class size increases, the odds of doing EBacc-eligible subjects also declines.

STEM

Table 5: Logistic Regression Predicting Three or More STEM subjects

	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)
Observations	11,714		11,714		11,714	
Log likelihood	-7200		-7070		-7028	
DF	17		18		22	
Pseudo R-squared	0.02		0.04		0.05	

School-level cluster-robust SE reported in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Source: Secure Lab: First Longitudinal Study of Young People in England, Waves One to Seven, 2004-2010, Secure Access (SN7104).

Table 5 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 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.

Applied GCSEs

Table 6: Logistic Regression Predicting One or More Applied GCSEs

	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)
Observations	11,714		11,714		11,714	
Log likelihood	-7888		-7713		-7654	
DF	17		18		22	
Pseudo R-squared	0.03		0.05		0.06	

School-level cluster-robust SE reported in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Source: Secure Lab: First Longitudinal Study of Young People in England, Waves One to Seven, 2004-2010, Secure Access (SN7104).

Table 6 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 highest 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 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 significant variables from Model 1 change once prior attainment is taken into account, except that the apparent influence of parental education reduces slightly and special educational needs become associated with lower odds of taking one or more applied GCSEs.

Once school characteristics are included in Model 3 the variables do not change substantively. 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.

Discussion and Conclusion

There are some common predictive factors across the outcomes we have looked at. As expected, prior attainment is consistently positively associated with taking selective subjects, facilitating subjects, STEM subjects and EBacc-eligble subjects, while it is negatively associated with taking applied GCSEs. This confirms that primary effects, in the form of prior attainment, are an important predictor for all of our metrics for subject choice at age 14 in England and may indicate that high achieving students are directed towards particular subjects. However, important secondary effects according to parental socio-economic background remain once these are held constant. The secondary effects are greatest in the case of subject selectivity, and weakest in the case of STEM. The presence of strong secondary effects of stratification for subject selectivity, facilitating 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. For example, ethnic minority pupils are, broadly speaking, advantaged in terms of facilitating subjects, but there is no such clear pattern for subject selectivity or for Ebacc-eligible subjects. 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 or facilitating subjects.[11]

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-eligble subjects, STEM and facilitating subjects (although for STEM and facilitating subjects the results are not 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 doing a more selective curriculum and EBacc-eligible subjects. We find that the proportion of free school meal 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. In summary, we found that even after controlling for prior attainment and school difference, young people from advantaged households take more selective subjects, have higher odds of doing three or more facilitating subjects and EBacc-eligible subjects and lower odds of taking Applied GCSEs than less advantaged young people. This is likely to be partly a result of

[11] We found little evidence of systematic interactions between gender, ethnicity and socio-economic status in determining curriculum outcomes (results not shown).

direct forms of support from parents with higher socio-economic status which leads to difference in subject choice, but we also found evidence to support an indirect effect via school differences. We found that there were important differences by school characteristics, which may be a result of differential opportunities, subjects offered and within school policies. In future research, we will take advantage of linked administrative datasets to examine whether schools systematically direct students to do particular subjects, offer compulsory courses beyond English and Maths and what the returns are to selection of particular GCSE subjects.

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