Selective education and university subject choice

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Fifty years ago, entry to state secondary schools in England was decided on the basis of an exam taken at age 11. Those with the highest scores – around 25% of the population – could go to grammar schools (selective state funded schools), while the rest would go to secondary moderns. Children educated at these different types of school followed different curricula and took different qualifications at age 16, and staying in education beyond this point was usually only open to those who had attended grammar schools.

The education system in England has changed dramatically since then, with a move away from selection (on the basis of academic attainment or potential) in much of the country, accompanied by significant reform of the qualifications system. However, grammar schools continue to cater for around 25% of pupils in a small number of local authorities around the country, with a further small number of 'isolated' grammar schools operating within broadly non-selective authorities as well. In total, around 3.5% of each academic cohort attends a selective (grammar) school.

The UK government is currently considering an expansion of selective secondary education. The available evidence suggests that attending a grammar school has small positive benefits on the cognitive skills of at least some of the students who go, but that there are negative effects for those who miss out on grammar schools. There is stronger evidence that attending a grammar school positively affects take-up, course choice and attainment of subsequent qualifications (e.g. A-levels and higher education).[2] However, much of the evidence on the benefits or otherwise of selective education for the pupils who do and do not enter grammar schools comes from studies based on relatively older cohorts who experienced selective education when it was initially introduced or phased out across the country. There is a limited amount of evidence based on more recent cohorts and, to our knowledge, none focused on the higher education outcomes of these individuals.[3]

This note seeks to partially fill this gap. It complements a broader piece of analysis by the same authors which compares the higher education outcomes of pupils in selective areas who do and do not attend grammar schools with other similar pupils in parts of the country without access to a selective education system. In this note we consider the subject choices of pupils who go to university, with a particular focus on STEM (science, technology, engineering and maths) subjects.

Data and methods

We use data from the National Pupil Database linked to records from the Higher Education Statistics Agency, which enables us to follow all pupils attending secondary schools in England on to university anywhere in the UK. We focus on those who took their GCSEs between 2003 and 2006, who potentially entered university at either age 18 or age 19 between 2005-06 and 2009-10.

We classify students according to the subject they were recorded as studying in their first year of university, and focus particularly on five subject areas:

- Biological Sciences
- Physical Sciences
- Mathematical Sciences
- Computer Science

[1] We are grateful to the Royal Society for funding this work. All views expressed in this note are those of the authors and not necessarily the Royal Society.

[2] See, for example, Atkinson et al (2006); Burgess et al. (2014); Clark (2010); Clark and Del Bono (2016); Galinda-Rueda and Vignoles (2005); Guyon et al. (2012); Manning and Pischke (2006).

[3] See, for example: http://epi.org.uk/wp-content/uploads/2016/09/Grammar-schools-and-social-mobility_.pdf

- Engineering and Technology

In each case, we compare how much more or less likely students from selective education areas are to study one of these subjects, conditional on going to university, than those from a matched group of comparable non-selective areas. We consider differences amongst students overall, as well as by gender and socio-economic background.

We designate an area "selective" if more than 20% of each academic cohort attends a grammar school.[4] We follow Burgess et al. (2014) in restricting non-selective areas to those in which fewer than 5% of each academic cohort attends a grammar school and choose, from amongst this group of areas, a subset that are most similar to our selective areas on the basis of a set of historic local area characteristics, including average earnings and unemployment rates, the percentage of the local population with a degree or who are in the top two social classes, the local population density and the Conservative majority on the local council.[5]

We then consider the differences in university subject choice between individuals who went to school in these (similar) selective and non-selective areas. To do so, we run linear probability models, conditioning on a set of characteristics that we observe about pupils before they entered secondary school, including gender, ethnicity, socio-economic background and Key Stage 2 results.

Results

Figure 1 shows the percentage of students who study each of our subjects of interest at university in our group of matched non-selective areas. This is the baseline from which to compare the gaps between selective and non-selective areas which are shown in subsequent figures.

Figure 2 shows how much more or less likely students who went to school in selective areas are to study each of these subjects at university relative to those in our matched non-selective areas. It shows that, amongst students who go on to university, those from selective areas are slightly less likely to study STEM subjects than those from our group of matched non-selective areas. Given the small percentage of students who study these subjects, some of these differences imply that a student who went to school in a selective area is around 10% less likely to study a STEM subject.

Figures 3 and 4 consider whether these differences in subject choice between those going to school in selective vs. non-selective areas differ by gender or socio-economic background.

Figure 3 shows that the lower probability of choosing STEM subjects amongst those who went to school in selective areas is concentrated amongst boys (who are more likely to take these subjects in the first place). There is little evidence of an effect for girls.[6]

Figure 4 presents the results for students from the 20% most deprived backgrounds, with some evidence of a switching away from biology and computer science and towards engineering and

[4] Using this definition, Bexley, Buckinghamshire, Kent, Lincolnshire, Medway, Slough, Southend-on-Sea, Sutton, Torbay, Trafford and Wirral are classified as selective areas.

[5] Using this approach, the areas selected as comparable non-selective areas are: Croydon, Devon, East Sussex, Harrow, Kingston upon Hull, Milton Keynes, Norfolk, Sefton, Solihull and West Sussex. Further details of this matching process will follow in our work considering a wider set of university outcomes.

[6] The small positive effects seen for physics and engineering can be partially explained by the fact that girls going to school in selective areas are more likely to attend single sex schools, where they are more likely to choose these subjects anyway.

technology amongst students from these backgrounds in selective areas who go to university (relative to those from our matched non-selective areas).[7]

These results are robust to other ways of selecting the group of non-selective areas to which we compare the outcomes of pupils in selective areas, and to excluding private school students.

Figure 1 – percentage of students in matched control areas studying each subject at university

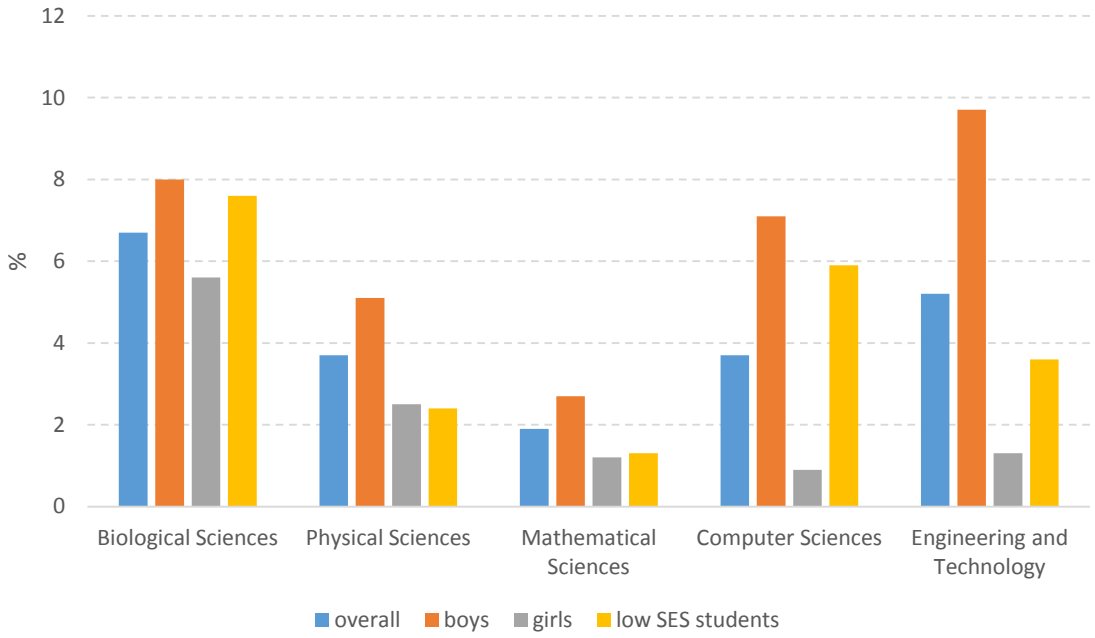
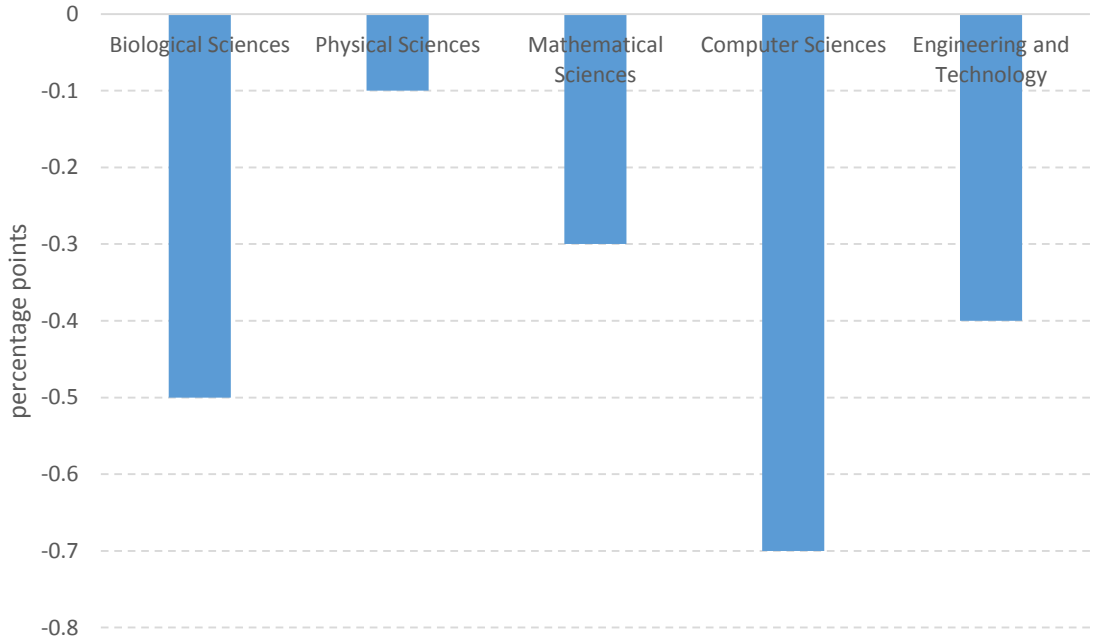


Figure 2 – difference in the percentage of university participants studying STEM subjects between those who went to school in selective areas vs. those who went in matched non-selective areas



[7] It should be noted that the 2.5 percentage point reduction in the likelihood that students from low SES backgrounds take biological sciences is reduced (to around 1 percentage point) if we instead include all non-selective areas and control for the local area characteristics listed above.

Figure 3 – difference in the percentage of university participants studying STEM subjects in selective vs. matched non-selective areas, by gender

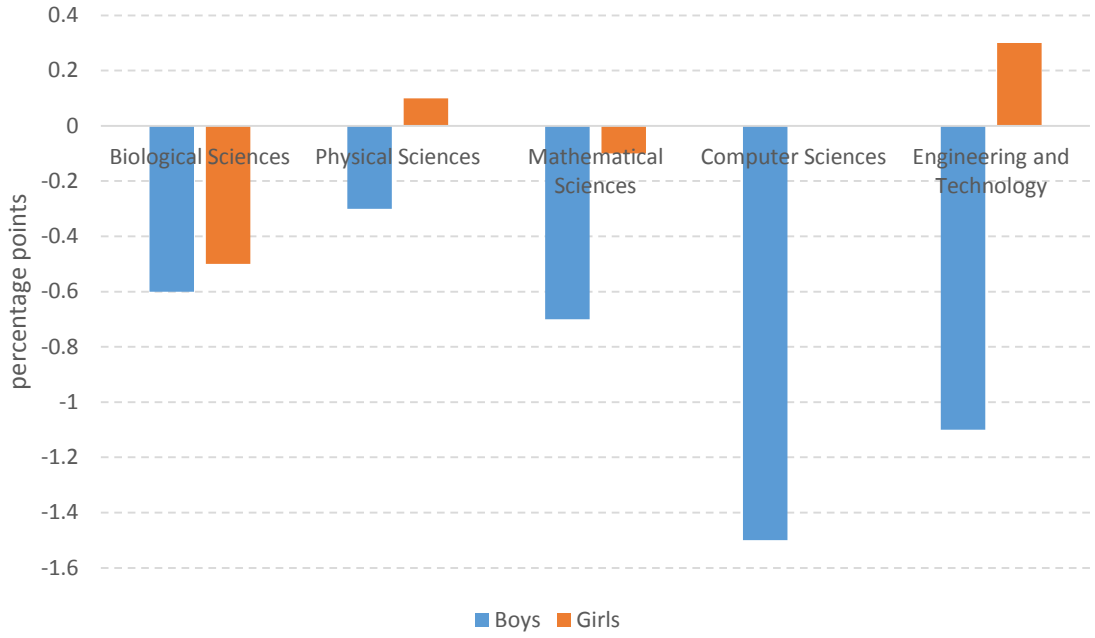
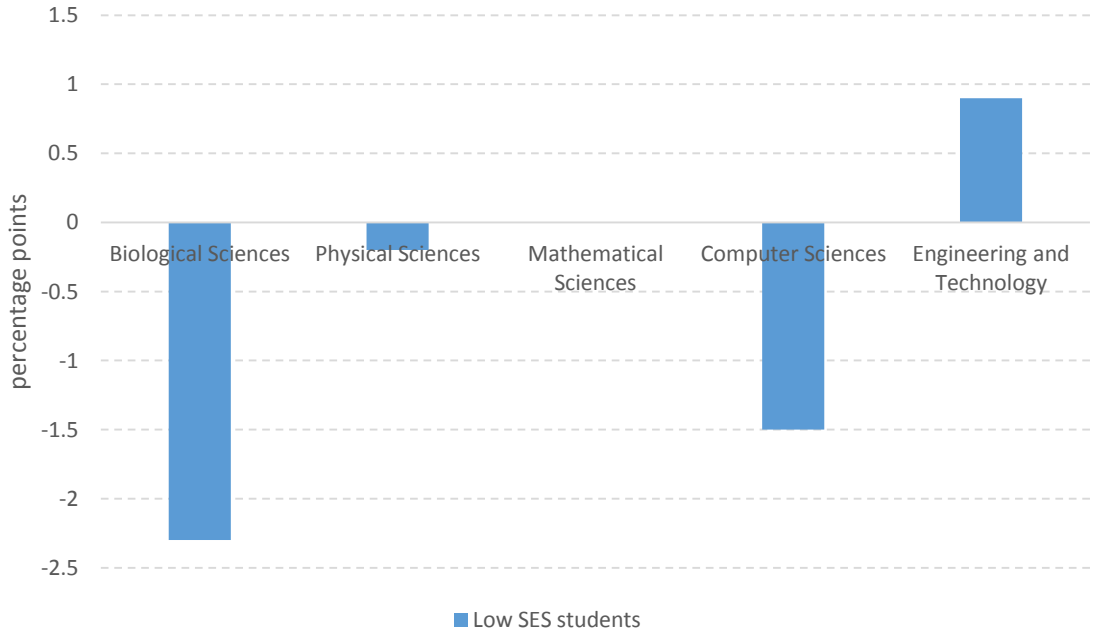


Figure 4 – difference in the percentage of university participants studying STEM subjects in selective vs. matched non-selective areas, disadvantaged students only



Notes: Students are classified as disadvantaged if they are in the bottom quintile of an index of socio-economic status comprising eligibility for free school meals and a mixture of local area measures of disadvantage.

Conclusion

This note has presented the differences in the likelihood of studying a STEM subject at university between those who went to school in selective areas relative to similar non-selective areas. It suggests that, amongst those who went to university in the UK at age 18 or 19, the proportion of students who opted to study these subjects was lower amongst those who went to school in selective areas than amongst those who went to school in non-selective areas.