

## Is the English Baccalaureate the most appropriate academic core? Subject choice and attainment at GCSE and A-level

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### Summary

The English Baccalaureate (EBacc) was introduced to encourage the uptake of a set of academic subjects which the government believe will improve the prospects of young people from all backgrounds (Department for Education, 2010). It has been criticised for not adequately serving pupils of all ability levels and for pushing stringently academic qualifications on those who are not academically inclined (House of Commons Education Committee, 2011). For the current study, pupils' GCSE choices and grades from 2009 were matched to their A-level choices and grades from 2011 in order to explore the relationship between taking EBacc subjects and attainment at GCSE and A-level. The findings suggest that those who studied the EBacc subjects at GCSE had better prior attainment than those who did not. However, even when this relationship was accounted for (along with differences in school type and gender), those who took the EBacc subjects appeared to slightly outperform those who did not in terms of their average GCSE grade. This effect also appeared at A-level, though it was less prominent. The analysis cannot establish the reason for this 'EBacc effect' due to a number of confounding factors. However, possible explanations for the finding, in the context of subject choice and exam performance, are discussed.

### Introduction

#### The English Baccalaureate

The English Baccalaureate (EBacc) is a school performance measure that was introduced by the Department for Education (DfE) in November 2010 as part of a drive to provide all pupils, regardless of their background, with access to a broad and robust academic curriculum (Department for Education, 2010). For a pupil to achieve the EBacc they require A\*-C grades at GCSE in the following subjects: Maths, English, Science<sup>1</sup>, a modern or ancient foreign language and either History or Geography. These subjects constitute an 'academic core' of six or seven GCSEs (depending on choices for Science) which the government would like all pupils to have access to. The selection of these particular subjects is informed by what the Russell Group of universities have defined as 'facilitating' subjects at A-level - subjects that are recommended for pupils who want to keep their options open and to undergo rigorous preparation for higher education (Russell Group, 2011). Concerns about the declining number of pupils taking GCSEs in languages, History and Geography also informed the rationale for introducing the EBacc (DfE, 2010, p. 44).

The percentage of pupils within a given school who achieve the EBacc is published in the school performance table. Though the EBacc has been established as a performance measure

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<sup>1</sup> Either a 'double award' or at least two passes from entry into all three individual science subjects: Physics, Chemistry and Biology. From 2014 Computer Science will also be included as an eligible science subject (with pupils requiring two passes from entry in at least three subjects).

it is not an accountability measure (the DfE does not stipulate a pass rate that schools are expected to meet). In England, pupils in maintained schools *must* take GCSEs in Maths, English and Science but can choose their other subjects (usually a further six to eight GCSEs or alternative qualifications), based on what is offered by their school. The government hopes that the introduction of the EBacc will encourage schools to offer more EBacc subjects and to steer their pupils towards them. This would also address concerns that performance tables have inadvertently established 'perverse incentives' for schools to enter their pupils for less academically rigorous GCSEs (or equivalent qualifications) in which they would be more likely to achieve the all-important grade C (DfE, 2010, p. 68).

There is evidence that a shift in school GCSE entry policies occurred following the initial introduction of the EBacc. The Centre for Analysis of Youth Transitions (2011) found that the EBacc had influenced the curriculum offer in 52% of the 1500 maintained secondary schools surveyed and that, overall, more EBacc subjects were being offered to and taken by pupils. More recent evidence from Greevey, Knox, Nunney & Pye (2012) suggests that the effect that the EBacc is having in schools has now stabilised. According to their research, schools have facilitated the EBacc without enforcing it by ensuring that classes are scheduled in such a way that pupils could study for and attain an EBacc if they so pleased. There was some evidence that some schools were recommending it for their more academically able pupils but in most cases schools were not overtly pressuring their pupils to take subjects which could lead to the EBacc, just facilitating it as an option.

Part of the evidence used to support the EBacc comes from the finding that those who achieve passes in this particular suite of subjects are substantially more likely to remain in education at age 19 than those who achieve the current school accountability measure of passing five or more GCSEs (including English and Maths) with grades A\*-C (DfE, 2011). The DfE statistical bulletin (2011a) elaborates on this, comparing pupils who 'achieved' the EBacc (though it did not exist when the data was collected) with those who achieved the accountability measure and those who did not achieve either benchmark. There was a clear hierarchy. Those with the EBacc were the most likely to go on to higher education, followed by those with five A\*-C grades. Those without five A\*-C grades were most likely to be not in education, employment or training (NEET), while those who achieved the EBacc were least likely to be NEET. The government argues that pupils who achieve the EBacc may be at an advantage in terms of their prospects for both higher education and employment.

### **Criticism of the EBacc**

The introduction of the EBacc was controversial (as reported by Coughlan, 2011; Mansell, 2011; and Meabh, 2011). The House of Commons' Education Select Committee (2011) outlined much of the criticism, citing evidence from a range of stakeholders. The concerns were wide ranging, from criticisms of the abrupt manner in which it was introduced, to more fundamental worries about the composition of subjects and the extent to which it may reduce pupil choice.

Though the report did not oppose the notion of establishing an academic core of subjects for all pupils, there were concerns about the composition of that core. The exclusion of religious education as an alternative to Geography or History was called into question, as was the exclusion of information technology, which, it has been argued, is a qualification which may be highly relevant to employability. The lack of provision within the core for the arts was also controversial, as was the marginalisation of vocational subjects. There were also fears that the academic core prescribed by the EBacc may damage the prospects of pupils who are not academically inclined:

*Academic subjects are not the only path to a successful future, and all young people, regardless of their background, must continue to have opportunities to study the subjects in which they are likely to be most*

*successful, and which pupils, parents and schools think will serve them best.*

(House of Commons' Education Select Committee, 2011, p.4)

This suggests that, by restricting choice, the EBacc may pressure students in to taking subjects which are inappropriate for their aspirations and that this may be detrimental for their future. The literature on subject choice suggests that students tend to select the subjects which they perceive themselves to be best at (Wilkins & Meeran, 2011), are most interesting or enjoyable to them (Stables & Wikeley, 1999), and which they perceive as most pertinent to their future (Adey & Biddulph, 2001). If this is the case, an added layer of prescription may indeed prevent pupils from taking subjects which inspire them and afford them the best opportunity for success. However, this is not clear cut: there is also evidence that pupils may not be particularly well-informed in their decisions (see McCrone, Morris, & Walker, 2005), selecting subjects which are not compatible with their aspirations. If this is the case then offering a smaller range of subjects at GCSE may indeed help pupils to keep their options open. Additionally, socioeconomic status and gender have been shown to influence subject choice (Colley & Comber, 2003; Davies, Telhaj, Hutton, Adnett, & Coe, 2008) which could lead to some groups benefitting from their education more than others based purely on trends in their decision making. There is a tension between prescribing a core of subjects which will protect pupils from poor decisions (and allow them access to a wide range of options in the future) and allowing pupils the freedom to select those subjects which best chime with their interests, aptitudes and aspirations.

The introduction of the EBacc raises important questions about the national curriculum. Young (2011) analyses the Coalition's general approach to the curriculum for 14-19 year olds and expresses concerns that a focus on transmitting 'powerful knowledge' through specific subjects (the academic core inherent in the EBacc) may exacerbate inequalities by failing to recognise the different contexts in which schools operate. Young (2011) questions whether an approach which focusses on subjects rather than learner experiences and interests is in itself problematic and suggests that a balance is required. Conway (2010) is more comfortable with the idea of academic subjects driving the curriculum and suggests that such subjects have been at the core of education for over a century. Conway (2010) goes on to suggest that teachers and pupils simply need greater scope for creativity *within* those subjects. Clearly the question of whether or not there should be an academic core of subjects is one for debate.

The EBacc performance measure was applied retrospectively to the school performance tables for 2010 (DfE, 2010). The data showed that only around 15% of students in total were achieving the EBacc and that only 4% of students eligible for free school meals passed. This was used as evidence that access to the core subjects was a particular issue for poorer pupils and was therefore a blockade to social mobility – a blockade which the EBacc could help remove. The House of Commons' Select Committee report (2011) critiqued the use of this data for including only information about those pupils who had *achieved* the EBacc and not those who had taken the relevant subjects but been unsuccessful. They confirmed that 15.2% of pupils achieved A\*-C in a full set of EBacc subjects in 2010 but found that this was only 69% of those who were taking the relevant subjects (21.9% of all pupils were taking subjects that *could* lead to the award of an EBacc). Of those students who were eligible for free school meals, only 45% of those who took subjects that could lead to an EBacc achieved it. The Select Committee point to trends over the previous seven years and argue that, though uptake of EBacc subjects was indeed on the decline, the overall number of pupils passing the EBacc was relatively stable. In other words, the subgroup of the pupil population who were no longer taking EBacc subjects appeared to represent those who were less likely to attain at least a grade C in those subjects.

Those pupils who 'completed' the EBacc before it was introduced to performance tables were not encouraged to do so by schools looking to boost their ranking. They had *chosen* to study a

language and either History or Geography (on top of the statutory Maths, English and Science) for their own reasons, which were presumably a source of motivation to them. Perhaps they were particularly interested in the subject or perhaps they felt they were very good at it. In the future, those who take a full set of EBacc subjects by choice and those who do so because they are encouraged to by their school's entry policy will be indistinguishable. It is unclear how those who are nudged into taking EBacc subjects will perform relative to those who are self-selecting but it is possible that the greater uptake of higher education opportunities and the low incidence of NEET that has been associated with the EBacc (DfE, 2011a) may be in some part dependent on this self-selection issue.

### **Rationale for the current study**

This paper attempts to build on the evidence which has informed the creation of the EBacc by exploring the relationship between subject choice, prior attainment and academic performance at GCSE and A-level. Though it is still too early to evaluate the impact of the EBacc on exam performance it is possible to explore data from previous years in a more nuanced way in order to inform the debate and raise questions that future research can tackle. Of principle concern are three potentially problematic assumptions. Firstly, there is the notion that taking the EBacc leads to increased participation in higher education and decreased occurrence of NEET (DfE, 2011a). There is a problem with comparing the outcomes of those who achieve the EBacc with those who achieve the accountability measure (five A\*-C grades including English and Maths) because the two groups are not necessarily of the same academic ability. The former requires six or seven GCSEs while the latter requires only five and these benchmarks are not sensitive to differences in average grade. The success that those who 'took the EBacc' experienced in later life may simply have been a result of higher overall academic achievement (better average grades) rather than any value inherent in studying the particular 'core' of subjects that constitute the EBacc. This study will investigate the relationship between academic ability (represented by prior attainment) and uptake of the EBacc subjects. There is an important limitation to this: the data was gathered before the EBacc was actually introduced so the analysis is based on school GCSE entry policies and pupil subject choices which were not geared towards it.

Linked to this is a second assumption that taking the EBacc, regardless of ability, somehow boosts the pupil's academic prospects. There are two mechanisms by which this may happen. Firstly, the subjects that are specific to the EBacc may be the most useful for access to higher education and employment and so taking them improves the pupil's chances of getting into university or finding work. The fact that the EBacc is based on the Russell Group facilitating A-levels suggests that the included subjects may well be beneficial for those seeking access to higher education. However, pupils will still need to attain good grades in those subjects in order for them to be valuable in this arena. The second mechanism by which the EBacc could improve prospects is by somehow boosting overall academic performance in a way which other constellations of subjects do not. Though the EBacc itself is not a programme of study, it may be that taking the EBacc subjects together facilitates better overall academic performance through a process of positive reinforcement between subjects (for example, studying History or Geography may bolster academic skills associated with English). Whether there is a cumulative effect of studying these subjects together is worth exploring. It may be that there is some sort of 'EBacc effect' which operates independently of prior attainment and school type. This paper will look for evidence of such an 'EBacc effect' but it will not be able to ascertain causality.

Finally, there seems to be an implicit assumption that those students who take the EBacc subjects at GCSE will then choose to study them at A-level. Though there is some evidence that progression between GCSE and A-level for a given subject is dependent upon the grade achieved at GCSE (Department for Education, 2012b), the relationship between the EBacc and A-levels, which are usually the intermediate step between GCSEs and higher education (and often employment), is under-researched. Although the EBacc promotes exposure to a core of

subjects at GCSE level, it does not guarantee that this exposure will lead to uptake of those same subjects at A-level. This is not a criticism of the EBacc, which aims to offer the necessary breadth to keep pupils' options open rather than to enforce subject choice (DfE, 2010), but there is certainly value in exploring whether the study of EBacc subjects at GCSE does indeed predict their study at A-level.

With these issues in mind, this paper seeks to tackle the following **research questions**:

1. How does academic performance at Key Stage 2 and GCSE differ between those who achieve the EBacc and those who achieve other benchmarks of success at GCSE?
2. Controlling for achievement at Key Stage 2, do those who study the EBacc (regardless of whether they achieve it):
  - a. Achieve better grades at GCSE?
  - b. Achieve better grades at A-level (controlling for GCSE achievement)?
  - c. Study more Russell Group facilitating subjects at A-level?

It is important to note that the EBacc is continuing to evolve. The proposal to introduce new qualifications called English Baccalaureate Certificates (EBCs) as a replacement for GCSEs has now been withdrawn (as reported in the media by Paton, 2013) but GCSEs are still to be reformed and the DfE are also consulting the public over a broad redevelopment of the accountability system (DfE, 2013). This may alter the nature of the EBacc as a performance measure or introduce alternative measures which supersede its importance. For example, a new measure has been proposed which is based on pupils' average performance across eight subjects. These eight subjects need to include English, maths, and three other EBacc subjects (from science, physics, biology, chemistry, computer science, the languages, history and geography). The remaining three subjects could be from the EBacc group, could be any other GCSE, or could be other specified vocational qualifications. This 'Average point score measure' clearly emphasises the scope for studying non-EBacc subjects (which the EBacc measure does not preclude but does not encourage in such an explicit way) and this may alter patterns of subject choice by pupils. However, regardless of which performance measure becomes most salient following reform, the EBacc looks set to stay. Essentially it introduces an 'academic core' of subjects and this raises important questions about what that core should be and how much choice pupils should have in what they study.

## Method

The analysis included close to 675,000 candidates. The dataset included all students who had taken at least one GCSE in June 2009 with one of the major awarding bodies who offer qualifications in England (AQA, OCR, Edexcel and WJEC). Pupils' subject entry and grades in June 2009 were matched to their entries and grades at A-level in June 2011 (where possible). Only participants who were aged 16 at the time of their GCSEs were included in the analysis because they constitute the main cohort of candidates and exemplify a 'typical' path through education (e.g. taking GCSEs at 16 followed by A-levels at 18). The June series was selected because it is by far the most popular for certification, though this means candidates who certificated in earlier series of modular specifications (such as Maths and English) were excluded from the analysis<sup>2</sup>. The data does not include AS qualifications because they are less pertinent for entry to higher education. School type was also included in the analysis, classified as either comprehensive, selective, independent, city academy or other.

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<sup>2</sup> There is a growing trend for early entry to some GCSEs (Department for Education, 2011b) but unfortunately it was not possible to identify and include such candidates in this analysis.

A series of variables were calculated from the available data. Average Key Stage 2 (KS2) score was calculated by taking the mean key stage level attained across the three assessed subjects (English, Maths, and Science), excluding those who did not have a full complement of results. The average GCSE grade was calculated by assigning a numeric value to each grade (A\*=8, A=7..., G=1) and taking the mean across all subjects that were taken. Average GCSE was only calculated for those pupils who took 5 or more subjects. Total A-level grade was calculated by assigning a number to each grade (A\*=6, A=5..., E=1) and summing the values<sup>3</sup>. It was decided that a total score was preferable to an average score for A-level given that pupils tend to take only a few subjects and it would be undesirable to compare averages when subject choices may be radically different. For example, comparing the average grade of a pupil who had taken Maths, further Maths, Physics and Chemistry to that of a pupil who had studied Sociology and Media studies may not be a fair representation of their relative academic attainment.

Variables were created to indicate whether pupils had achieved a number of benchmarks at GCSE (see Table 1). Four of these benchmarks represent alternative academic cores, versions of the EBacc which have slightly less heavily prescribed subject requirements. It was also possible to distinguish between: a) those who had achieved the EBacc, b) those who had taken a set of subjects that may have led to an EBacc but had failed to achieve the required grades, and c) those that had not taken the necessary subjects and could not have achieved an EBacc regardless of their grades. It is important to note that the exact qualifications and specifications eligible for each subject within the EBacc differ slightly year on year (for example, iGCSEs are now recognised for subjects such as Maths and English but were previously ineligible). The structure of the EBacc used in this study was based on the guidance from 2010 and may not reflect the currently available specifications or the current rules of eligibility (DfE, n.d.). This means that the data may provide an inaccurate impression of pupils from some schools, particularly independent centres that may be more likely to register their pupils for non-standard qualifications in key EBacc subjects.

## Results

### *Prior attainment and EBacc success*

Table 1 shows the pass rates for a number of different performance measures along with the mean KS2 and GCSE grades of those who passed them. The final four benchmarks shown in the table indicate what the pass rates would be if less heavily prescribed academic cores were specified and if religious education was allowed in lieu of History or Geography. Though the differences between groups were quite small, the English Baccalaureate is the benchmark which was least likely to be attained by candidates in 2009. Those who achieved the EBacc had the highest prior attainment at key stage 2 and the best average GCSE grade.

**Table 1** Percentage of students achieving different sets of subjects (Grades A\*-C)

Performance Measure	% Achieved	Mean KS2 score (2-5)	Mean GCSE grade (0-8)
English Baccalaureate (EBacc)	12.2	4.72	6.54
Passed 5 A*-C (including English & Maths)	40.1	4.56	5.98
Passed 9 A*-C (including English & Maths)	19.3	4.69	6.45
EBacc without language, History or Geography	29.4	4.61	6.12
EBacc without language	18.9	4.69	6.41
EBacc without Geography or History	17.2	4.66	6.31
EBacc allowing RE in lieu of Geography or History	13.9	4.71	6.51

<sup>3</sup> Note that pupils who had taken more than six A-levels were excluded from analysis as outliers (N = 69).

*School type and EBacc success*

It is worth noting that there are substantial differences in the entry patterns of different school types with regard to the EBacc. Table 2 shows a breakdown of the proportion of pupils attempting and achieving the EBacc at each school type. The EBacc subjects appear to be particularly popular in selective schools, where over half of all students attempted a set of subjects that would have led to an EBacc, and 82% of these pupils would have achieved it. The EBacc was least popular in City Academies, where around seven per cent of pupils took the relevant subjects and only around half of those would have been successful. Comprehensive schools make up the majority of this sample and around 17% of pupils from this school type took subjects which could lead to the EBacc (62% of whom would have been successful). It would appear that the proportion of pupils in a school who study for qualifications in the full range of EBacc subjects differs depending on the type of school.

**Table 2** Cross tabulation of EBacc entry, EBacc success and school type<sup>4</sup>

		EBacc status			N
		Did not take	Took subjects but did not achieve	Achieved	
<i>School Type</i>	Comprehensive	83.3%	6.4%	10.3%	552838
	Selective	52.4%	5.0%	42.6%	30477
	Independent	73.0%	4.2%	22.9%	46470
	City Academy	92.8%	2.6%	4.7%	18197
	Other	98.2%	0.5%	1.3%	13618
<b>Total</b>		81.7%	6.0%	12.3%	661600

*The EBacc and average attainment at GCSE*

A regression model was used to control for prior attainment at Key Stage 2 in an attempt to establish whether the act of selecting all of the EBacc subjects leads to better GCSE performance. Average GCSE grade was the outcome variable, while the explanatory variables were added in two steps: step 1 included average KS2 score, gender and a series of dummy variables for school type<sup>5</sup>, while step 2 added the 'EBacc taken' variable, which specifies whether or not the pupil took subjects that could lead to an EBacc (regardless of success). Interactions between the EBacc variable and the centre type variables were explored but are excluded because they made the model less parsimonious and added very little explanatory power. The model is summarised in Table 3.

<sup>4</sup> The percentage values may not add to one hundred on each row due to rounding.

<sup>5</sup> The base category is Comprehensive school. This is compared to Selective, Independent, City Academy and 'Other' school types, each represented by a dummy variable.

**Table 3** Average GCSE grade regressed on average KS2 score, gender, school type and EBacc

	<b>B</b>	<b>SE B</b>	<b>β</b>
<i>Step 1</i>			
Constant	-2.036	.011	
KS2 score	1.627	.003	.668*
Gender	.251	.003	.093*
Selective	.644	.007	.097*
Independent	.897	.006	.146*
City Academy	-.117	.009	-.013*
Other	-.223	.028	-.008*
<i>Step 2</i>			
Constant	-1.787	.011	
KS2 score	1.548	.003	.636*
Gender	.242	.003	.090*
Selective	.501	.007	.076*
Independent	.867	.006	.141*
City Academy	-.082	.009	-.009*
Other	-.181	.028	-.007*
EBacc taken	.451	.003	.139*

$R^2 = .538$  for step 1,  $\Delta R^2 = .017$  for step 2 ( $p < .001$ ). \* $p < .001$ .

By far the most important predictor of average GCSE grade was prior attainment at KS2. Gender also had a statistically significant effect such that girls tended to attain about a quarter of a grade more than boys (0.242). There were significant school type effects, even after accounting for prior attainment, with those from independent schools attaining around nine-tenths (.867) of a grade more on average than those from comprehensive schools. Those from selective schools attained an extra half a grade (.501) relative to their peers from comprehensive schools. The analysis suggests that those who studied the constellation of subjects included in the EBacc do indeed seem to achieve a higher average GCSE grade (regardless of prior attainment) relative to those who study other selections of subjects. They attain, on average, just under half of a grade more (.451). The final model (EBacc variable included) accounts for 55.5% of the variance in average GCSE grade. Including the EBacc variable in the model explains only 1.7 % of the variance in average GCSE grade.

#### *The EBacc and average attainment at A-level*

A similar model was constructed to see if there was also an EBacc effect for total A-level score. Average GCSE grade was included in the first step of the model which means that any effect at A-level would not be purely attributable to the increased performance at GCSE of those who took the EBacc. The school type variable refers to the school the pupil attended during their GCSEs. Table 4 summarises this model.



**Table 4 Total A-level score regressed on average KS2 score, average GCSE grade, gender, school type and EBacc**

	<b>B</b>	<b>SE B</b>	<b>β</b>
<i>Step 1</i>			
Constant	-17.077	.093	
KS2 score	-.167	.025	-.013*
Average GCSE grade	4.523	.012	.731*
Gender	-.146	.017	-.013*
Selective	1.141	.032	.057*
Independent	.307	.030	.016*
City Academy	-.348	.064	-.008*
Other	-.171	.239	-.001
<i>Step 2</i>			
Constant	-16.891	.093	
KS2 score	-.188	.025	-.015*
Average GCSE grade	4.479	.012	.724*
Gender	-.145	.017	-.013*
Selective	1.021	.032	.051*
Independent	.334	.030	.018*
City Academy	-.302	.064	-.007*
Other	-.116	.239	-.001
EBacc taken	.509	.018	.045*

$R^2 = .549$  for step 1,  $\Delta R^2 = .002$  for step 2 ( $p < .001$ ). \* $p < .001$

Average GCSE grade is the strongest predictor of A-level score by a large margin, subsuming the importance of KS2 score. The model suggests that if a candidate scores one full grade higher on average across their GCSEs than their peers they will be predicted an A-level score that is four and a half grades higher (4.479). When interpreting this coefficient it is important to take into account ceiling effects – the average grade of those included in the sample is already high<sup>6</sup>. The effect of gender, though statistically significant, is smaller at A-level. Interestingly it appears to point in the opposite direction, with boys achieving about one-seventh (.145) of an A-level grade more than girls. School type effects are present, with those from selective schools outperforming peers who studied at comprehensive schools by about one grade (1.021). Whether or not a pupil took GCSEs that could have led to the EBacc does seem to influence A-level performance: those who took the EBacc achieve just over half a grade (.509) more on their A-level score. This may reflect higher average grades, taking more subjects, or a combination of the two. Including the EBacc variable in the model has a barely discernible impact on the amount of variance in A-level score that it explains (only 0.2% of additional variance is accounted for). The model accounts for 55.1% of the total variance in A-level score.

#### *The EBacc and uptake of facilitating A-levels*

Table 5 shows a cross-tabulation of two binary variables: whether or not the pupil took the EBacc (regardless of success), and whether or not they went on to study two or more Russell Group facilitating subjects. Only students who took at least two A-levels were included in this table. Chi square analysis suggests that those who studied the EBacc subjects were more likely to take at least two facilitating subjects at A-level than those who did not study them,  $\chi^2(1, N = 223,087) = 4232.17, p < .001$ .

<sup>6</sup> The model includes only those who took A-levels and therefore represents pupils who are more academically able. This means there is restriction of range in the prior attainment variables and therefore there is less variance to model.

**Table 5 Cross tabulation of EBacc entry and Russell Group A-levels**

		Number of Russell Group facilitator subjects taken	
		Zero or one	Two or more
EBacc	Did not take	65.7	34.3
	EBacc subjects taken	51.7	48.3

A binary logistic regression model was used to establish whether or not studying the EBacc increases the probability of a pupil taking two or more Russell Group facilitating subjects at A-level if prior attainment is taken into account. Table 6 summarises the analysis. With the exception of two of the school type comparisons, the explanatory variables were all statistically significant. Average GCSE grade proved to be the strongest predictor of uptake of Russell Group subjects, with an odds ratio of 4.624. This means that if pupil A achieves a full grade more than pupil B than she is around four and a half times more likely to take two or more Russell group facilitating A-levels. Boys were nearly three times as likely to take two or more Russell Group facilitating A-levels than girls. The model suggests that those who studied subjects which could lead to the EBacc were one and a half times more likely to study two or more facilitating A-levels.

**Table 6 Logistic Regression model for predicting uptake of two or more Russell Group subjects at A-level**

	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
<i>Step 1</i>				
<i>Constant</i>	-10.540 (.080)*			
KS2 score	.159 (.019)*	1.131	1.173	1.216
Average GCSE grade	1.551 (.010)*	4.625	4.718	4.812
Gender	-1.009 (.012)*	.356	.365	.373
Selective	-.019 (.020)	.944	.982	1.021
Independent	-.180 (.020)*	.804	.835	.868
City Academies	.050 (.048)	.957	1.051	1.155
Other	.008 (.175)	.716	1.008	1.421
<i>Step 2</i>				
<i>Constant</i>	-10.506 (.080)*			
KS2 score	.148 (.019)*	1.118	1.159	1.203
Average GCSE grade	1.531 (.010)*	4.533	4.624	4.717
Gender	-1.017 (.012)*	.353	.362	.370
Selective	-.110 (.020)*	.861	.896	.932
Independent	-.158 (.020)*	.822	.854	.887
City Academies	.086 (.048)	.991	1.090	1.198
Other	.063 (.175)	.756	1.065	1.500
EBacc taken	.387 (.012)*	1.438	1.473	1.508

$R^2 = .263$  (Cox & Snell),  $.358$  (Nagelkerke). Model  $\chi^2 (8) = 40.120$ ,  $p < .001$ . \* $p < .001$ .

These findings must be interpreted cautiously. The data does not appear to be a particularly good fit for the model (Hosmer & Lemeshow  $\chi^2 (8) = 40.120$ ,  $p < .001$ ) and the pseudo  $R^2$  values are relatively low. The model does not reliably identify those who *did* study two or more Russell Group A-levels, incorrectly classifying 40.0% of cases (the model correctly classifies 83.5% of cases who *did not* take two or more Russell Group A-levels and 74.5% of cases overall). Though it does appear that studying the EBacc subjects at GCSE is associated with continuing to study them at A-level, a stronger influence on uptake would appear to be academic ability - the odds of studying two or more Russell Group A-levels is four and a half times higher (4.624) for every increase of one average grade. Though this figure is striking it must be interpreted

cautiously given the relatively low reliability of the model and the restriction of range associated with the high average GCSE grades held by the sample.

## Discussion

The government's intention to use the EBacc as a lever to steer pupils towards what they consider to be the academic core of subjects appears to have been relatively successful thus far (Centre for analysis of youth transitions, 2011; Greevey, Knox, Nunney & Pye, 2012). This paper seeks to enhance understanding of the link between *taking* the EBacc and general attainment at GCSE and A-level. It also explores whether taking the EBacc improves the uptake of facilitating subjects at A-level, those subjects identified by the Russell group as the best preparation for higher education and the most important for keeping a range of options open to pupils. Clearly the landscape has changed since 2009 when the data used in this study was collected. The EBacc did not exist at that time and so issues surrounding subject choice were very different. For this reason, it is important to carefully consider the limitations of this study before drawing any conclusions so that balanced extrapolations can be more easily made.

### *Limitations*

Firstly, the data used in this study, like the data used by the government to inform the creation of the EBacc (DfE, 2010), actually predates the introduction of the EBacc. The issue here is that in future studies it will become impossible to disentangle those who naturally chose the EBacc (as would have been the case for pupils in this study) and those who may have had their choices prescribed by schools that are keen to improve their appearance in the performance tables. As has been discussed, if a pupil shows a preference for a subject at GCSE then they may well also show it at A-level. Encouraging pupils to study subjects which they may not be good at or which they may have no interest in *could* increase uptake of those subjects at A-level. If taken at GCSE the subject will remain viable as an option at A-level and it is possible that exposure to less popular subjects may improve disaffected pupils' perceptions of them. However, it is also very possible that it will have no impact on A-level uptake. Rather than encourage pupils to study EBacc subjects at a more advanced level, it will simply move back the time at which they will be free to drop them. The issue of self-selection is crucial. Those who explicitly choose a subject may be more motivated by it and therefore more likely to outperform what is expected of them based on their prior attainment. Those who are forced to take a subject may underperform relative to expectation simply because they are not engaged by the content. This study has no way of clarifying the nature of this relationship but it will be interesting to see whether the small but positive 'EBacc effect' observed in this analysis continues to exist in future data sets which will include both those who self-select and those who are influenced by their school.

Secondly, the way in which the EBacc benchmark is constructed may change frequently and subtly over time. Each year the DfE has slightly alters the precise qualifications which are eligible for the EBacc which may cause small shifts in the outcomes associated with it. For example, this study had no way of establishing whether or not pupils had taken iGCSEs, which are now eligible for inclusion within the EBacc. Indeed, there was a small subpopulation of pupils who did not achieve the EBacc or any other benchmark based on the measures available in this study but achieved 9 or more GCSEs at A\*-C and very good GCSE and A-level grades. Exploring these outliers revealed that they had a tendency to come from independent schools, which may mean they are taking reputable alternative courses for English and/or Maths, such as the iGCSE, which would be invisible to this data set. This has the potential to skew the findings but the impact of not having this data is difficult to gauge precisely. The relatively low proportion of pupils from independent schools, around 7% of pupils in England (Independent Schools Council, 2011), is a mitigating factor. As discussed on page 5, the proposed new points based accountability measures may further change the landscape for 2014.

Finally, there are a number of demographic variables that are pertinent to academic performance that are not included in this analysis but may be relevant to the EBacc effect. For example, socio-economic class (SEC) has been shown to influence achievement (e.g. Sullivan, Heath & Rothon, 2011) and this relationship is further complicated by an interaction between SEC and ethnicity (e.g. Strand, 2011). Given that SEC has also been linked to subject choice (Davies, Telhaj, Hutton, Adnett, & Coe, 2008) it may well contribute to an explanation for the EBacc effect observed in this analysis. There is also a large body of research which demonstrates that schools differ significantly in what they offer students at GCSE (Davies, Telhaj, Hutton, Adnett, & Coe, 2004). Though a general school type variable has been used in the analysis this may not adequately capture the diversity in individual school subject entry policies. If each individual school offers different subjects then there are likely to be significant school effects in uptake of EBacc subjects and pass rates. To be adequately disentangled, these effects would require exploration through the use of multi-level modelling. A natural next step would be to ascertain if the findings of this study are the same even when accounting for such potential school level effects. There are clearly a multitude of variables associated with exam performance and many of these may well interact with (or possibly confound) the 'EBacc effect' observed in this study.

### *Findings*

Despite these limitations, this study provides some extra nuance to our understanding of the research that associates the study of the EBacc subjects with positive outcomes for pupils (DfE, 2011a). There is clearly a strong link between taking the EBacc subjects and prior attainment at KS2 in pre-EBacc era data. This suggests that the relationship between the EBacc and entry to higher education (and low NEET incidence) which was championed by the government (DfE, 2011a) may be confounded by pupils' overall academic ability. There appears to be an assumption that studying the EBacc will increase participation in higher education but this may be flawed. Pupils hoping to attend a top university or compete in the job market will still require good grades in whatever qualifications they take. They may be less likely to get such grades if studying subjects that they did not choose themselves and are therefore less interested in. Table 1 shows that pupils who pass the EBacc are the highest achieving group in terms of their KS2 profile. In short, it could be argued that they were already the cohort most likely to attend university *before* they selected their GCSEs because they were the most academically able.

This prior attainment advantage was accounted for statistically to ascertain whether studying the EBacc (regardless of success) improves pupils' average GCSE attainment. In other words is there an 'EBacc effect' whereby studying the EBacc subjects together (the academic core) boosts performance. Those with the EBacc did indeed have a higher average GCSE grade (about half a grade higher) and there are a number of possible explanations for this. Firstly, it may be that pupils who choose to study the more classically academic subjects that make up the EBacc are stronger academically than those that don't, regardless of prior attainment at KS2, because they are generally better suited to secondary education. Their willingness to tackle academic subjects may reflect a higher than average level of engagement with school and this may translate to better overall grades.

A second explanation is that there may be differences in the relationship between KS2 performance and GCSE attainment for each subject. There is some evidence that it is easier for students to achieve high grades in some subjects relative to others (Coe, 2008). If EBacc subjects were leniently graded relative to other subjects (based on predictions formed from KS2 results) then there may be a boost to the *average* GCSE grade of those who study them, even after controlling for KS2 results. Equally, the opposite may be true – EBacc subjects may in fact appear quite harshly graded once prior attainment is accounted for meaning that the extent of the 'EBacc effect' is understated in this study. The analysis by Coe (2008) suggested that

languages were relatively difficult and Geography and History were about average relative to other subjects, so, if either effect exists, the latter seems more likely<sup>7</sup>.

A final possible explanation is that something about the constellation of subjects that compose the EBacc provides a boost to overall attainment. The EBacc is a rather nebulous entity - it is not a programme of study like the international baccalaureate and is instead a package or 'wrapper' for a particular set of existing qualifications (House of Commons Education Committee, 2011). However, this does not negate the possibility that studying the content of one subject could have a positive effect on another. For example, studying Maths may help a pupil to improve at Physics. Wolf's (2011) report on vocational education suggests that 'wash-back' effects such as this are possible. The report discusses evidence that studying certain vocational qualifications in tandem with traditional GCSEs can actually reduce a pupil's chances of achieving the accountability measure at GCSE (5 A\*-C grades including English and Maths). It is possible that the EBacc is having a similar but reverse effect - somehow, the whole is greater than the sum of the parts. It would be speculation to attempt to identify the origin of such a Gestalt effect but this is certainly an area with scope for future research. Perhaps prescribing an academic core of subjects instead of sanctioning a more pupil/school-led pick and mix approach could boost overall academic performance for all or some pupils.

Related to this, there was some evidence for a small but statistically significant effect of studying the EBacc being carried over to A-level, whereby those with the EBacc scored about half a grade more on their total A-level score. It is apparent that the EBacc is more important for average GCSE performance than performance at A-level, but given that those pupils who take A-levels are a self-selecting group of relatively high achievers this is not particularly surprising. Also somewhat unsurprising is the fact that those who studied the EBacc at GCSE are more likely to study the facilitating subjects on which it is based at A-level (though clearly subject choice at A-level is a complex process which incorporates a wider range of variables than those included in the model described in this study). The effect is quite small, but is still present after accounting for GCSE attainment, which has been shown to be an important predictor of progression between GCSE and A-level (DfE, 2012b). Showing a preference for a selection of subjects at GCSE seems to predict similar preferences at A-level. While this step is intuitive it is one that was missing from the initial rationale for the EBacc and so serves to fill a gap in our understanding. Care must be taken to avoid over-interpreting this because, as has been discussed, pupils who take the EBacc in the future are likely to incorporate a smaller proportion of self-selecting individuals who chose the EBacc subjects based entirely on their own interests and ambitions. The relationship between GCSE choices and A-level choices may therefore change once the EBacc has established itself and once the reform of Key Stage 4 qualifications is complete.

### *Conclusion*

This study suggests that the combination of subjects which is at the core of the EBacc may be associated with higher overall academic performance but this effect is confounded by the shifting context of education policy's impact on subject choice. Regardless, future research should continue to build on our knowledge of how certain sets of subjects (academic cores) may complement each other. It is also important to continue to monitor the impact of the EBacc on academic performance, subject choice, higher education uptake and incidence of NEET while accounting for the prior ability of pupils.

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<sup>7</sup> There is potential to analyse the dataset used in this study with regard to inter-subject comparability of grading standards. However, such an analysis is beyond the scope of the current paper.

There are two key questions to consider going forward:

- 1) Is narrowing subject choice through policy potentially damaging to sub-groups within the population of pupils?
- 2) Is the core of subjects that is prescribed by the EBacc the most suitable and valuable?

Even though GCSEs and the accountability system are to be reformed, these issues remain pertinent. The structure and potential impact of any 'academic core' of subjects which we encourage our young people to study must be explored in sufficient detail if we are to provide the type of courses and qualifications which will be most beneficial to young people.

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