Department for
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Skills

Use of an Aptitude Test in University Entrance

A Validity Study

2008 Update: Further Analyses of SAT® Data

Catherine Kirkup, Rebecca Wheater, Ian Schagen,
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Table of contents

Tables

Appendix

Figures

1 Executive summary

1.1 Introduction

This is the second major report of a five-year research study to examine the validity of an aptitude test in higher education admissions. The study is co-funded by the National Foundation for Educational Research (NFER), the Department for Innovation, Universities and Skills (DIUS), the Sutton Trust and the College Board. The first stages of the study are described in Kirkup *et al.* (2007).

Until degree outcomes for students in the sample become available in 2010, it will not be possible to answer the main research questions (see section 2, page 5). In the early phases of the research, the analysis is therefore focussed on the relationships between SAT® scores, A levels, prior attainment at age 16 and background characteristics of the student sample.

This report examines the higher education (HE)[1] destinations of students in the sample and presents further analyses of the SAT® data, looking at the relationships between SAT® scores and attainment in particular A level subjects. It also reports on more complex modelling of the background data to answer the following question: can the SAT® identify economically or educationally disadvantaged students, with the potential to benefit from higher education, whose ability is not adequately reflected in their A level results?

1.2 Key findings

Relationships between the SAT® and specific A level subjects

- The relationships of the SAT® components to A level subjects are not all the same. SAT® Maths is more strongly related to A level grades in predominately science based subjects whereas Critical Reading and Writing are most closely related to subjects such as History and English A levels.

- The mean SAT® scores associated with particular grades of A levels can be at different levels for different subjects. (For example, the mean SAT® Maths score of students obtaining an A or B grade in Physics is over 600, whereas for Geography it is around 500.) This could be seen as reflecting a difference in the difficulty of different A level subjects.

- Students studying A level mathematics achieved significantly higher SAT® Maths scores compared with those students not studying A level mathematics. This increase was similar for male and female students. The increase in SAT® Critical Reading and Writing scores for students studying English at A level (compared to those not taking English) was somewhat greater for male students than for female students.

- Over a number of different subject areas, male students tended to achieve higher SAT® scores than female students with the same grade in the same A level subject. There is some evidence that differences between male and female scores on the SAT® are related to test-taking strategies, particularly differences in omission rates on SAT® items.

The findings published in 2007 showed that the SAT® might prove useful in differentiating between the most able A level pupils. These further interim findings seem to suggest that the

[1] Higher education qualifications are offered in a number of different places, e.g. universities, other higher education institutions (HEIs) and some further education colleges. For simplicity in this report we use HE to refer to any educational institution offering higher education qualifications.

utility of the SAT® may differ as a predictor of degree outcomes depending on the sex of the student, the subjects taken at A level and the degree subjects studied. These relationships will need further individual exploration when the degree outcome data is available in 2010.

Relationships between the SAT® and background characteristics

Two measures of affluence/deprivation were used: one (IDACI - Income Deprivation Affecting Children Index) was from the Pupil Level Annual School Census (PLASC), and the other was based on students' questionnaire responses.

- If prior attainment at GCSE is not taken into account, students from schools with a higher IDACI index (i.e. from areas of low income households) do less well on the SAT® than students from less deprived areas with similar A level attainment. However, if prior attainment is included, students with similar A level and GCSE points perform similarly on the SAT® irrespective of household income.

- Using the affluence measure derived from the survey response, SAT® scores tended to be higher for more affluent students (compared to less affluent students with similar A level attainment). Scores were significantly higher on two components (Critical Reading and Writing) when prior attainment (average GCSE score) was taken into account.

Destinations

- There was a good match between students' declared HE intentions in the autumn 2006 questionnaire and their subsequent enrolment: 96 per cent of those saying they were about to start an HE course appear in the Higher Education Statistics Agency (HESA) / Individualised Learner Record (ILR) 2006 dataset.

- Based on the current figures, the number of students in the main sample likely to graduate in 2009 is estimated to be around 3400, with approximately 2400 further students completing their degrees in 2010.

Relationships between destinations and background characteristics were also explored. However, these findings may be confounded by the gap year phenomenon and may need to be updated in 2009 when 2007 HE entry data becomes available.

- Girls were more likely to have started an HE course in 2006 than boys with similar attainment and Asian and Black students were more likely to be in HE than equivalent white students.

- Girls were less likely to be on courses with high entry point requirements[2] than similarly attaining boys. For students of similar attainment, the other factors positively related to achieving places on courses with high entry points were being Asian or mixed ethnicity, learning English as an additional language (EAL) and attending an independent school.

- IDACI (available only for students in the maintained sector) was not significantly related to the entry points requirements of students' HE courses, implying that students from more deprived areas on average are just as likely to be studying at more prestigious institutions (or on courses for which there is fierce competition), conditional on their actual attainment. However, the analysis using the survey affluence measure (based on responses from students from both the maintained and non-maintained sectors) indicated

[2] Entry point requirements were obtained by matching all courses on which students in the sample were registered to the minimum UCAS tariff for the year of entry, i.e. the basis on which students would have submitted their applications.

that more affluent students were more likely to be studying on courses with high entry point requirements.

- The overall GCSE performance of schools was positively related to the entry points of students' HE courses; students from higher-performing schools are more likely to achieve places on courses with high entry requirements than students from lower-performing schools. However, there was a negative interaction between school level performance at GCSE (the school GCSE band) and SAT® scores. This means that for two students with similar attainment in schools within the same GCSE band, the student with the higher SAT® scores is more likely to have achieved a place on a course with a higher entry point requirement than a student with similar attainment but a lower SAT® score. The difference in course entry points will be greater for students in low-performing schools compared to students with the same difference in SAT® scores in high-performing schools. If such students do well at HE, this may indicate that the SAT® score might provide some useful information in differentiating between candidates within the admissions process - see section 5, page 46 for further discussion.

Although, it is likely that the predictive power of A levels and SAT® may be greater than A levels alone, there is limited evidence at this stage to suggest that the SAT® will be useful in identifying economically or educationally disadvantaged students with the potential to benefit from higher education. However, a definitive answer to these questions will not be possible until the degree results of students in the sample are collected and further analyses are carried out.

1.3 Structure of the report

Section 2 gives a very brief summary of the aims and objectives of the research and the representation and background characteristics of the student sample. Section 3 describes the relationships between the SAT® and subject attainment at A level and GCSE are explored and section 4 presents the findings from the more complex modelling of the background data, using more sensitive measures of economic and educational disadvantage. The destinations of the students are described in section 5, including the relationships between HE and the measures of disadvantage outlined in section 4. Future phases of the study are outlined in the final section.

2 Introduction

The primary aim of the study is to examine whether the addition of the SAT Reasoning Test™ alongside A levels is better able to predict HE participation and outcomes. Two specific issues are also to be addressed, namely:

- Can the SAT® identify students with the potential to benefit from higher education whose ability is not adequately reflected in their A level results because of their (economically or educationally) disadvantaged circumstances?

- Can the SAT® distinguish helpfully between the most able applicants who get straight As at A level?

For the full background to this study, details of the methodology employed in earlier parts of the research and key findings from the initial analyses of the student data please see the report published in Spring 2007 (Kirkup *et al.*, 2007).

In the 2007 report the analysis of the attainment data focused on the broad relationships between SAT® scores and total scores at A level and GCSE. These analyses showed that there were wide variations in SAT® scores amongst high-ability students with two or three A grades at A level, particularly in the Critical Reading and Maths scores. In the earlier analyses, the study also looked at the potential of the SAT® to identify disadvantaged students whose ability is not adequately reflected in their A level results. These analyses were inconclusive because the measure of disadvantage being used, the eligibility for free school meals (FSM) indicator, was missing for a large proportion of the sample.

Following publication of the 2007 report further analyses of the student data have been carried out, focussing on three issues:

- further exploration of the relationships between SAT® scores and attainment in particular individual A level subjects

- analysis of destination data, using both Universities and Colleges Admissions Service (UCAS) data and HESA/ILR data

- more complex modelling of the background data of students to create more sensitive measures of economic and educational disadvantage.

This report examines the findings from these analyses. In the following sections the main features of the SAT®, a brief description of the sample and details of the data matching process are repeated in order to provide sufficient context relevant to an understanding of the analyses described within this report. For fuller details please see the 2007 report cited above.

2.1 The SAT Reasoning Test™

The principal previous study underpinning this current research is the pilot comparison of A levels with SAT® scores conducted by NFER for The Sutton Trust in 2000 (McDonald *et al.*, 2001a). For a detailed discussion of aptitude testing for university entrance see also the literature review conducted by McDonald *et al.* for the Sutton Trust (2001b).

The SAT Reasoning Test™ was revised most recently in 2005 and now comprises three main components: Critical Reading, Mathematics and Writing. The Critical Reading section of the SAT® contains two types of multiple-choice items: sentence completion questions and passage-based reading questions. The Mathematics section contains predominantly multiple-choice items but also a small number of student-produced response questions that offer no answer choices. Four areas of mathematics content are covered: number and operations; algebra and functions; geometry and measurement; and data analysis, statistics and probability. The new Writing section (first administered in the US in 2005) includes multiple-choice items addressing the mechanical aspects of writing (e.g. recognising errors in sentence structure and grammar) and a 25 minute essay on an assigned topic.

2.2 Student sample

All schools and colleges in England with students taking two or more A levels were invited to participate in the study. For reasons of economy, A level students were chosen as the population that would be most likely to be affected should a test such as the SAT® ever be introduced (although inevitably this means that students following other routes into HE are excluded from the study). In January 2007 the data for 9011 students who had taken the SAT® in autumn 2005 and agreed to take part in the study was matched with the 2005/06 National Pupil Database supplied by the DfES[3]. The dataset included A level data, GCSE prior attainment data and, for any student educated within the maintained sector, Pupil Level Annual School Census (PLASC) data. The number of students with valid data on all three main variables (SAT® scores, A levels and GCSEs) was 8041, thereafter referred to as the 'main sample'. The 'national population' was derived from the same National Pupil Dataset by extracting those students taking two or more GCE A levels. Background characteristics of the sample are shown in Table 2.1. These details were obtained by combining information from the PLASC data for students from maintained schools with information supplied by individual FE colleges and independent schools.

[3] The DfES was replaced in June 2007 by the Department for Children, Schools and Families (DCSF) and the Department for Innovation, Universities and Skills (DIUS).

Table 2.1: Background characteristics of the sample

		Main sample		National population*	
		N	Valid per cent	N	Valid per cent
Sex	Male	3692	45.9	98625	45.6
	Female	4349	54.1	117718	54.4
Ethnicity	Asian or Asian British	670	9.1	7799	6.9
	Black or Black British	117	1.6	2243	2.0
	Chinese	116	1.6	996	0.9
	Mixed	145	2.0	1392	1.2
	White	6212	84.4	93732	83.2
	Other	104	1.4	6499	5.8
	Missing	677	-	103682	-
SEN	No provision	7437	97.3	114818	97.9
	School Action (A)	137	1.8	1632	1.4
	School Action Plus (P)	35	0.5	474	0.4
	Statement of SEN (S)	32	0.4	384	0.3
	Missing	400	-	99035	-
FSM eligibility	No	5953	96.1	114058	97.2
	Yes	243	3.9	3250	2.8
	Missing	1845	-	99035	-
Type of institution	Comprehensive	4200	52.2	99280	45.9
	Grammar	1701	21.2	19790	9.1
	Independent	1800	22.4	32544	15.0
	FE college	340	4.2	64729	29.9
Total		8041	100	216343	100

Candidates entered for 2+ GCE A levels in 2005/06 (source: DfES)
Valid percentages exclude missing data. Due to rounding, percentages may not sum to 100.

For a small number of students in the sample, and for a considerable numbers of students in the national sample, information on ethnicity, special education needs and eligibility for free school meals was missing. In the national figures the missing data mainly comprised students from FE colleges and the independent sector. Comparing those for whom information was available, there were slightly more Asian and Chinese students in the sample compared to the national population of A level students and slightly fewer Black students. The figures for students with special educational needs and those eligible for free school meals may be somewhat distorted due to the large numbers of students in the national sample for whom data was missing.

Approximately three per cent of the sample were known to be eligible for free school meals and between two and three per cent were known to be on the register of special educational needs. The figures for these categories are slightly higher in the table where missing data has been excluded in order to enable comparisons with the national data.

With regard to the different types of educational institutions, independent schools and grammar schools were over-represented in the sample whilst FE colleges were substantially under-represented.

2.3 Student surveys

In March 2006, students who had taken the SAT® and had agreed to participate in the study were sent a questionnaire via their school or college. The questionnaire asked them to provide some background details about their home and family circumstances and asked about their post-16 experiences of school or college, their immediate plans after A levels and their views of higher education.

At the beginning of September 2006 a second questionnaire was sent to 8814 students (excluding withdrawals) who had supplied a home address for future contact. The autumn survey provided information on their post A level destinations.

The numbers of responses to the spring and autumn surveys used in the survey analyses were 6825 and 3177 respectively. Of the main sample of 8041 students with data on the three main study variables, 77 per cent responded to the spring survey, 40 per cent to the autumn survey and 34 per cent (2750 students) to both surveys.

Full details of the survey samples, the findings and copies of the questionnaires annotated with students' responses are given in the spring 2007 report.

Some of the details supplied by sub-samples of pupils in these two surveys have contributed to one of the measures of disadvantage used in the analyses reported in sections 4 and 5.

3 Relationships between SAT® scores and attainment

This section briefly summarises the findings from the 2007 Spring report (Kirkup *et al.*, 2007) and explores in more detail the relationships between SAT® scores and attainment of students grouped by subjects studied at A level.

For the initial analysis carried out for the Spring report 2007, the main study variables for each participant were: their total A level score, their total GCSE score and their SAT® scores for Critical Reading, Mathematics and Writing. A description of each of these variables is given at the beginning of the relevant section below.

3.1 Descriptive statistics

3.1.1 Attainment data

Attainment data for students in the sample was taken from a dataset supplied to the NFER by the DCSF. The A level score used in the analyses was the total QCA point score for all Level 3 qualifications approved as A level equivalences. For prior attainment the GCSE variables used in the analyses were the total KS4 point score and the average KS4 point score. Again the GCSE point scores are based on the QCA system. Further details of the scoring systems for both KS4 and KS5 qualifications can be found on the Department for Children, Schools and Families (DCSF) website (DCSF, 2006).

Table 3.1 shows the sample and national means for the key attainment measures; score distributions can be found in the previous report (Kirkup *et al.*, 2007).

Table 3.1: Mean attainment scores - main sample

	main sample (n = 8041)		**national population*** (max n = 216343)	
	mean	**s.d.**	**mean**	**s.d.**
Total A level (or L3 equivalent) point score	***848.6***	260.4	***808.4***	235.8
Total GCSE point score	***489.9***	80.1	***469.0***	107.6
Average GCSE point score	***47.4***	6.0	***46.4***	5.5

Values significantly different at the 5 per cent level are shown bold and in italics.
** 2005/06 GCE A level entrants taking 2+ A levels from the dataset supplied by DfES*

To summarise the findings from 2007:

- the main sample spans a wide range of A level ability but with a score distribution slightly skewed towards the upper range compared to the national population of A level entrants taking two or more GCE A levels (probably because of the number of students from grammar and independent schools).

- the prior attainment (i.e. GCSE) of the main sample was slightly higher than that of the national population. The differences in means of the sample and the population are statistically significant.

Although the distribution of the main sample is skewed towards the high end, it broadly covers the same range as the population containing sufficient cases from all areas of the population to enable reasonable conclusions to be drawn.

3.1.2 SAT® data

SAT® scores for the main three components (Critical Reading, Mathematics and Writing) are each reported on a scale from 200 to 800. The writing component consists of a multiple-choice writing section, which counts for approximately 70 per cent, and an essay, which counts for approximately 30 per cent of the total writing raw score. The US mean or average scaled score for Critical Reading, Maths, and Writing is usually about 500.

Table 3.2 shows the means obtained on each of the main components of the SAT®. For comparison purposes, the means and score distributions for over 1.4 million students in the US 2006 College-bound Seniors cohort are given (College Board, 2006).

Table 3.2: Mean SAT® scores - main sample and US 2006 cohort

SAT® component	main sample (n = 8041)		US 2006 cohort (n = 1465744)	
	mean	s.d.	mean	s.d.
Critical reading	500	115	503	113
Mathematics	500	116	518	115
Writing	505	88	497	109

As can be seen in the above table the means achieved by the English sample are roughly comparable with US means, averaged over a number of administrations throughout the year using different versions of the SAT®.

Descriptive statistics for the UK SAT® sample of 9022, analyses examining the functioning of the SAT® and further comparisons with the US students can be found in Kirkup *et al.* (2007). Overall these results indicated that the individual SAT® items functioned reasonably well and in a similar way for the English and US samples.

Table 3.3 gives a breakdown of the main study variables by gender. For breakdowns relating to other background variables see the 2007 report.

Table 3.3: Main study variables by gender

	Male	Female	Total
Number of cases	3692	4349	8041
% of cases	46%	54%	100%
Mean A level total score	***825.2***	***868.5***	***848.6***
Mean GCSE total score	***485.9***	***493.3***	***489.9***
Mean SAT® score	***505.3***	***498.4***	***501.6***
SAT® Critical reading	497.6	501.7	499.8
SAT® Mathematics	***523.3***	***480.3***	***500.0***
SAT® Writing	***494.9***	***513.3***	***504.8***

Values significantly different at the 5 per cent level are shown bold and in italics.

Female students had higher total GCSE and A level points scores and achieved significantly higher scores on the SAT® Writing component than male students. There was no significant difference in the scores for male and female students on the SAT® Critical reading component, but male students performed significantly better on the SAT® Mathematics component. The differences between male and female students on the various SAT® components are similar to recent results for students in the USA, where male students generally outperform female students in mathematics but do less well in writing (College Board, 2006).

Further analysis (Kirkup *et al.*, 2007) comparing the number of grades at A level and SAT® performance found that a higher proportion of male students compared to females were in the high SAT® performance categories, but achieved less than three A grades at A level. Conversely more females than males achieved three A grades and were in the bottom five per cent of SAT® scores. It is interesting to note that some male students did extremely well on what was for them a low-stakes test, even though they did not subsequently achieve three A grades at A level. Whether this is due to the content of the SAT® or the nature of the assessment (mainly multiple-choice) is not known. Whether the additional information offered by the SAT® would be useful to HE admissions staff will depend on whether the combination of these scores will better predict HE degree outcomes than A levels alone. The relationship between SAT® scores and degree outcomes will not be known until data for these students becomes available in 2010.

3.2 Exploring the relationships between the main study variables

Students were divided into equal groups based on their overall SAT® score and also their total A level score. Table 3.4 below shows a simple comparison of students' A level and SAT® performance.

Table 3.4: Crosstab of students' A level performance with SAT® performance

		Students grouped by overall SAT® score				
		Lowest	Mid-low	Middle	Mid-high	Highest
Students grouped by total A level score	Lowest	862 11%	465 6%	244 3%	89 1%	28 0%
	Mid-low	424 5%	447 6%	352 4%	216 3%	73 1%
	Middle	228 3%	385 5%	478 6%	387 5%	197 2%
	Mid-high	100 1%	215 3%	348 4%	480 6%	393 5%
	Highest	20 0%	77 1%	203 3%	425 5%	905 11%

It is evident that there is not a direct relationship between A level and SAT® performance.

Table 3.5 below displays the correlations[4] between the GCSE and A level scores and between GCSE and A level scores and each of the SAT® scores.

Table 3.5: Correlations between GCSE and A level scores and SAT®

	A level total score	GCSE total score	average GCSE score
Mean SAT® score	***0.64***	***0.54***	***0.70***
SAT® Critical reading	***0.55***	***0.46***	***0.59***
SAT® Mathematics	***0.54***	***0.48***	***0.60***
SAT® Writing	***0.57***	***0.48***	***0.64***
Writing: multiple-choice	***0.55***	***0.47***	***0.62***
Writing: essay	***0.32***	***0.25***	***0.34***
A level total score		***0.58***	***0.76***
GCSE total score			***0.70***

Correlations significantly different from zero at the 5 per cent level are shown bold and in italics.

In the above table it is clear that the correlation between total SAT® score and A level total score is somewhat higher than with GCSE total score, but that the highest correlation with total SAT® is average GCSE score. Correlations with the different components of the SAT® are similar, except for the essay element which has much lower correlations with GCSE and A level outcomes (probably at least partly because of the relatively restricted range of the essay score).

The correlation of total A level points with average GCSE score is higher than with the total GCSE score. It is likely that this is because the number of GCSEs entered can vary widely and does not always reflect the ability of the student whereas at A level there is far less variation in the number of A levels attempted.

The higher correlation between SAT® and average GCSE score than between SAT® and A level total score is in accordance with previous findings (McDonald *et al.*, 2001a). In the pilot SAT® study in 2000 the correlations between SAT® score and mean A level grade were 0.45 and 0.50 for high-achieving and low-achieving schools respectively. However, the SAT® as a whole has undergone some change since 2000, particularly the introduction of the writing components, and therefore one would expect a higher correlation between total SAT® scores and A levels than previously. Also there have been considerable changes to the A level system since the pilot; a greater number of subjects are now studied at A level and the structure of such courses is modular.

[4] Correlation: a measure of association between two measurements, e.g. between size of school and the mean number of GCSE passes obtained by each pupil. A positive correlation would occur if the number of passes increased with the size of the school. If the number of passes decreased with size of school there would be a negative correlation. Correlations range from -1 to +1 (perfect negative to perfect positive correlations); values close to zero indicate no linear association between the two measures.

The high correlations between SAT® scores and attainment at GCSE and A level are not unexpected given that each of these is measuring overall educational ability, albeit measuring different aspects and in different ways. Research generally shows similarly high correlations between different measures of educational ability. For example, Thomas & Mortimore (1996) found correlations of 0.72, 0.67 and 0.74 between Cognitive Abilities Test (CAT) scores in Year 7 and GCSE total points score, GCSE English grades and GCSE mathematics grades respectively. Correlations between measures of educational ability are also generally higher when such measures are administered in close proximity to one another, as is the case with the SAT® and the A level examinations.

The relationship between A levels and SAT® scores is complicated in that each of these measures is associated with prior attainment at GCSE. Controlling for average attainment at GCSE, the partial correlation between SAT® and A levels was 0.23. This suggests that, although SAT® and A levels are highly correlated, the underlying constructs that are being measured are somewhat different. This may indicate a potential for the SAT® to add to the prediction of HE outcomes from A levels, although the increment is likely to be relatively small. Whether this is indeed the case will not be known until such outcomes are available for students in the sample.

3.3 Relationships between SAT® scores and attainment in particular A level subjects

Further analyses were carried out examining performance on the SAT® by subgroups of students according to the subjects studied at A level. With the overall large sample size, the numbers of students taking specific subject A levels also remained substantial. This meant that it was possible to explore the relationships of the individual A level subject grades with the three SAT® measures. Any such analysis is actually collating data from several A level providers and rests on the assumption that the grades awarded are comparable and equated in terms of level. This assumption underpins the universities' use of grades and so is accepted here.

An initial examination of the relationships between the SAT® and the ten most popular A level subjects (those taken by large numbers of students as a full A level) was undertaken using a simple correlational approach. The result of this is shown in Table 3.6. Some aggregation of subjects is incorporated; in particular the three foreign language A levels of French, Spanish and German have been combined. This analysis showed that there is no one pattern of relationships between A levels and the SAT® scores. For several subjects, the Maths score of the SAT® has the strongest relationship with the A level outcome. These include Physics and Mathematics A levels especially and Biology and Chemistry to a lesser extent. In contrast, for other subjects the Writing element of SAT® has the strongest relationship. This includes the A levels of English Literature, English Language and History. For these subjects Critical Reading is also strongly related to the A level outcomes. For Geography, there is no real differentiation and all three SAT® scores are similarly related to A level outcome. The same is true of Psychology, which has the weakest relationship between SAT® scores and A level grades.

Table 3.6: Correlations between SAT® Scores and A Level grades[5] for specific subjects

A Level subjects			SAT® Scores		
		Cases	Maths	Critical Reading	Writing
Biology	All	1899	0.50	0.42	0.42
	Male	742	0.51	0.43	0.41
	Female	1157	0.52	0.41	0.42
Chemistry	All	1594	0.45	0.36	0.40
	Male	786	0.50	0.38	0.42
	Female	808	0.46	0.33	0.35
Physics	All	1191	0.57	0.42	0.43
	Male	864	0.59	0.41	0.42
	Female	327	0.58	0.42	0.42
Mathematics	All	2202	0.49	0.32	0.35
	Male	1295	0.52	0.33	0.33
	Female	907	0.50	0.31	0.36
Geography	All	1184	0.40	0.42	0.48
	Male	613	0.42	0.41	0.49
	Female	571	0.42	0.41	0.44
History	All	1526	0.42	0.50	0.57
	Male	719	0.48	0.48	0.54
	Female	807	0.40	0.51	0.57
Psychology	All	1290	0.31	0.33	0.40
	Male	359	0.36	0.27	0.35
	Female	931	0.33	0.37	0.41
English Language	All	915	0.35	0.50	0.50
	Male	306	0.34	0.44	0.41
	Female	609	0.38	0.54	0.55
English Literature	All	1730	0.47	0.58	0.62
	Male	536	0.45	0.54	0.58
	Female	1194	0.51	0.60	0.64
French, Spanish, German	All	1109	0.38	0.43	0.46
	Male	281	0.42	0.34	0.41
	Female	828	0.39	0.46	0.47
General Studies	All	2693	0.44	0.58	0.58
	Male	1341	0.42	0.54	0.55
	Female	1352	0.51	0.63	0.61

[5] using a scale from 0-5, from ungraded = 0 to grade A = 5.

Table 3.6 shows for each subject the sample size and then the correlation of the subject grade with the three SAT® scores of Maths, Critical Reading and Writing. The data is shown for the total group and then for males and females separately. All the correlations shown are statistically significant, and vary from a reasonable to a strong association[6].

There is little difference in the pattern of correlations for male and female students in each subject. There are two exceptions to this, English Language and the cluster of foreign language A levels: French, Spanish and German. For these, the correlations between the SAT® scores of Critical Reading and Writing and A level outcome are reasonably substantial for female students. However, for males, they are much lower.

To summarise the main findings from Table 3.6:

- SAT® Critical Reading correlated most highly with English Literature (0.58), General Studies (0.58), History (0.50) and English Language (0.50).

- SAT® Writing correlated most highly with English Literature (0.62), History (0.57), General Studies (0.58) and English Language (0.50).

- SAT® Maths correlated most highly with Physics (0.57), English Literature (0.47), Biology (0.50) and Mathematics (0.49)

The subjects that correlated most highly with mean SAT® scores were English Literature (0.62), General Studies (0.62), History (0.56) and Physics (0.54). Some A level subjects such as Psychology did not correlate particularly highly with any SAT® score.

The following sections explore the differences in male and female performance in more detail, in particular the relationships between SAT® scores and individual A level outcomes by subject.

3.3.1 Mathematics

There are some differences in the take up of mathematics subjects and in overall attainment in mathematics between the main sample and the national population (students taking 2 or more A levels - see section 2.2). The percentage of students in the main sample entered for A level mathematics was higher than the national sample, 28 per cent compared to 22 per cent respectively. Overall, in the main sample, 34 per cent of students studied mathematics beyond GCSE, either at A or AS level. This was higher than in the national population, where 29 per cent of students studied mathematics beyond GCSE.

Compared to the percentages of male and female students in the sample as a whole (46% and 54% respectively) the proportion of male and female students within the mathematics sub-group were reversed (58% male and 42% female), reflecting the proportions of male/female students taking A level Mathematics in the national population.

In addition to a higher proportion of male mathematics students, the study of mathematics beyond GCSE was found to be related to a number of other background variables:

- some ethnic groups (Asian, Chinese and those with missing ethnicity data) were more likely to take mathematics A level

- independent and grammar school students were more likely to take mathematics A level

[6] Further explorations of these correlations have found that for some subjects the relationships are non-linear and so the linear correlations presented in Table 3.5 may be slight underestimates of the strength of the relationships.

- students who took more than three A levels were more likely to take mathematics A level (possibly because many students who take mathematics also take Further Mathematics as a fourth A level).

In the SAT®, students studying mathematics AS or A level achieved significantly higher scores than those who did not take mathematics beyond GCSE. Male students achieved significantly higher means in the Maths component than female students, as shown in Table 3.7. However there was no interaction between sex and studying A level mathematics; the increase in SAT® score due to studying A level mathematics was the same for both male and female students.

Table 3.7: SAT® Maths scores for students with or without AS or A level mathematics

		mean SAT® Maths score
No mathematics beyond GCSE	male (n = 2085)	454
	female (n = 3184)	440
	total (n = 5269)	446
AS or A level mathematics	male (n = 1607)	613
	female (n = 1165)	591
	total (n = 2772)	603
Total	male (n = 3692)	523
	female (n = 4349)	480
	total (n = 8041)	500

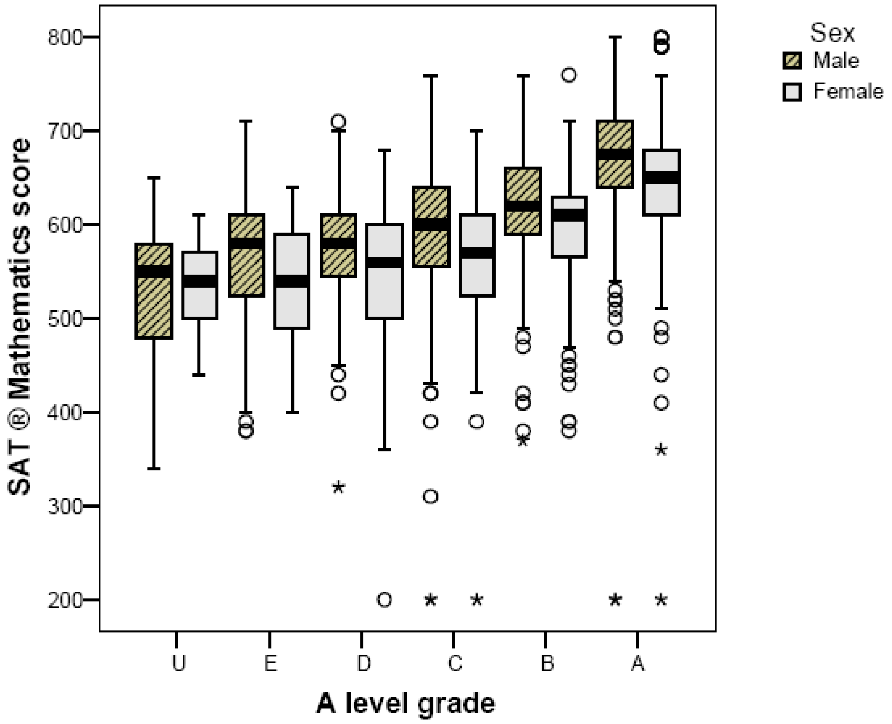
The higher SAT® Maths scores achieved by male students within the maths group were investigated further by examining the A level grades achieved by students in the sample.

Comparing achievement at A level, in the national population 41 per cent of males who took A level mathematics achieved grade A compared to 46 per cent of females in the national population (JCQ, 2006). The main sample showed a similar difference, with 47 per cent of males achieving grade A at A level, compared to 53 per cent of females.

Figure 3.1 illustrates the data for A level Mathematics for male and female students at each grade. Students that had only completed AS level Mathematics were not included in the analysis. Figure 3.1 shows the high SAT® Mathematics scores of those entering Mathematics A level, the strength of the relationship between the two measures (correlation of 0.49) and gender difference at each grade.

Male students achieved higher means in the SAT® Maths component than female students at every A level grade. This shows that the difference in SAT® Maths scores is not due to the ceiling effect of the current A grade (i.e. higher SAT® scores by male mathematics students do not arise purely because male students are achieving much higher raw scores at A level but are being awarded the same A grade at A level as female students with lower raw scores). It also suggests that the difference in Maths SAT® scores between male and female students is not accounted for by differences in A level attainment.

Figure 3.1: Relationship of SAT® Maths and A level Mathematics



In order to try and explore further the differences in SAT® scores between male and female students with the same A level grades, the relationship between the number of correct multiple-choice Maths items and the number of omitted items was examined, see Table 3.8. Overall female students omitted significantly more items than male students. (This was also true of students who had not studied A level mathematics.) When the mathematics ability of the student was controlled in a regression model (using the Maths SAT® score as the measure of ability) gender was still significant, i.e. the difference in omission rates was still statistically significant even when comparing female and male students with similar SAT® scores.

Table 3.8: Comparison of omitted multiple-choice SAT® Maths items by gender

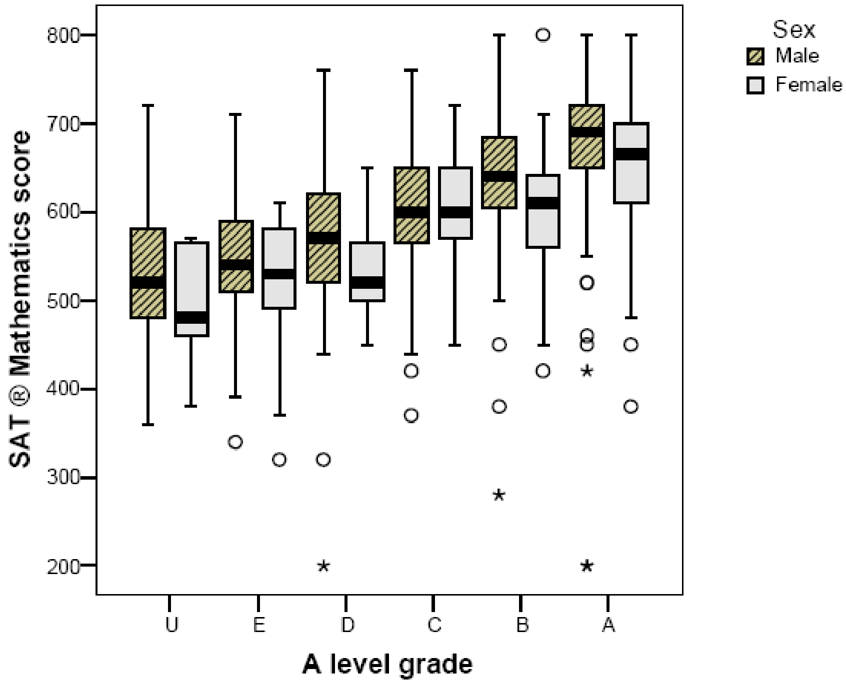
	Male (n = 1607)	Female (n = 1165)	All (n = 2772)
Number correct	32.9	31.5	32.3
Number omitted	1.8	3.0	2.3
Number incorrect	9.2	9.5	9.3

Higher scores on the SAT® for male students have often been attributed to the multiple-choice format of the test. Evidence over a wide range of tests, would certainly suggest that multiple-choice formats favour male students (Henderson, 2001; Wester & Henriksson, 2000; DeMars, 2000). Where male students outperform female students on such tests, the reason for the score gap is often attributed to a difference in the extent to which male and female students are prepared to make informed guesses. Evidence has shown that female students tend to guess less frequently than male students resulting in higher omission rates (Ben-Shakhar & Sinai, 1991).

Other reasons that have been put forward to explain gender differences in tests include the level of interest in the subject, self-confidence (Lundberg *et al.*, 1994) and the anxiety generated by the more speeded competitive format of a multiple-choice test. Although the evidence is slight, the responses from the optional student survey would suggest that male students in the sample tend to have more confidence in their academic ability than female students. In some studies, differences in test scores between males and females have been reduced when students concurrently assess the correctness of their answers. It is the female scores which tend to change, the suggestion being that reflecting on the extent to which they are sure of their answers helps them to respond more accurately, possibly by reducing their test anxiety and increasing their self-confidence (Hassmen & Hunt, 1994; Koivula, 2001). This lends support to the view that self-confidence and anxiety are contributory factors and that it may not be the multiple-choice format of itself that that causes the gender difference. (See also Kirkup *et al.*, 2008.)

Figure 3.2 shows the same relationships for SAT® Mathematics with achievement by students completing the full Physics A level. This was the pairing with the highest correlations, 0.59 for males and 0.58 for females. This is shown by the steep gradient across the grades. It also illustrates the higher overall SAT® scores of those taking the Physics A level. The median scores of all grades from A to E are above 500, the overall average. The medians of those gaining A or B grades are above the SAT® Mathematics score of 600, higher than those for Mathematics A level. A further feature of this figure is the gender difference. Overall, there was again a difference between males and females in the SAT® Mathematics score with males scoring higher. This is generally reflected across each of the grades of the Physics A level. Effectively this means that although the relationship between the SAT® Mathematics and Physics A level has the same strength for males and females, males who achieve an A grade in the Physics A level have higher scores on the SAT®.

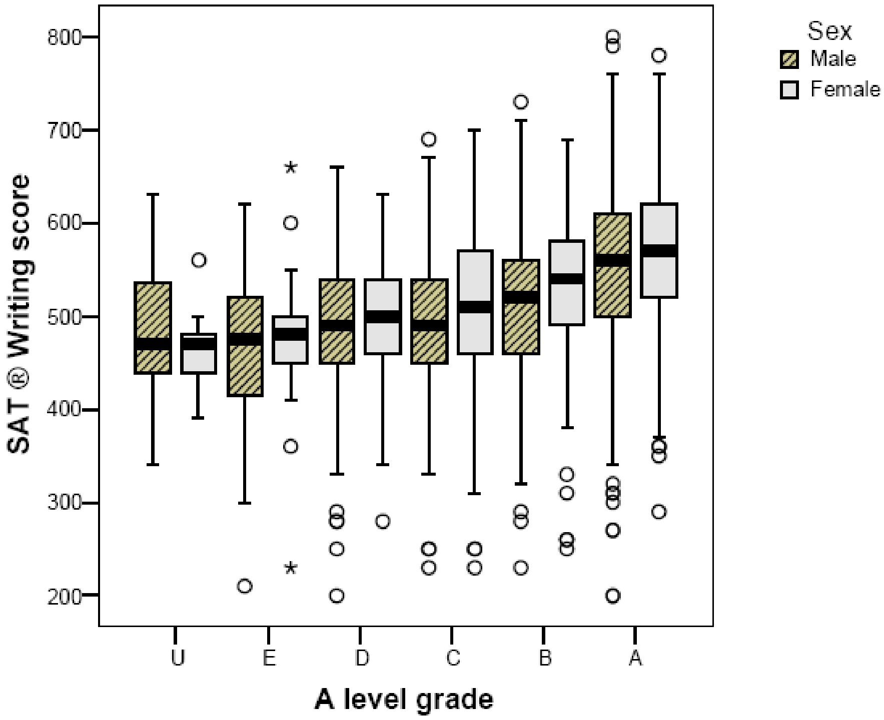
Figure 3.2: Relationship of SAT® Maths and A level Physics



Similar analyses looking at SAT® Maths scores grouped by grades achieved in a number of different subjects (Biology, Chemistry, Geography, History, Psychology, English Literature, etc) showed similar results - male students tended to achieve higher SAT® Maths scores than female students with the same A level grade.

This relationship was not the same for each of the SAT® components. Figure 3.3 shows the relationship of the SAT® Writing with achievement by students taking the full Mathematics A level. It illustrates the reverse gender effect: within each A level grade the females have higher means than the males. This is within a context of a much less strong relationship between the SAT® score and the A level outcome. There is little differentiation across the grades, reflecting the lower correlations of around 0.35. This is among the weakest relationships of any subject and SAT® combination. The relationships between scores on SAT® Critical Reading and Writing and other A level subjects are covered in section 3.3.2.

Figure 3.3: Relationship of SAT® Writing and A level Mathematics



Students with mathematics A level also did better than non-mathematics students on the SAT® as a whole. One interpretation is that more able students take mathematics A level. However, this could be confounded by other factors (e.g. higher proportions of independent and grammar school pupils take A level mathematics).

In order to examine which factors are the best predictors of SAT® Maths, a regression[7] model was carried out with the mathematics score as the dependent variable. This makes it possible to compare the performance of certain groups (e.g. male and female students), taking into account factors such as A level performance, prior attainment at GCSE, school type and pupil background characteristics, such as ethnicity and eligibility for free school meals.

In Table 3.9 (and also in Tables 3.11 and 3.12) significant results (at the 5 per cent level) are presented. For categorical variables, presented below the dashed line, the change in SAT® score is the change in one category of pupils compared to other categories, i.e. boys compared to girls. For the non-categorical attainment variables, presented above the dashed line, the change in SAT® score is the change associated with an increase in attainment by one grade in the respective attainment measure, i.e. for an increase of one grade at A level or an increase of one grade in the average GCSE grade. Non-significant variables in the regression were attending an independent school, attending an FE college and having Black, Chinese, Mixed or Other ethnicity.

[7] Regression analysis (linear): this is a technique for finding a straight-line relationship which allows us to predict the values of some measure of interest ('dependent variable') given the values of one or more related measures. For example, here we wish to predict SAT® Maths performance taking into account some background factors, such as free school meals and ethnicity (these are sometimes called 'independent variables'). When there are several background factors used, the technique is called multiple linear regression.

Table 3.9: Significant predictors of SAT® Maths performance

Variable	Predicted change in SAT® Maths score
A level maths points*	13
AS level maths (not A2) points*	11
Total A level points excluding maths	1
Average prior attainment (GCSE)	44
Boys v. girls	35
Asian	-19
Missing ethnic group	-9
Eligible for free school meals	-10
Grammar school	15

n = 8041, * = 0 if not taken at A/AS level

The regression model showed that studying mathematics at A level, having higher prior attainment points scores and higher A level total points were all associated with higher SAT® Maths scores. Being a male student and attending a grammar school were also associated with higher scores whereas being Asian, or missing ethnic background information or being eligible for free school meals were associated with lower scores. In other words male students are likely to achieve higher SAT® Maths scores than female students with similar prior attainment and A level points scores, and Asian students are likely to achieve lower scores than comparable white students. For example, if there were two pupils with the same characteristics, such as, white boys, who are not eligible for free school meals and who went to a comprehensive school and who got the same GCSE grades and both got the same A level grades in two subjects. If one boy got CCC at A level, with a C in mathematics and the other boy got CCB at A level, with a B in mathematics, then the second boy would, on average, score 13 more points on the Maths SAT®.

3.3.2 English

Thirty-two per cent of students in the sample had studied an A level in an English subject (including English, English Language and English Literature). This is very similar to the figure of 33 per cent for the population in England as a whole. A further six per cent of students in the sample had studied a one-year AS English course. Within the English A level sub-group 68 per cent were female and 32 per cent were male students. However, apart from the sex of the student, the study of English beyond GCSE was found to be much less strongly related to background variables (e.g. school attended or ethnic group) than the study of mathematics.

Thirty-two per cent of the female students and 24 per cent of the male students achieved grade A. The equivalent national figures for students achieving A grades in England in 2006 were 22 per cent and 21 per cent for female and male students respectively (JCQ, 2006).

Students with an AS or A level in English achieved significantly higher scores than students without English A level in the Critical Reading and Writing components of the SAT®. In the SAT® Maths the difference was also statistically significant but in the other direction, with those students not studying English achieving higher scores. For Critical Reading and Writing there was an interaction between the sex of the student and studying English at A level, i.e. the difference in the SAT® scores between students studying English at A level and those not taking English was greater for male students than for female students.

Table 3.10: Mean SAT® scores for students with or without AS or A level English

		Critical Reading	Maths	Writing
no English beyond GCSE	male (n = 2724)	488	537	485
	female (n = 2274)	492	502	503
	total (n = 4998)	490	521	493
AS or A level English	male (n = 968)	526	486	523
	female (n = 2075)	513	457	525
	total (n = 3043)	517	466	524
Total	male (n = 3692)	498	523	495
	female (n = 4349)	502	480	513
	total (n = 8041)	500	500	505

The relationships between SAT® scores in Critical Reading and Writing and A level grades achieved in English were also examined as illustrated in Figures 3.4 and 3.5. Only those students that had completed a full A level were included in these analyses.

In Critical Reading male students achieved higher mean scores than female students with the same A level grade in English. In Writing the mean SAT® scores of students of either sex with the same English A level grade were very similar.

Figure 3.4: Relationship of SAT® Critical Reading and A level English

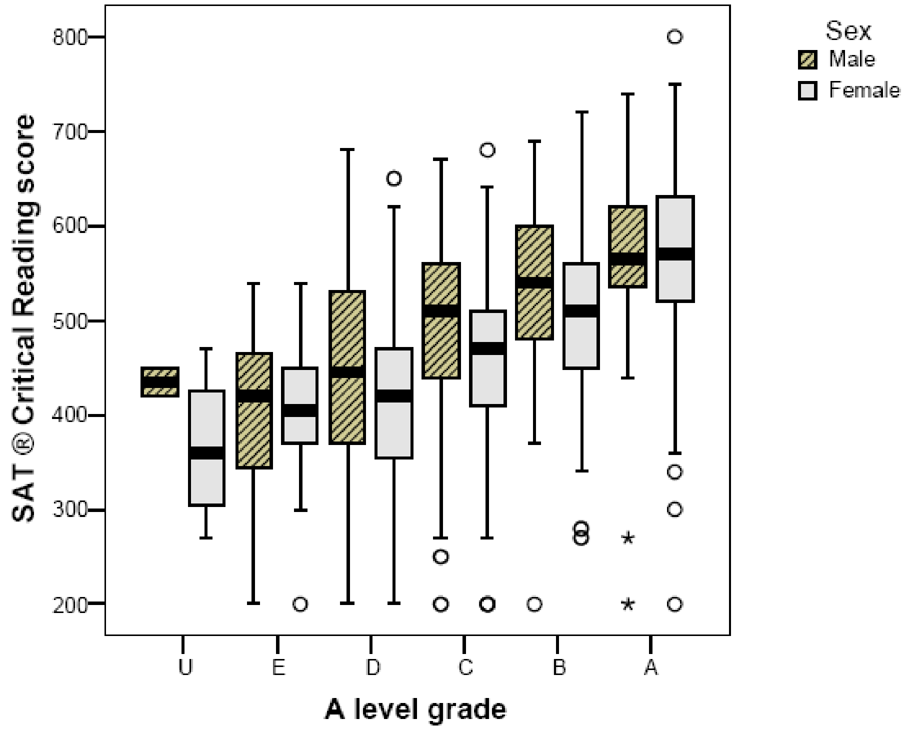
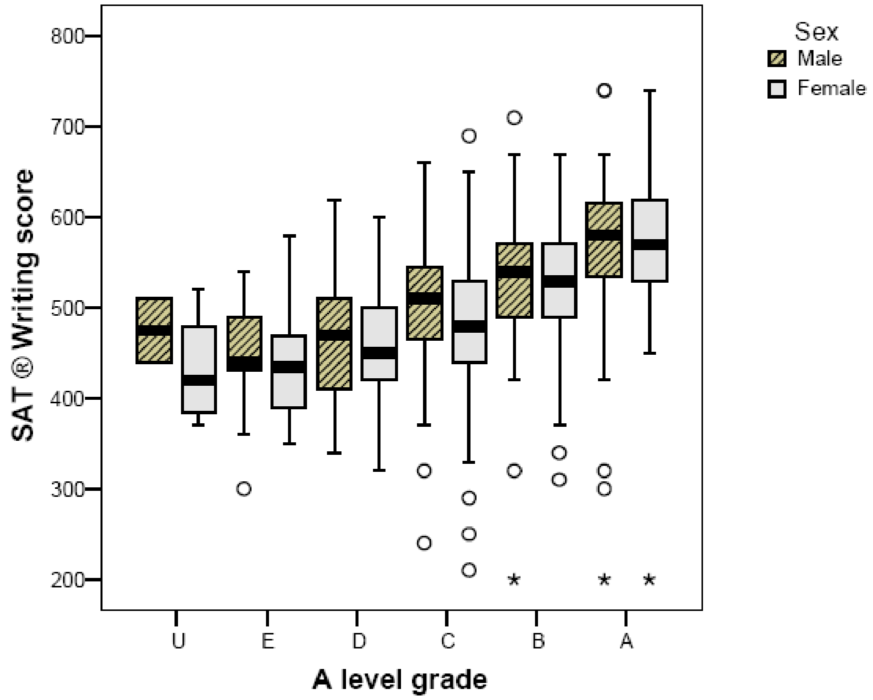
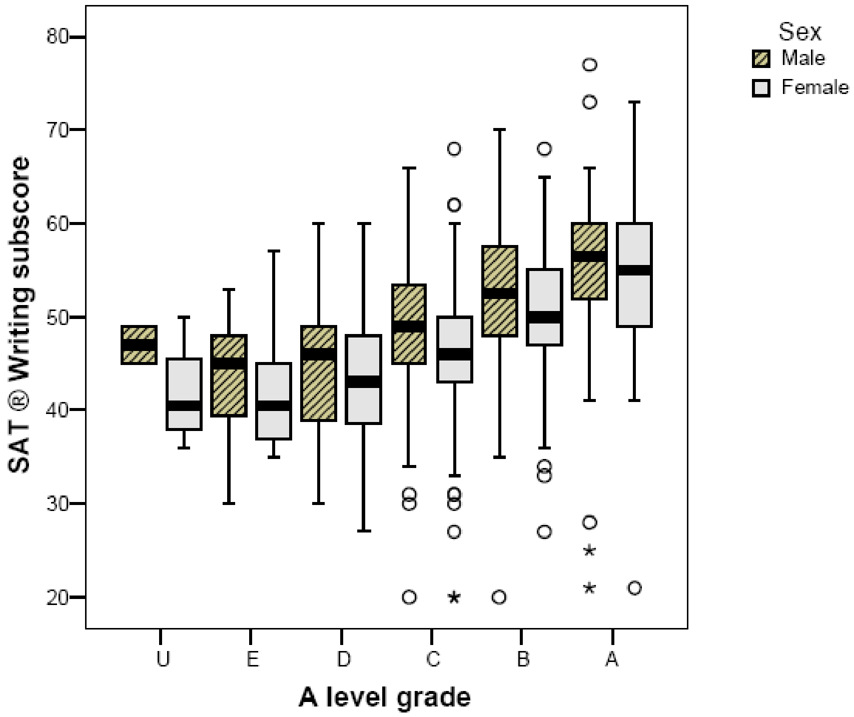


Figure 3.5: Relationship of SAT® Writing and A level English



Although there appears to be less difference between male and female SAT® Writing scores amongst students with the same A level grade, when the essay sub-score is removed (30 per cent of the SAT® Writing score) a more pronounced gender effect is observed across the lower A level grades although not at the highest grade (see Figure 3.6).

Figure 3.6: Relationship of SAT® Writing subscore and A level English



As with the SAT® Maths analysis, regression models were run to examine which factors were the best predictors of SAT® Critical Reading and Writing scores. The outcomes shown in Tables 3.11 and 3.12 are presented in the same way as Table 3.9 earlier. For categorical variables, presented below the dashed line, the change in SAT® score is the change in one category of pupils compared to other categories. For the non-categorical attainment variables, presented above the dashed line, the change in SAT® score is the change associated with an increase in attainment by one grade in the respective attainment measure.

The Critical Reading regression analysis showed that prior attainment and having higher A level total points were related to SAT® scores. Having controlled for these factors, male students, those attending a grammar school and those eligible for free school meals were more likely to achieve higher scores. Asian, Chinese and Black students and students with missing ethnicity data were likely to achieve lower scores. Non-significant variables in the regression were attending an independent school, attending an FE college and having Mixed or Other ethnicity. A level results in English had less impact on SAT® Critical Reading scores than A level mathematics results had on SAT® Maths.

Table 3.11: Significant predictors of SAT® Critical Reading performance

Variable	Predicted change in SAT® Critical Reading score
A level English points*	6
AS level in English (not A2)*	4
Total A level points excluding English	3
Average prior attainment (GCSE)	50
Boys v. girls	17
Asian	-47
Black	-18
Chinese	-73
Missing ethnic group	-16
Eligible for free school meals	18
Grammar school	8

n = 8041, * = 0 if not taken at A/AS level

For students studying English with similar prior attainment and A level points, the model predicted higher Writing scores for students from grammar schools and independent schools and lower scores for all ethnic groups (Asian, Black, Chinese, Mixed, Other) and those with missing ethnicity data compared to white students. Non-significant variables were gender, attending an FE college and eligibility for free school meals.

Comparing Table 3.9 with Tables 3.11 and 3.12 there is a noticeable difference in the impact of studying A level Mathematics on the SAT® Maths score compared to the impact of studying an English A level on either the SAT® Critical Reading or Writing score; the effect of the first being much larger than the other two. However, ethnic group differences tended to be larger in SAT® Critical Reading and Writing scores than in SAT® Maths scores.

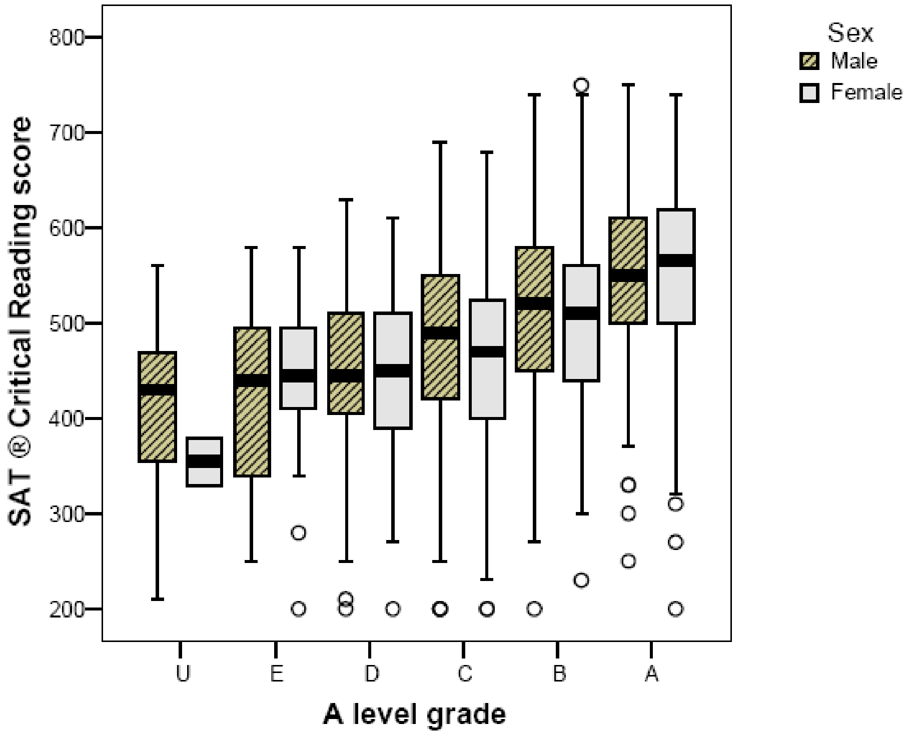
Table 3.12: Significant predictors of SAT® Writing performance

Variable	Predicted change in SAT® Writing score
A level English points*	5
AS level in English (not A2)*	4
Total A level points excluding English	2
Average prior attainment (GCSE)	41
Asian	-39
Black	-12
Chinese	-77
Mixed ethnicity	-11
Other ethnicity	-17
Missing ethnic group	-12
Grammar school	11
Independent school	6

n = 8041, * = 0 if not taken at A/AS level

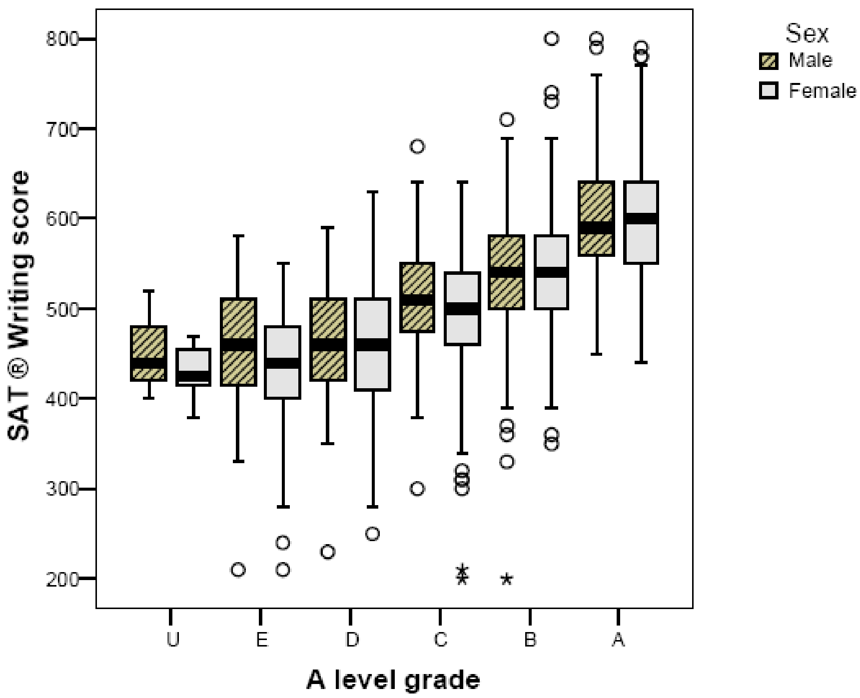
Some further analyses were done comparing attainment at A level with Critical Reading scores for the other popular A level subjects. Only students that had completed the full A level were included in these analyses. Figure 3.7 illustrates the relationship for a fairly typical level of correlation. This shows the scores achieved in SAT® Critical Reading for the grades of the Geography A level. This had a correlation of 0.41 for both males and females. The figure shows that for both genders there is a reasonable relationship between the Critical Reading scores and A level grade. The Critical Reading scores for males and females for each grade are also broadly similar. The levels of scores are such that the median scores of those obtaining an A or B grade are above a SAT® score of 500, the average for this sample.

Figure 3.7: Relationship of SAT® Critical Reading and A level Geography



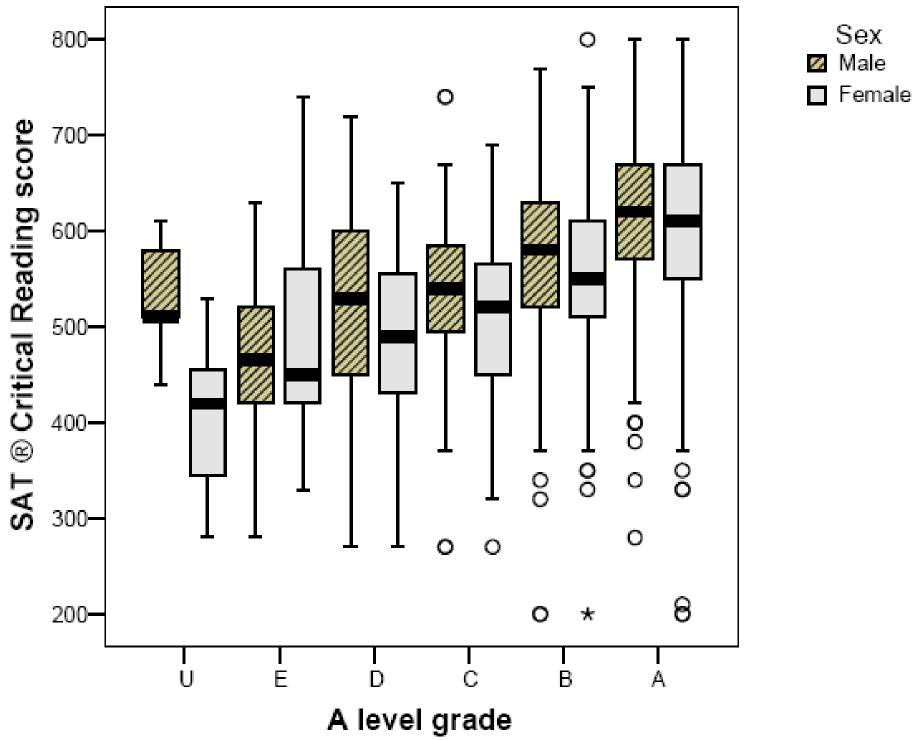
The different English A level subjects were also separated. The relationship between SAT® Writing and A level English Literature is among the strongest found with correlations for males of 0.58 and females of 0.64. This is shown in Figure 3.8. This also shows that there is little gender effect in this relationship, with the mean SAT® Writing score being the same for male and female students within each A level grade.

Figure 3.8: Relationship of SAT® Writing and A level English Literature



The final figure (Figure 3.9) illustrates the relationship between SAT® Critical Reading and the foreign language A levels, French, Spanish and German. In this case, there is a different strength of relationship for the male and female students with a relatively strong correlation of 0.46 for females and a weaker 0.34 for males. This results in the interactions shown in the figure with a steeper gradient for females and less steep for the males. The effect of this is to gradually increase the gender differences so that although this is small for the A grade, males have higher SAT® Critical Reading scores than females at the lower A level grades.

Figure 3.9: Relationship of SAT® Critical Reading and A level French, Spanish and German



3.4 Relationships between SAT® scores and GCSE subjects

As reported in section 3.2, the correlation between average GCSE score and mean SAT® score was 0.70 and the correlation between total A level points and mean SAT® score was 0.64. The correlation between maths GCSE and the maths component of the SAT® was 0.66 (n = 7575) and the correlations between English GCSE and the Reading and Writing components of the SAT® were 0.56 and 0.61 respectively (n = 7575). These are generally higher than the correlations between SAT® scores and A levels in maths and English with the exception of the correlations between English Literature A level and Reading and Writing SAT® scores which are very similar to the GCSE English ones.

Having calculated the above correlations, the question as to whether GCSE achievement (using average GSCE scores) plus SAT® score better predicts A level performance (total points score) than GCSE alone was examined. This was found to be the case although the difference was fairly small. In the regression model average GCSE score accounted for approx 57% of the variance in A level scores. When the SAT® was added to the model approx 60% of the variance in scores was explained.

When pupils were grouped into five bands according to the performance of the school at which they took their GCSEs, the correlations between GCSE English and SAT® Reading and Writing for the different groups (lowest two GCSE achievement bands, bands 3 & 4 and top band) were fairly similar. In mathematics the correlation between mathematics GCSE and SAT® Maths was highest for pupils in the middle-performing schools (0.73) and lowest for pupils in the highest-performing schools (0.57). This is probably due to range restriction in the GCSE grades (with most pupils at schools in this band likely to have gained very high grades). Therefore in the regression model GCSE mathematics alone appears to be a poor predictor of A level mathematics for pupils at schools in the top band, explaining only 5 per cent of the variance in A level scores. Adding SAT® Maths scores explains a further 16 per cent of the variance in A level scores. For pupils at schools in the lowest two achievement bands, performance in GCSE mathematics accounts for 25 per cent of the variance in A level scores. With the SAT® scores added, this rises to 29 per cent.

Due to the ceiling effect of the GCSE grades this analysis suggests that the SAT® (depending on when it was taken) could potentially provide useful information in differentiating between the most able pupils at GCSE and helping to predict the A level performance of able students. Similarly, the findings published in 2007 showed that the SAT® might prove useful in differentiating between the most able A level students.

A further set of regression models were used to compare which is the better predictor of performance at A level; SAT® score or average GCSE score. In each case, the regression models included the GCSE school achievement band of the schools attended at the time of the GCSEs to look for interactions between overall school performance and students' SAT® or GCSE scores. The results showed that GCSE average score is a better predictor of A levels (R^2 = 0.603) than SAT® score (0.472). With average GCSE there is an interaction with school GCSE band - average GCSE score is a better predictor of A levels for pupils in higher-achieving schools.

3.5 Conclusions

These examples reveal some general findings concerning the relationships between SAT® scores and attainment in particular subjects.

Generally, average GCSE performance across all subjects is a better predictor of total A level points score than the mean SAT® score. However, the SAT® could potentially play a role in particular subjects such as mathematics, differentiating between the most able pupils at GCSE and helping to predict their A level performance.

First, the analysis has shown that the relationships of the SAT® components to A level subjects are not all the same. For some subjects, predominately science based, SAT® mathematics is more strongly related to A level grades; for others such as History and English A levels and General Studies, Critical Reading and Writing are most closely related. There are a small number of subjects, such as Psychology where none of the SAT® scores are particularly strongly related to A level performance.

This implies that the utility of the SAT® may differ as a predictor of degree outcomes depending on both the subjects taken at A level and the degree subjects involved. These relationships will need individual exploration when the degree outcome data is available.

A second finding is that the mean SAT® scores associated with particular grades of A levels can be at different levels. For example, the mean SAT® Mathematics score of those obtaining an A or B grade in Physics is over 600, whereas for Geography or Psychology it is around 500. This implies that the threshold set for the SAT® in relation to acceptance for degree courses (if the SAT® becomes used in this way) will have to vary according to the degree subject. This is not unexpected but will add complexity. Again though, this will need much more exploration when the degree information becomes available, since the level relationship of the A level data and the SAT® will determine if the extra data is useful.

Finally, the analysis has revealed that there are gender differences in the relationships between the SAT® scores and A level grades, particularly for SAT® Mathematics. The general gender difference in SAT® scores occurs with all of the A levels explored and means that at any grade, the mean score for males is greater than for females. This would mean that if a purely statistical approach to prediction were to be taken, different equations would for males and females have most utility. However, if this is not legally or socially acceptable, any eventual use of the SAT® scores would need to be an average equation, which would lose some predictive power. Nevertheless, it remains necessary to collect the degree data before any certainty can be achieved on the utility of the SAT®.

What are the implications for the potential use of the SAT®?

- There is some evidence that the SAT® could prove useful in differentiating between able pupils either at GCSE or at A level.

- The current evidence suggests that the utility of the SAT® may differ according to the subjects studied at A level or in HE.

4 Disadvantaged students

The main research question is to discover whether the SAT® combined with A levels can better predict HE outcomes than A levels alone. A further objective is to explore whether the SAT® can identify students with the potential to benefit from higher education whose ability is not adequately reflected in their A level results because of their (economically or educationally) disadvantaged circumstances.

In the previous published report (Kirkup *et al.*, 2007) one of the issues addressed was whether particular types of student performed better in the SAT® than would be predicted from their A level (and GCSE) results. Two analyses were carried out: one looking at inconsistent performance; and one focussing on individuals who had better than expected SAT® scores, taking into account their performance at A level (and at GCSE). A summary of these analyses are given below as a context for the further analyses reported in section 4.2.

4.1 Summary of previous findings

In the first part of the analysis a regression model was used to look at the relationship between different attainment measures and background characteristics. The results showed that some groups of students (i.e. Chinese students, students eligible for free school meals, those learning English as an additional language and students from FE colleges) were more likely to have inconsistencies between the SAT®, A levels and GCSEs but did not show that these inconsistencies were systematically in any particular direction.

For the second part of the analysis the focus was on the background characteristics of students who had better than expected SAT® scores, given their performance at A level (and at GCSE). Regression models were run, with average SAT® score (across Critical Reading, Maths and Writing) as the outcome, one controlling for A level total score and one controlling for both A level total score and mean GCSE score. Similar regressions were run for the individual components of the SAT®. The results of this analysis are summarised below.

- Females, ethnic minorities and those with special educational needs or English as an additional language appeared to perform less well on the SAT® than expected given their A level and GCSE performance. Students in grammar schools did better than might be expected.

- Students in independent schools did better than expected when A level results were taken into account and Black students and students in FE colleges worse than expected. In each case they neither did better nor worse than expected when prior attainment at GCSE was also taken into account.

- On the individual components of the SAT® Chinese students did better than might be expected in Maths and female students did better in Writing.

- Eligibility for free school meals (often viewed as a proxy for disadvantaged circumstances) was not a significant factor in predicting performance on the SAT® as a whole. FSM students did better than would be expected on the SAT® Reading component (i.e. students eligible for free school meals tended to achieve higher reading scores than non-eligible students with similar attainment at KS4 and KS5) but did worse than expected on SAT® Maths.

For this dataset in particular, FSM is likely to be a poor indicator of social and economic disadvantage. A small proportion of students in this relatively high-performing group were actually eligible for FSM, and within the rest there are bound to be wide variations in background which are not being captured by FSM. By combining data from other sources, including PLASC and the student questionnaire, it was possible to develop a more informative measure of deprivation/affluence. This is detailed in the following section (4.2).

Other school-level indicators are also of interest, telling us about the educational environment experienced by the students. These are detailed in the following section (4.2) and used in the analysis of two main outcomes: students' SAT® outcomes (section 4.3) and destinations (section 5.2). With this extra information it may be possible to understand better the complex relationships between students' backgrounds and the results they achieve and their success at gaining entry to higher education.

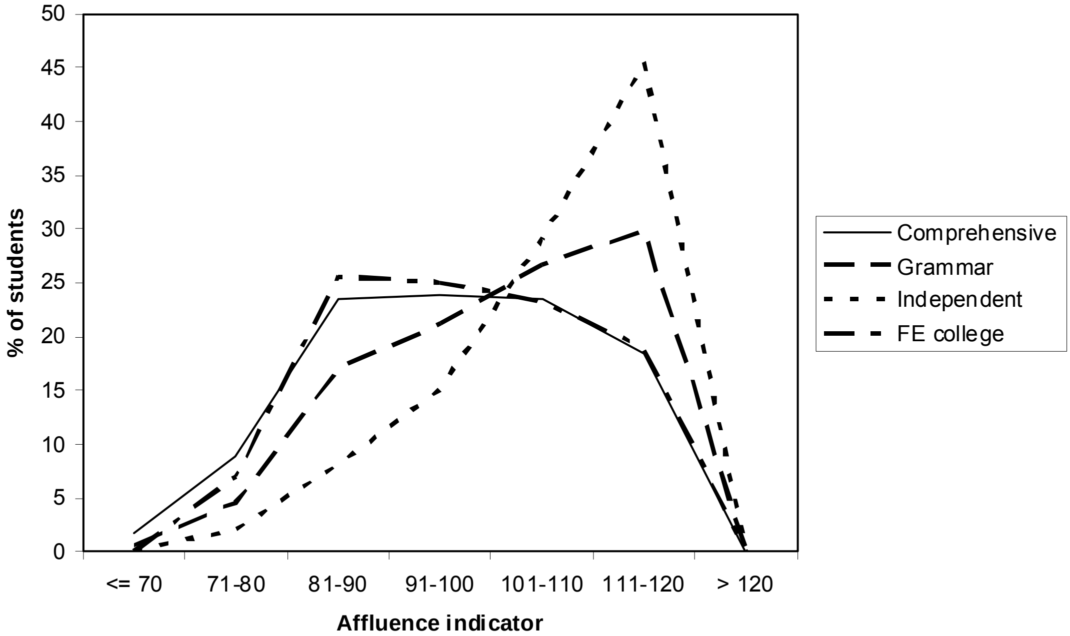
4.2 Improved measures of affluence / disadvantage

In order to explore students' SAT® outcomes and destinations according to more subtle measures of disadvantage, additional items of background data were used, where available, to supplement the broad background characteristics already examined. In particular, measures of affluence / disadvantage which were superior to the simple free school meal indicator were sought. The background data used were derived from a number of different sources as outlined below.

Student questionnaire responses were included in a factor analysis to produce an affluence indicator. The items used to derive this indicator were: socio-economic group (based on the occupation of highest-earning parent), whether the home property is rented, number of siblings, books in the home, level of education of mother and level of education of father (see Appendix 1 of the 2007 report (Kirkup *et al.*, 2007) for an annotated copy of the student questionnaire). The Cronbach's alpha[8], a measure of reliability, of the affluence indicator was 0.54, which is respectable for a scale derived from six questionnaire items. With a mean indicator of 100 for the questionnaire sample as a whole (5059 cases), students from comprehensive schools had the lowest affluence indicator (96.8) and students from independent schools had the highest (106.3), see Figure 4.1.

[8] A measure of internal reliability or consistency of the items in a scale. Like other reliability coefficients Cronbach's alpha ranges from 0 to 1. Scores towards the high end of the range suggest that the items in a scale are measuring the same thing.

Figure 4.1: Affluence indicator by institution type



School level measures (i.e. the school or college GCSE band[9], the school or college A level band[10], the average total GCSE score in 2005, the average total A level points score in 2005 and the percentage of students eligible for FSM).

IDACI (Income Deprivation Affecting Children Index). This index provided by the Office of the Deputy Prime Minister measures the proportion of children under the age of 16 in an area, who are living in low income households. The IDACI indicator ranges from 0.00 to 1.00 with 0.14 being around average nationally (see DCSF, 2005). Higher scores indicate greater deprivation. In our sample the average for the known sample (5858 students) was 0.13. The IDACI of those students eligible for free school meals (232 students) was 0.33.

[9] School GCSE band: students' total GCSE point score is averaged across the school, and schools are divided into 5 bands, of 20% each, ranging from the lowest attaining schools to the highest. This relates to the school where the student took their GCSE exams.
[10] School A level band: students' total A level point score is averaged across the school, and schools are divided into 5 bands, of 20% each, ranging from the lowest attaining schools to the highest.

4.3 Analysis of SAT® scores including additional affluence / disadvantage measures

The analysis of SAT® scores controlling for pupils' GCSE and A level results was rerun taking account of the above, in two models: the first using IDACI as well as school-level indicators (with a total sample of 5815 students); and the second with the affluence indicator developed from the student questionnaire plus school-level indicators (with a total sample of 4806 students). The results from the regression analysis are presented in Tables 4.1 and 4.2 respectively.

Table 4.1: Significant predictors of SAT® outcomes, including IDACI deprivation measure

Background variable	Predicted change in SAT® score			
	Overall SAT score	Reading	Maths	Writing
A level total points	2	3	2	2
GCSE average points	47	45	60	37
IDACI measure				
School GCSE band (per 20% band)				
Sex (female)	-20	-11	-57	7
Eligible for FSM		15	-15	
Black (v. white)				
Asian (v. white)	-27	-37		-36
Chinese (v. white)	-25	-44	25	-51
Mixed (v. white)				
Other ethnicity (v. white)				-16
Missing ethnicity				
EAL	-10	-23		-12
SEN				-21
Grammar school	11	10	10	13

For categorical variables, presented below the dashed line, the change in SAT® score is the change in one category of pupils compared to other categories, i.e. boys compared to girls. For the non-categorical attainment variables, presented above the dashed line, the change in SAT® score is the change associated with an increase in attainment by one grade in the respective attainment measure, i.e. for an increase of one grade at GCSE or an increase of one grade at A level. Detailed statistical information in terms of the significant β coefficients[11] from the regression analysis is provided in Tables 1 and 2 in the appendix.

To summarise these results, for the analysis including IDACI:

- IDACI is only defined for comprehensive and grammar schools, so no independent or FE college students were included in the analysis.

- The strongest predictor of SAT® scores is students' GCSE performance, much stronger than other factors including A level performance. Neither the school GCSE achievement band nor the IDACI measure is a significant factor in predicting SAT® scores when GCSE scores are included. If GCSE performance is omitted from the regression, school GCSE band becomes significant (positive) for overall mean score

- For three out of four SAT® outcomes (total score, Maths and Writing) there was a significant negative relationship with IDACI controlling for A level and other variables when prior attainment at GCSE was not included in the model, implying that students from more deprived areas did less well at SAT® compared with their A levels as they also tended to be students with lower average GCSE attainment.

- When average GCSE grade was included in the regression the coefficient of IDACI became non-significant.

- When school-level A level band was used in place of school-level GCSE band, the school A level band was non-significant in all cases when IDACI was included.

In other words, if prior attainment at GCSE is not taken into account, students from schools with a higher IDACI index (i.e. from areas of low income households) do less well on the SAT® than students from less deprived areas with similar A level attainment. However, irrespective of their IDACI index, students with similar A level points and prior attainment at GCSE performed similarly on the SAT®.

[11] The β coefficient is a dimensionless quantity showing the strength of the relationship between each variable and the outcome, controlling for all other variables in the analysis.

Table 4.2: Significant predictors of SAT® outcomes including derived affluence measure

Background variable	Predicted change in SAT® score			
	Overall SAT score	Reading	Maths	Writing
A level total points	2	3	2	2
GCSE average points	50	49	61	40
Affluence measure (per 20% increment)	5	7		5
School GCSE band (per 20% band)				
Sex (female)	-23	-12	-62	6
Eligible for FSM	19	33		16
Black (v. white)				
Asian (v. white)	-19	-35	9	-29
Chinese (v. white)	-31	-62	45	-73
Mixed (v. white)	-14	-19		
Other ethnicity (v. white)			24	-15
Missing ethnicity				
EAL	-11	-21		-19
SEN	-21		-16	-31
Grammar school	9	9	6	11
Independent school				

The pupil-level affluence indicator is significant for three of the outcomes, and also for mathematics if GCSE is omitted. The affluence measure and eligibility for FSM were both significant for three of the outcomes showing that both add information to the models. This is not surprising, as students can either be eligible or not eligible for FSM whereas the affluence measure is on a scale.

To summarise the results for the analysis including the student-level affluence measure:

- For all four SAT® outcomes the affluence measure had a positive relationship when prior attainment at GCSE was not included in the regression; i.e. more affluent students achieved higher scores relative to their A level results.

- For three of the outcomes (total SAT® score, reading and writing) the positive relationship with the affluence indicator remained significant when average GCSE score was included in the regression.

- When school-level A level band was used in place of school-level GCSE band, the school-level A level indicator was significantly positively related to the same three outcomes when pupils' GCSE performance was excluded, but not significant when it was included.

- The overall conclusion to be drawn from this seems to be that SAT® score tends to be higher for more affluent students even when controlling for A level performance, and also when average GCSE score is taken into account.

What are the implications for the potential use of the SAT®?

The evidence relating to disadvantaged students is somewhat inconclusive:

- When prior attainment at GCSE is taken into account, students with similar A level and GCSE points perform similarly on the SAT® irrespective of household income as measured by the IDACI index.

- Using the affluence measure derived from survey responses, SAT® scores (Critical Reading and Writing) tended to be higher for more affluent students (compared to less affluent students with similar GCSE and A level attainment).

Based on the current evidence the SAT® may have limited use in identifying economically or educationally disadvantaged students with the potential to benefit from higher education whose ability is not adequately reflected in their A level results. However, it may provide an additional strand of evidence for some students - see section 5.2.

5 Destinations after school or college

In early 2008 The Higher Education Funding council for England (HEFCE) matched 5808 students in our sample of 8041 students to the HESA and ILR databases (students enrolled on HE courses in the academic year 2006/07). Estimates based on the 2006 student survey suggested that approximately three-quarters of students in the main sample would be starting a higher education course in 2006 and about fifteen per cent in 2007. In the event there was a good match between students' declared intentions in the questionnaire and their subsequent HE enrolment: 96 per cent of those saying they were starting an HE course in 2006 were in the HESA/ILR dataset, and 95 per cent of those not intending to go into HE were not in the dataset.

The HESA/ILR matched dataset of 5808 students indicated that 67 per cent of the main sample had started a course at a university or other higher education institution and a further five percent (401 students) were studying within the FE sector. Sixty-three per cent of the 2006 entrants were starting a three-year course, 27 per cent a four-year course and six per cent a longer course. Again, these matched fairly closely to the survey estimates of 60 and 30 per cent for courses of three years and four-years or more respectively.

In the original survey 92 per cent of students indicated they would 'definitely' or 'probably' enter higher education either in 2006 or 2007. If these figures prove to be accurate, it is likely that a further 1400-1600 students may appear in the 2007 HESA dataset.

Based on the HESA data, it is likely that, due to the number of students taking courses of more than 3 years duration, the number of students in the main sample completing their degrees in the academic year 2008/09 is likely to be approximately 3400 (although some students may withdraw from their courses in the interim without completing them). It is likely that around 2400 students will complete their degrees one year later (this figure includes 2006 entrants known to be on four-year courses and assumes that 66 per cent of the estimated number of 2007 entrants will take three-year courses).

5.1 Relationships between attainment, SAT® scores and HE destinations

In early 2008 HEFCE matched 5808 students in our sample of 8041 students to their HESA and ILR databases, of whom 401 were on the ILR database only (i.e. studying within the FE sector). The institutions and courses on which these students were registered were matched to the UCAS standard tariff entry requirements where available. As a result 4571 students in our sample were matched to the minimum entry requirement for their particular course of study.

Correlations between the entry points of the courses being studied and key attainment measures (total A level points, mean SAT® score, total GCSE points and average GSCE points) were calculated. For details of how these scales are related, see Table 3 in the appendix. Of the four measures, entry points were most closely associated with total A level points (0.62). Students were then grouped into four roughly equal-sized groups according to the minimum UCAS entry points of the course for which they were registered on the HESA database and the attainment of these groups was compared. There were significant differences in the mean scores of the four attainment measures (total GCSE points, average GCSE points, total A level points and SAT® scores) between the four 'entry points' groups as shown in Table 5.1.

Table 5.1: Students' HE course entry points (grouped) by mean attainment

Entry points*	Total A level points*	Mean SAT® score	Total GCSE points	Average GCSE points	N
0-230	***702***	***461***	***457***	***43.7***	1070
240-290	***817***	***488***	***481***	***46.2***	1172
300-320	***971***	***531***	***515***	***49.9***	1152
325+	***1114***	***584***	***551***	***53.5***	1177

Values significantly different at the 5 per cent level are shown bold and in italics.
**See Table 3 in the appendix for details of how the UCAS tariff and the QCA scales are related for GCSE, AS and A level.*

The entry points data was also matched to students' specific responses on the first student questionnaire with the following results:

- Students who achieved their first choice of HEI place were more likely to have places on 'high entry points' courses and those who went through clearing were more likely to have places on 'low entry points' courses.

- Students on courses with 'low entry points' requirements were more likely to be living closer to home and to be living with parents.

- Students on courses with higher 'entry points' groups were more likely to say they were 'very confident' in their ability to complete the course.

Based on the 2006 entry data a comparison was made between the background characteristics of students currently in HE (including HE courses in FE) and those not (or not yet) in HE. However, at this stage there can be many reasons for students not being in HE: taking a gap year; re-sitting A levels; temporary employment. Actual destinations for this diverse group of students will become clearer once the confirmed 2007 HE entry data is available in February 2009.

Comparing students who are currently in HE with those not in HE according to a number of broad background characteristics, it was found that:

- Female students were more likely to be currently in HE.

- Students with English as an additional language were slightly less likely to be currently in HE than students with English as a first language.

- Students eligible for free school meals were less likely to be currently in HE than those not eligible.
- Students from comprehensive schools were less likely to be currently in HE than students from other schools and FE colleges.

- Chinese students or students with missing ethnicity data were less likely to be currently in HE than other ethnic groups.

However, the above results were based only on simple analyses, looking at one background factor at a time. A more detailed analysis used regression to investigate the significant factors associated with the two outcomes, when all other factors were considered simultaneously.

The significant factors positively associated with the entry points of the courses being studied were (in order of importance):

- Total A level points
- Average GCSE points
- Attending an independent school
- Asian ethnicity
- English as an additional language
- SAT® score
- Mixed ethnicity

For example, the higher the total A level points the higher the entry points of the courses being undertaken. The one factor which was negatively related to course entry points was sex: girls were less likely to attend courses with higher entry points than equivalent boys. Non-significant factors considered in the regression were eligibility for free school meals, having Black, Chinese, Other or Missing ethnicity, having special educational needs and attending a grammar school or FE college.

It is interesting that, when attainment is not taken into account, students with English as an additional language are slightly less likely to be in HE than students with English as a first language. However, amongst students with similar attainment, EAL students are more likely to be on courses with high entry point requirements than non-EAL students.

An alternative approach to examining this question is logistic regression[12]. This provided an analysis of whether or not students are currently in HE and gave the significant positive factors as (in order of importance):

- Total A level points
- Asian ethnicity
- SAT® score

[12] Logistic regression is a variation of linear regression where the measure of interest (dependent variable) is binary, only taking the values of 0 or 1, indicating either possessing an attribute or not. In logistic regression the probability of possessing the attribute of interest is predicted, given the values of one or more related measures. For example, here we are predicting the probability that a student is in HE, given various background factors like the type of school they go to, their prior attainment measure and whether or not they are eligible for free school meals.

- Black ethnicity
- Sex (girls more likely than boys).

Negative factors were:

- Unknown FSM status
- Unknown ethnicity.

Non-significant factors that were considered in the regression were eligibility for free school meals, having Chinese, Mixed or Other ethnicity, having special educational needs, having English as an additional language and attending a grammar school, an independent school or an FE college. Interestingly, in the above analysis the GCSE performance does not appear to be significant. Also, some of the background variables in the simpler analyses, which indicated students who were less likely to go into HE, are not significant when attainment is taken into account. For example, in the earlier straightforward comparison students from comprehensive schools were found to be less likely to be in HE than students from other schools and FE colleges. As this variable is not significant in the regression analysis it indicates that students with similar attainment from these institutions are equally likely to be in HE. (However, whether such students have an equal chance of achieving the same level of attainment is not considered here.)

As the above findings apply to HE entry in 2006 only, the effect of those students who took a gap year before entering an HE course in 2007 is as yet unknown. The findings may therefore differ when these are re-calculated to take into account entry to HE in both years.

5.2 Analysis of Higher Education destinations using the additional affluence / disadvantage measures

The entry points required for courses offered to students in the sample (according to the data obtained from HESA) were analysed with respect to their A level and GCSE results, other background characteristics and the additional affluence / disadvantage indicators developed. The analyses were run separately for the group with IDACI (3338 students) and the affluence indicator (2895 students). Tables 5.2 and 5.4 show the increase in the course entry points that are associated with each of the background factors, for the two different cases. Tables 4 and 5 in the appendix (pages 56 and 57) show the significant β coefficients from the regression analysis. These show the relative strength of each of the variables.

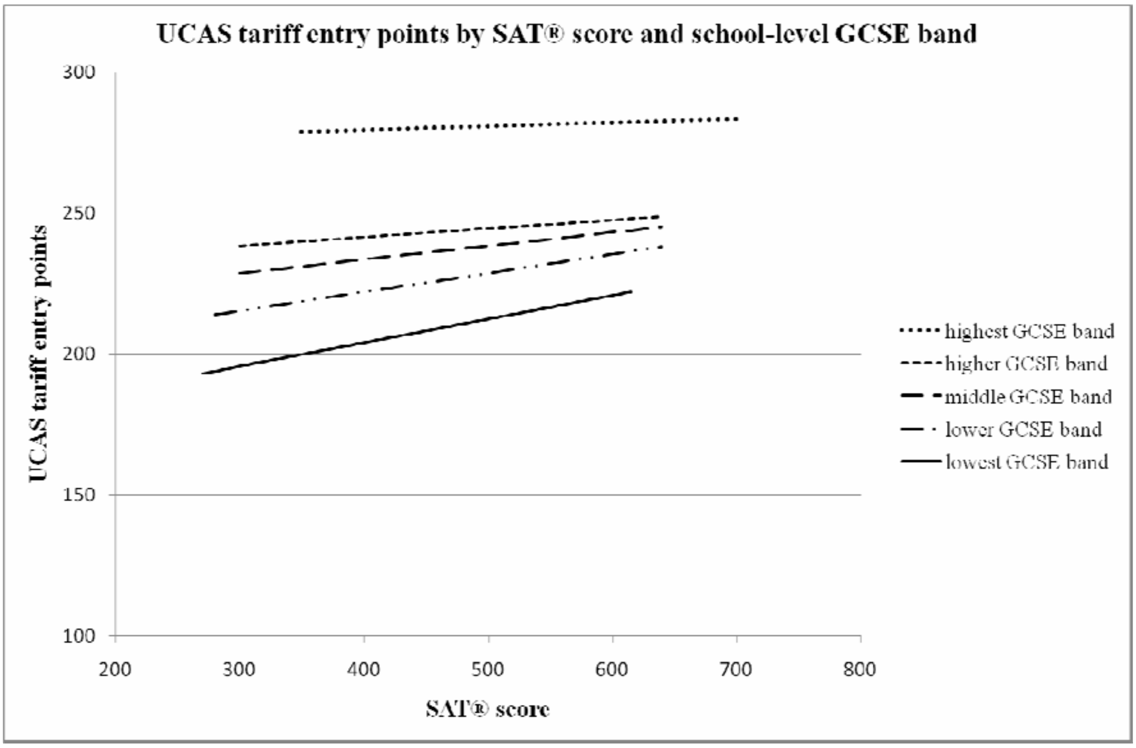
In this analysis some additional 'interaction' terms were included in order to see if there was any apparent difference in the relationship between entry points and SAT® score for different levels of IDACI, affluence measure, or school GCSE performance. Other interactions were also explored but did not produce any unexpected findings. As in earlier tables, for categorical variables, presented below the dashed line, the course entry points is the difference in entry requirements of the courses being studied by one category of pupils compared to other categories, i.e. boys compared to girls. For the non-categorical variables, presented above the dashed line, the course entry points is the difference in entry points associated with an increase in attainment by one grade in the respective attainment measure, i.e. for an increase of one grade at GCSE or an increase of 100 SAT® points. The last five rows show how course entry points are related to the interaction between students' SAT® performance and their school's GCSE performance.

Table 5.2: Significant predictors of entry points based on HESA data, including IDACI measure

Background variable	Course entry points
A level total points	4
GCSE average points	18
Total SAT® score (per 100 points)	5
IDACI measure	
School GCSE band (per 20% band)	2
Sex (female)	-7
Eligible for FSM	
Black (v. white)	
Asian (v. white)	17
Chinese (v. white)	
Mixed (v. white)	16
Other ethnicity (v. white)	
Missing ethnicity	
EAL	11
SEN	
Grammar school	-7
Interaction SAT® by IDACI	
Interaction SAT® by school GCSE band:	
per 100 points for a student in an average school	0
per 100 points for a student in better school	-2
per 100 points for a student in a top performing school	-4
per 100 points for a student in a below average school	2
per 100 points for a student in a bottom performing school	4

For this dataset there are some interesting relationships between entry points and school-level factors. The school's overall performance at GCSE seems to be positively related to the level of courses entered by its students, taking account of their attainment; although in this case attending a grammar school has a negative effect (independent schools did not figure in this dataset). However, the interaction term implies that the relationship between entry points and SAT® score is less strong for higher-performing schools and is stronger for students in schools which do less well at GCSE, as shown in Figure 5.1. This means that for two students with similar GCSE and A level attainment in schools within the same GCSE band, the student with the higher SAT® scores is more likely to have achieved a place on a course with a higher entry point requirement than a student with similar attainment but a lower SAT® score. The difference in course entry points will be greater for students in low-performing schools compared to students with the same difference in SAT® scores in high-performing schools.

Figure 5.1: Course entry points by SAT® score and school GCSE performance band



Each line represents the interaction for an average student in a school in each GCSE band (with the average GCSE and A level point scores for that particular band). The attainment and number of students in each group are shown in Table 5.3

Table 5.3: Average attainment by school GCSE performance band

		A level	GCSE	SAT®
School-level GCSE Band	**N**	**Total points**	**Av. points.**	**Mean score**
Lowest band	388	641	42	444
2nd lowest band	691	714	44	459
Middle band	1222	743	45	471
2nd highest band	823	769	45	473
Highest band	4544	930	50	528

As SAT® scores were not used by students in their HE applications it is unclear exactly why this difference in entry points has occurred. It is possible that the SAT® is reflecting factors that admissions tutors are already identifying and valuing (possibly demonstrated within applicants' personal statements or by means of other admissions tests and interviews for the most selective courses). If students with higher SAT® scores do better in HE than similar students with lower SAT® scores, there may be some potential for the SAT® to provide useful additional information to admissions departments (particularly where selection is by application form only), but exactly how this could be used would need to be established.

To summarise the results for the analysis including IDACI:

- IDACI was not significantly related to HE course entry points, implying that students from more deprived areas are on average just as likely to be studying at more prestigious institutions, conditional on their actual attainment.

- Performance at A level was the strongest predictor of entry points, with performance at GCSE the second strongest (see Table 4 in the appendix for the β coefficients which show the relative strength of each variable). SAT® score was also significantly related to entry points, over and above A level and GCSE.

- Controlling for attainment, girls tended to enter courses with lower levels of entry qualifications, while the opposite was true for Asian students and those of mixed ethnicity, and those with EAL.

- Interestingly, students in grammar schools tended to enter slightly less prestigious courses than would be predicted from their attainment, implying that students from high performance comprehensive schools, in terms of GCSE and A level band, with similar achievement and background characteristics are more likely to get onto a course with higher entry requirements than their grammar school counterparts.

- School-level performance at GCSE was a significant predictor of entry points once attainment was taken into account. The relationship with SAT® score was stronger for students in schools which did less well at GCSE.

Table 5.4: Significant predictors of entry points based on HESA data against other factors including affluence measure

Background variable	Course entry points
A level total points	3
GCSE average points	22
Total SAT® score (per 100 points)	
Affluence measure (per 20% increment)	3
School GCSE band (per 20% band)	2
Sex (female)	-8
Eligible for FSM	
Black (v. white)	
Asian (v. white)	22
Chinese (v. white)	
Mixed (v. white)	16
Other ethnicity (v. white)	
Missing ethnicity	
EAL	
SEN	
Grammar school	-9
Independent school	8
Interaction SAT® by school GCSE band	
Interaction SAT® by affluence measure	

As can be seen in Table 5.4 the results of the regression model using the affluence measure are similar to those using IDACI; however, since the dataset now includes independent school pupils, this factor has become significant. The affluence measure, based on individual students, is significant, while the SAT® score is not.

To summarise the results for the analysis including the affluence measure:

- The affluence measure was a significant predictor of the UCAS entry points for HE courses, when attainment was taken into account.

- Performance at A level was the strongest predictor of UCAS entry points (see Table 5 in the appendix for the β coefficients which show the relative strength of each variable), with performance at GCSE the second strongest. SAT® score was not significantly related to entry points, controlling for these measures and affluence.

- Controlling for attainment, girls tended to enter courses with lower levels of entry qualifications, while the opposite was true for Asian students and those of mixed ethnicity.

- School-level performance at GCSE was a significant predictor of entry points once attainment was taken into account.

- Students in grammar schools tended to enter less prestigious courses than would be predicted from their attainment, while those in independent schools tended to enter more prestigious courses.

The overall conclusion to be drawn from this is that there are factors related to the level of entry points required for students' chosen courses at both the individual student level and the school level. The former are primarily their attainment at A level and GCSE, but also elements of ethnicity and affluence. The main school-level factor is overall GCSE performance, with some evidence of students in grammar schools attending less prestigious courses than expected and the opposite for independent schools. It may be that SAT® score is a more important predictor for students in schools which do less well at GCSE.

What are the implications for the potential use of the SAT®?

- Although small, the SAT® appears to offer additional information to aid the selection of HE candidates over and above the information provided by performance at both GCSE and A level.

- Differences in SAT® scores may be useful in differentiating between students with similar attainment from schools within the same GCSE band (and that the utility of the SAT® for this purpose may be greatest within low-performing schools).

The SAT® appears to be reflecting factors identified by admissions tutors on the most selective courses. The value of this information will depend on whether students with higher SAT® scores perform better in HE than students from similar schools with similar attainment and lower SAT® scores. It will also be necessary to determine whether this information just reflects current practice or whether it can be used to identify young people who would benefit from accessing the most selective courses.

6 Future phases of the research

The final report in 2010 will follow the collection of degree outcomes from HEFCE. It will attempt to relate these to the SAT® scores and the A level outcomes, adjusting as far as possible for the loss of those not selected for HE courses. Multilevel or structural equating models will be set up to examine whether the initial aptitude test results gave significantly improved predictions of participation in HE courses and of HE course outcomes. The analyses will explore the effects of different types of school and HEI. Separate analyses for some popular subjects might be possible, as well as analyses within universities. (Such analyses will of course be reported in anonymised form.) The results of these analyses may change once data is available from students who started an HE course in 2007.

Once completed, this research will enable some important conclusions to be made about the use of the SAT® or similar aptitude test in HE admissions. The success of the SAT® in fulfilling the specified purpose will be demonstrated if it can be shown that the combination of the SAT® and A levels provides a better prediction of degree success than A levels alone. In addressing the question about students in disadvantaged circumstances, such a pattern of correlations will provide validation evidence for the SAT® in identifying those with potential - attested by their eventual degree results - not recognised by A levels, although the preliminary indications are that this will not be the case. In addressing the question regarding the most able HE candidates, the SAT® will be valid for this purpose if it provides additional discrimination amongst the highest attaining students that overcomes the ceiling effect of A levels.

The research findings will need to be considered within a wider context i.e. not only the usefulness of the SAT® but the appropriateness and consequences of its use, i.e. its consequential validity. They will also have to be considered in the light of other changes currently taking place, for example the impact of the introduction of the 14-19 diplomas.

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Appendix

Table 1: Significant β coefficients for regression of SAT® outcomes against other factors including IDACI deprivation measure

Background variable	Overall SAT score	Reading	Mathematics	Writing
A level total points	0.227	0.236	0.146	0.219
GCSE average points	0.498	0.388	0.498	0.410
Sex (female)	-0.111	-0.048	-0.246	0.038
Eligible for FSM		0.026	-0.026	
Black (v. white)				
Asian (v. white)	-0.081	-0.090		-0.113
Chinese (v. white)	-0.026	-0.037	0.021	-0.057
Mixed (v. white)				
Other ethnicity (v. white)				-0.021
Missing ethnicity				
EAL	-0.030	-0.059		-0.041
SEN				-0.032
Grammar school	0.056	0.042	0.041	0.068
School GCSE band (5 pts)				
IDACI measure				

Table 2: Significant β coefficients for regression of SAT® outcomes against other factors including derived affluence measure

Background variable	Overall SAT score	Reading	Mathematics	Writing
A level total points	0.216	0.205	0.162	0.200
GCSE average points	0.542	0.433	0.519	0.453
Sex (female)	-0.126	-0.054	-0.273	0.035
Eligible for FSM	0.027	0.038		0.024
Black (v. white)				
Asian (v. white)	-0.057	-0.082	0.021	-0.091
Chinese (v. white)	-0.038	-0.062	0.043	-0.094
Mixed (v. white)	-0.019	-0.021		
Other ethnicity (v. white)			0.026	-0.022
Missing ethnicity				
EAL	-0.028	-0.044		-0.051
SEN	-0.036		-0.021	-0.055
Grammar school	0.042	0.035	0.023	0.056
School GCSE band (5 pts)				
Affluence measure	0.074	0.095		0.076
Independent school				

Table 3: QCA GCSE and A level points scores for each grade and relationship between QCA A level points score and UCAS Tariff for A level grades

Grade	GCSE points	AS level points	A level points	UCAS Tariff (for A level grades)
A*	58			
A	52	135	270	120
B	46	120	240	100
C	40	105	210	80
D	34	90	180	60
E	28	75	150	40
F	22			
G	16			
U	0	0	0	0

Table 4: Significant β coefficients for regression of entry points based on HESA data against other factors including IDACI measure

Background variable	Course entry points
A level total points	0.447
GCSE average points	0.234
Total SAT® score	0.060
Sex (female)	-0.047
Eligible for FSM	
Black (v. white)	
Asian (v. white)	0.068
Chinese (v. white)	
Mixed (v. white)	0.026
Other ethnicity (v. white)	
Missing ethnicity	
EAL	0.044
SEN	
Grammar school	-0.044
School GCSE band (5 pts)	0.031
IDACI measure	
Interaction SAT® by school GCSE band	-0.035
Interaction SAT® by IDACI	

Table 5: Significant β coefficients for regression of entry points based on HESA data against other factors including affluence measure

Background variable	Course entry points
A level total points	0.381
GCSE average points	0.287
Total SAT® score	
Sex (female)	-0.053
Eligible for FSM	
Black (v. white)	
Asian (v. white)	0.086
Chinese (v. white)	
Mixed (v. white)	0.029
Other ethnicity (v. white)	
Missing ethnicity	
EAL	
SEN	
Grammar school	-0.059
Independent school	0.052
School GCSE band (5 pts)	0.035
Affluence measure	0.062
Interaction SAT® by school GCSE band	
Interaction SAT® by affluence measure	

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