

# Entry and attainment in STEM subjects at GCSE in grammar school areas

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The Education Policy Institute is an independent, impartial and evidence-based research institute that aims to promote high quality education outcomes, regardless of social background.

Education can have a transformational effect on the lives of young people. Through our research, we provide insights, commentary and critiques about education policy in England - shedding light on what is working and where further progress needs to be made. Our research spans a young person's journey from the early years through to higher education and entry to the labour market. Because good mental health is vital to learning, we also have a dedicated mental health team which will consider the challenges, interventions and opportunities for supporting young people's wellbeing.

Our core research areas include:

- Accountability and Inspection
- Benchmarking English Education
- Curriculum and Qualifications
- Disadvantaged, SEND, and Vulnerable Children
- Early Years Development
- School Funding
- School Performance and Leadership
- Teacher Supply and Quality
- Children and Young People's Mental Health
- Education for Offenders

Our experienced and dedicated team works closely with academics, think tanks, and other research foundations and charities to shape the policy agenda.

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## Background

In September the Education Policy Institute carried out new analyses examining the impact of academic selection in grammar schools on attainment and social mobility in England, using data from the school Performance Tables, the School Census and the Department for Education's National Pupil Database. The results were published in 'Grammar schools and social mobility'.<sup>1</sup>

It found no evidence to suggest that overall educational standards in England would be improved by creating additional grammar schools. At a national level, more grammar schools would likely lead to small gains in attainment for the minority of children attending such schools, including the small number of children from low income backgrounds. But, additional grammar schools would be likely to lead to increases in the aggregate attainment gaps between rich and poor children. In areas of the country where there is already a high proportion of selection, extra grammar school places are likely to lead to small but increasing attainment losses for all pupils who do not attend grammar schools - and net negative attainment effects for the poorest children.

Subsequently the Education Policy Institute was commissioned by the Royal Society to examine two further questions relating to performance in STEM subjects, specifically:

- Do grammar school areas have lower proportion of FSM students taking single science, or alternative science qualifications at 16 than non-grammar school areas?
- Do grammar school areas have a lower proportion of FSM students with GCSE maths grade D (or C) or less than non-grammar school areas?

We have examined these questions by carrying out new analysis of the National Pupil Database (NPD) which we present here. We have also considered attainment in mathematics and entry to science subjects for pupils in selective areas in comparison to similar pupils elsewhere.

**Note:** The Department for Education is responsible for the collation and management of the NPD and is the Data Controller of NPD data. Any inferences or conclusions derived from the NPD in this publication are the responsibility of the Education Policy Institute and not the Department for Education.

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<sup>1</sup> Available from [epi.org.uk/report/grammar-schools-social-mobility/](https://epi.org.uk/report/grammar-schools-social-mobility/)

## Analysis

There are currently 163 selective schools in England. They are found in 36 of the 152 local authorities in England. Ten local authorities are classified as ‘wholly selective’ by the Education (Grammar School Ballots) Regulations 1998. These are Bexley, Buckinghamshire, Kent, Lincolnshire, Medway, Slough, Southend-on-Sea, Torbay, Trafford and Sutton.<sup>2</sup> A further 26 local authorities are known as being ‘partially selective’, in that they have at least one selective school. Such areas are not defined as selective by legislation, though the proportion of pupils who are educated in selective schools is often significant.

In this analysis we present results for pupils attending selective schools, and then pupils attending non-selective schools in non-selective areas, in partially selective areas and in wholly selective areas. When considering the results for FSM pupils in this analysis it is important to remember the relative number of pupils in selective and non-selective schools. There are around 500 FSM pupils in selective schools at the end of Key Stage 4 compared to 51,000 in non-selective local authorities, 16,000 in non-selective schools in partially selective authorities and 4,000 in non-selective schools in wholly selective local authorities.

### Science subjects

Figure 1a shows the proportion of pupils that were entered for triple science, two EBacc sciences or any other science qualification by school type and eligibility for free school meals. Pupils in selective schools are overwhelmingly entered for biology, physics and chemistry – two-thirds of FSM pupils and nearly three-quarters of non-FSM pupils. This is much higher than the rate seen in non-selective schools in non-selective or partially selective areas.

The difference for non-selective schools in wholly selective areas is starker still. Pupils eligible for free school meals in these schools:

- Are very unlikely to be entered for triple science, just 4.5 per cent are entered for all three science subjects (half the rate seen in partially or non-selective areas)
- Have a less than 50:50 chance of being entered for either triple science or two EBacc sciences (46.8 per cent)
- Are much more likely to take a single science or other science qualification than FSM pupils in other areas – one third of such pupils versus one fifth.

The differences between FSM pupils in selective schools and FSM pupils in other schools are not surprising. A relatively small proportion of pupils in grammar schools are eligible for free school meals (less than 3 per cent) and the prior attainment of these pupils is very atypical of FSM pupils overall.

If we consider FSM pupils in *wholly selective* areas as whole (i.e. do not split by the type of school attended) we find that:

- They are less likely to be entered for triple science than FSM pupils in non-selective areas (8.8 per cent versus 9.3 per cent)

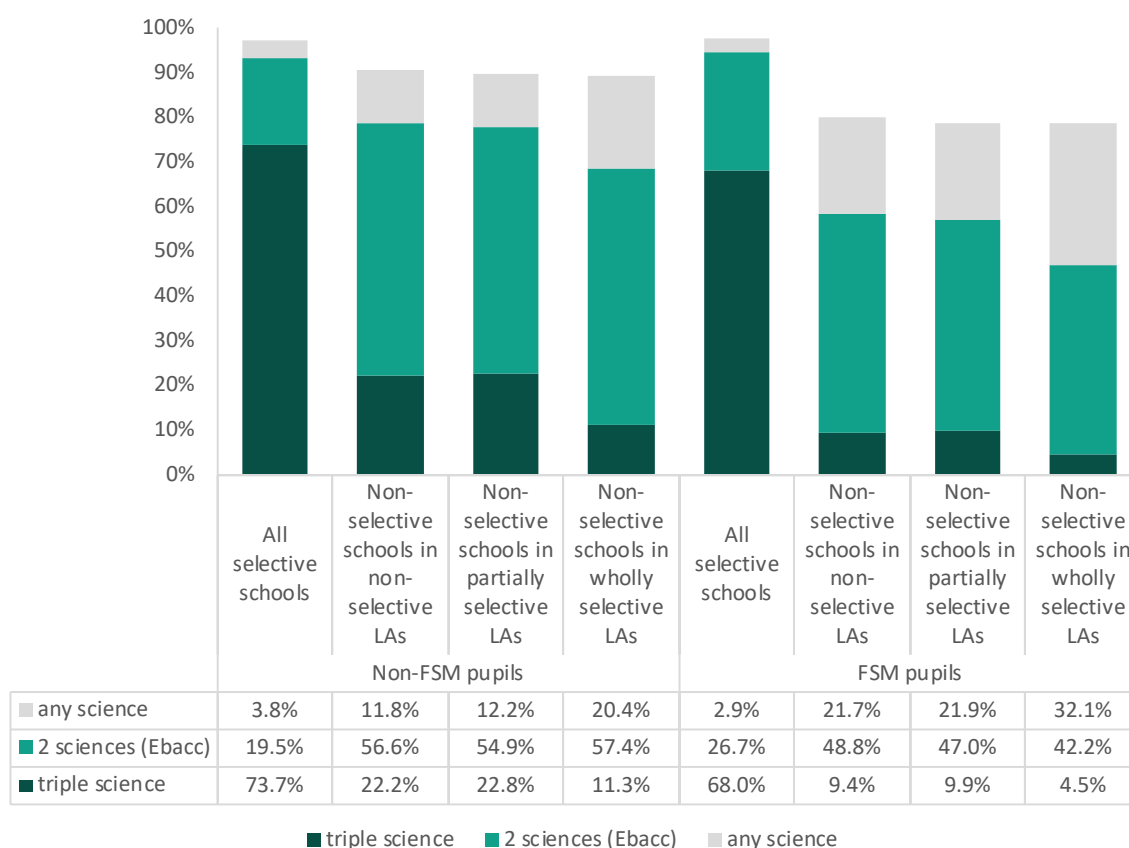
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<sup>2</sup> <http://www.legislation.gov.uk/ukxi/1998/2876/contents/made>

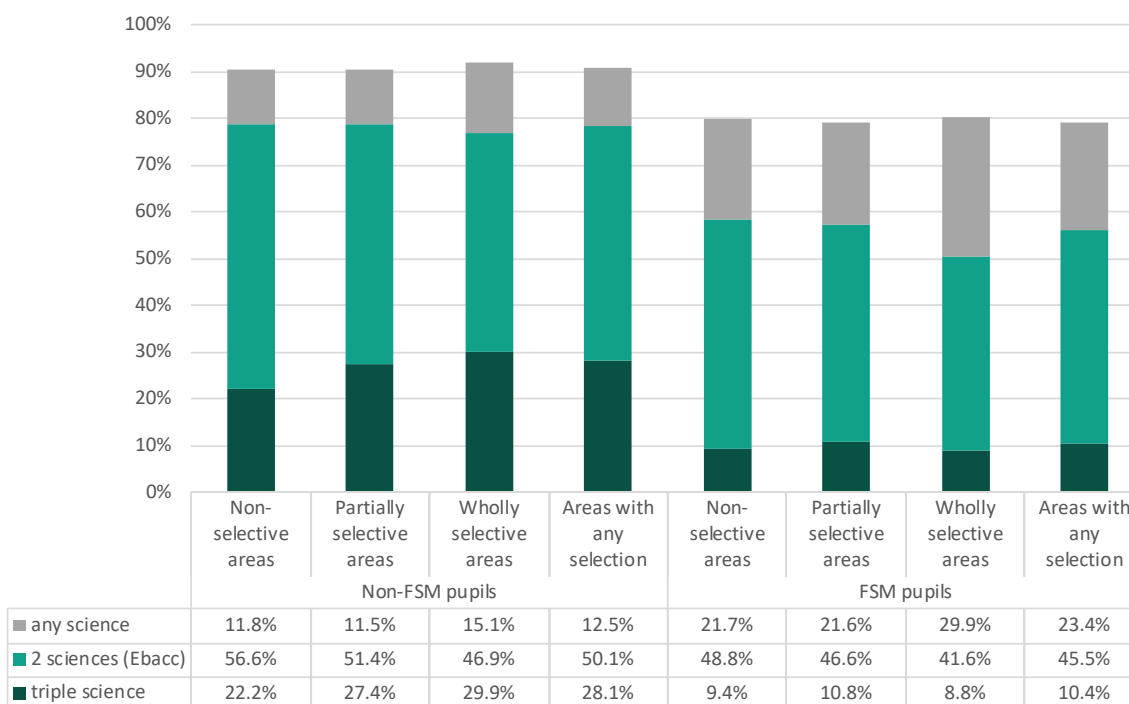
- They are far less likely to be entered for triple science or two EBacc sciences than FSM pupils in non-selective areas (50.4 per cent versus 58.2 per cent)
- Are much more likely to take a single science or other science qualification than FSM pupils non-selective areas – one third of such pupils versus one fifth.

For full breakdowns see Figure 1b.

**Figure 1a: Proportion of pupils entered for science subjects at GCSE in 2015 by free school meal eligibility, school admissions policy and local authority type.**



**Figure 1b: Proportion of pupils entered for science subjects at GCSE in 2015 by free school meal eligibility, and local authority type.**



## Mathematics

Figure 2a shows the proportion of pupils that achieved grade B or above in GCSE mathematics in 2015. Not surprisingly, the vast majority of pupils who attend selective schools achieve this benchmark – 91.7 per cent of non-FSM pupils and 83.6 per cent of FSM pupils.

More broadly, FSM pupils are unlikely to achieve a grade B in mathematics. Outside of grammar schools less than a fifth of pupils do so. The rate is lowest in non-selective schools in wholly-selective local authorities where just 13.2 per cent of FSM pupils meet the standard. Non-FSM pupils are also unlikely to achieve a grade B in these schools – less than a third of pupils do so compared to around 40 per cent in other areas.

If we consider FSM pupils as whole (i.e. do not split by the type of school attended) we find that pupils in wholly selective areas are less likely to achieve a grade B in mathematics than in non-selective authorities. In areas with *any* selection, i.e. including partially selective areas, then the rate of achievement at B+ is the same as in non-selective authorities (Figure 2b).

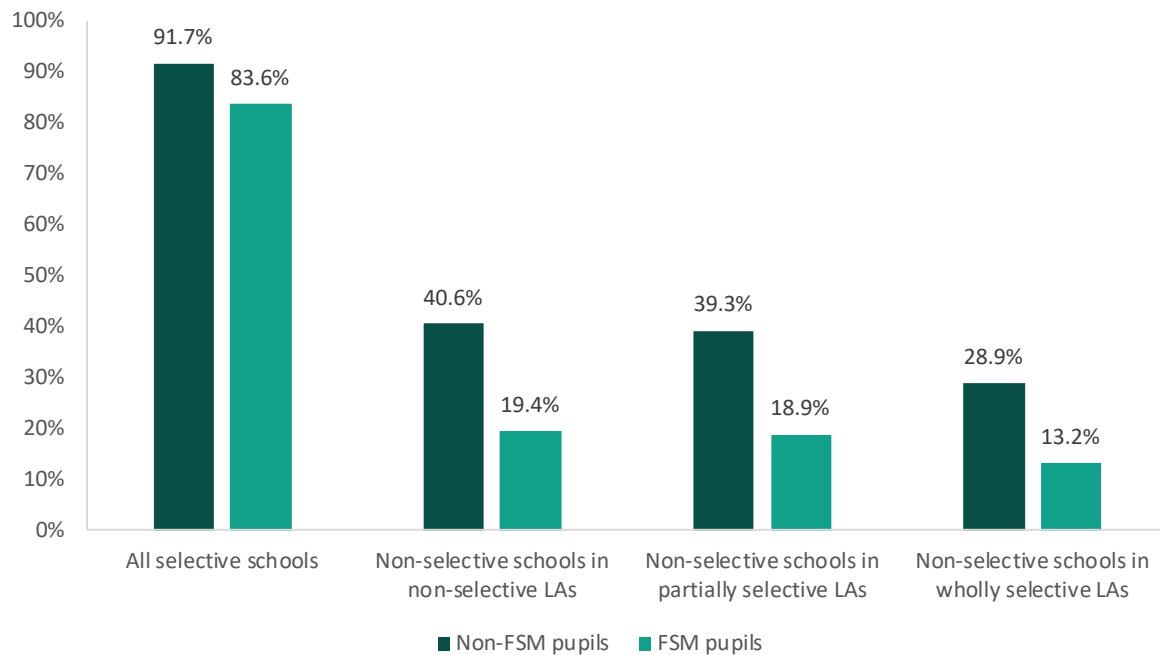
FSM pupils in wholly selective areas are also behind when it comes to achieving a grade C or above (Figure 3a) though the differences between area types are relatively smaller. For FSM pupils in non-selective schools the proportion achieving a grade C or above in mathematics was:

- 48.1 per cent in non-selective areas;
- 47.5 per cent in partially-selective areas; and
- 39.5 per cent in wholly-selective areas.

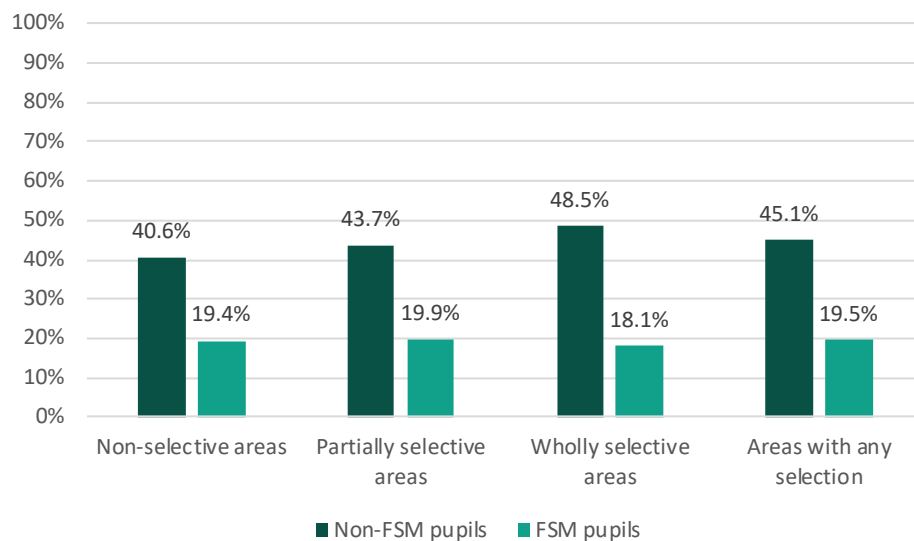
If we consider FSM pupils as whole (i.e. do not split by the type of school attended) we find that pupils in wholly selective areas are far less likely to achieve a grade C in mathematics than in non-selective authorities (43.9 per cent versus 48.1 per cent). See Figure 3b.



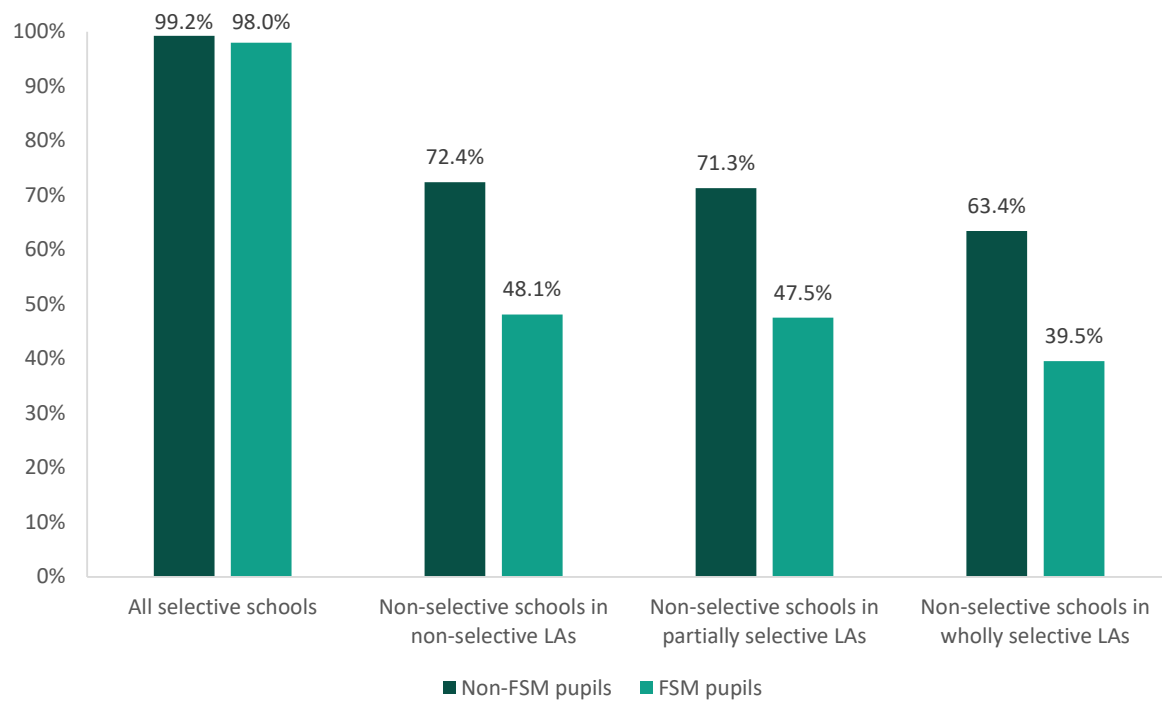
**Figure 2a: Proportion of pupils that achieved a B or above in GCSE mathematics 2015 by free school meal eligibility, school admissions policy and local authority type.**



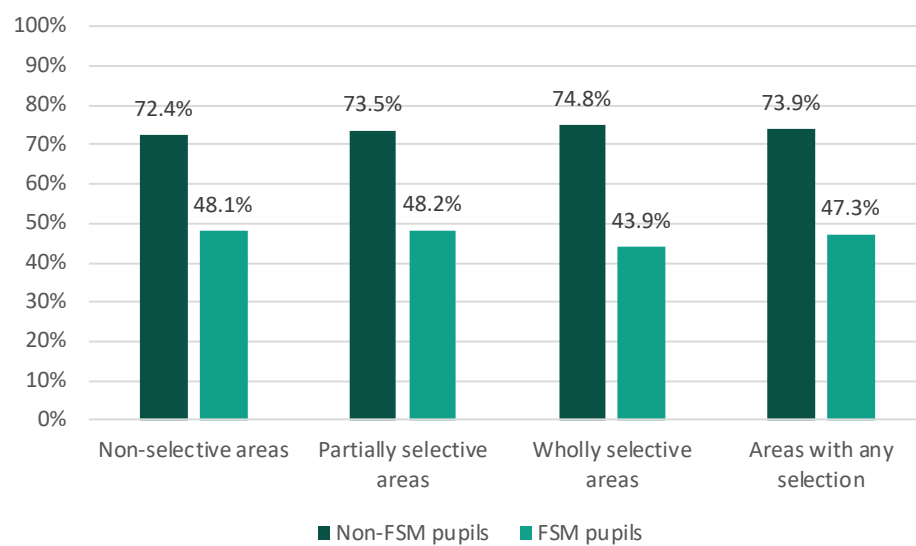
**Figure 2b: Proportion of pupils that achieved a B or above in GCSE mathematics 2015 by free school meal eligibility and local authority type.**



**Figure 3a: Proportion of pupils that achieved a C or above in GCSE mathematics 2015 by free school meal eligibility, school admissions policy and local authority type.**



**Figure 3b: Proportion of pupils that achieved a C or above in GCSE mathematics 2015 by free school meal eligibility and local authority type.**



## Entries and achievement in comparison to similar pupils

In our report 'Grammar schools and social mobility' we presented analysis that examined how well pupils in grammar schools performed in comparison to similar pupils elsewhere. In addition, we looked at the impact of those pupils who were within a reasonable travel distance of a selective school but who did not attend, in particular we were interested in the impact on pupils who missed out on a selective school place in the areas with high levels of selection (areas where there were enough selective school places for at least 45 per cent of high attainers at the end of primary school). It was in these areas that we saw penalties for those that missed out on a selective school place.

We have revisited that analysis to investigate the impact on outcomes in mathematics and also entry to two or more EBacc sciences. Throughout it should be remembered that in a fully selective system the number of pupils who 'miss-out' on a place far out-number the number of pupils who go to a grammar school (by approximately 3:1).

Figure 4 shows the attainment across the best 8 subjects at Key Stage 4 (as previously presented in our report) and then in GCSE maths. Pupils in selective schools achieved around a third of a grade higher in each subject than similar pupils elsewhere, the penalty for those missing out on a grammar school place was about a tenth of a grade. If we look at GCSE maths, the premium for those in grammar schools is slightly smaller – a fifth of a grade – and there is still a small penalty for those that miss out.

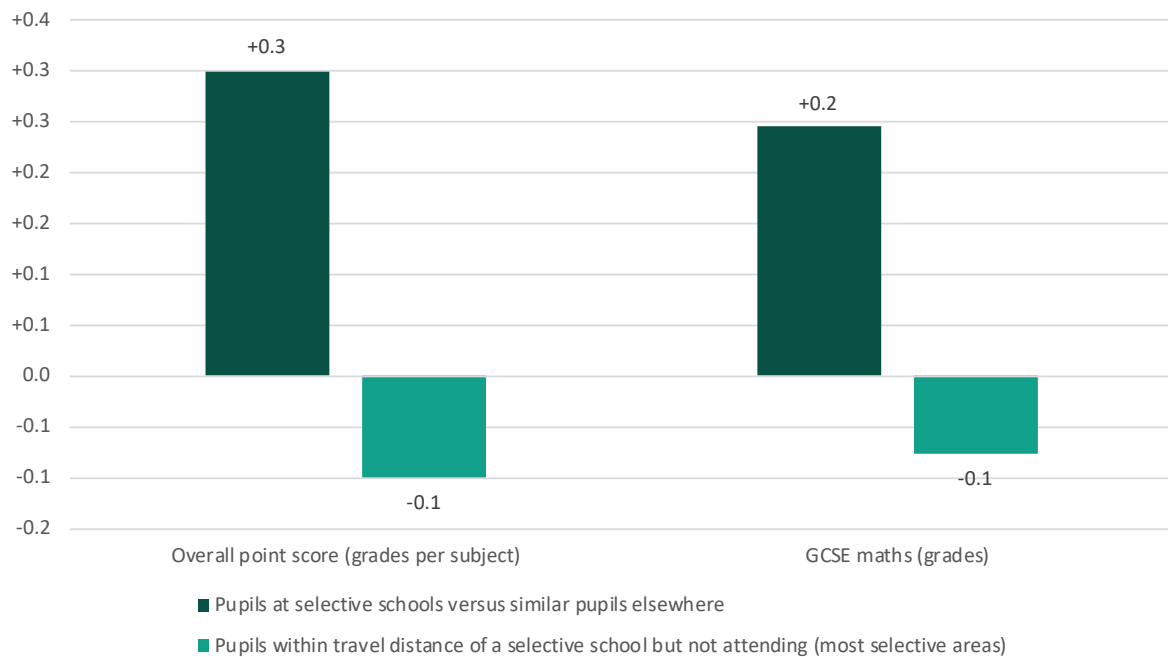
Figure 5 uses the same break downs but examines attainment of grade B in GCSE maths, attainment of grade C in GCSE maths and entry to two or more EBacc sciences. The figures presented are the percentage point difference between the group being examined and the comparator group.

Pupils in selective schools are 6.4 percentage points more likely to achieve a grade B in mathematics than similar pupils elsewhere. The penalty for those missing out on a grammar school place in the most selective areas is 0.7 percentage points. The difference between grammar school pupils and other pupils is much smaller when considering grade C or above – a premium of 1.5 percentage points – but there is a slightly larger penalty for those that miss out (1.8 percentage points). In other words, pupils living in highly selective areas but not getting a place at a grammar school are less likely to achieve a grade C in mathematics than similar pupils elsewhere.

On entry to two or more science subjects there appears to be a small *penalty* for those that attend selective schools, though this is likely to reflect entry choices of a small number of schools given that over 90 per cent of pupils are entered for this combination.

Within our report we also made comparisons to pupils in high performing non-selective schools. We have attempted this again, however we determined that the underlying models were not suitable for these indicators due to the exclusion of some pupils (which meant we were not able to identify a robust comparison group.)

**Figure 4: Attainment in 'Best 8' GCSE results and GCSE mathematics for pupils in selective schools, and pupils within travel distance of a selective school living in the most selective areas but not attending, in comparison to similar pupils elsewhere.**



**Figure 5: Attainment of grade B or C in GCSE mathematics and entry to two or more EBacc sciences for pupils in selective schools, and pupils within travel distance of a selective school living in the most selective areas but not attending, in comparison to similar pupils elsewhere.**

