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## Isolated schools: Out on a limb

This research paper explores the relationship between school performance and relative geographical isolation in England, defined as the straight-line distance to the next nearest secondary school. It particularly looks at how this relates to the GCSE attainment of students in receipt of Free School Meals (FSM students).

The research establishes a correlation between poorer outcomes for FSM students and relative geographical isolation.

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### Key findings

- As relative geographical isolation of schools increases, so the average attainment of FSM students decreases.
- For each additional kilometre between schools, FSM students' attainment of five or more GCSEs at A\* to C including English and maths (5+A\*-C[EM]) declines by an average of 1.06 percentage points.
- Looking at average attainment over the past three years, both FSM and non-FSM students perform worse in schools that are further apart, but the impact on FSM students is greater.
- Over the past three years, schools in this analysis that were less than 1km apart saw 49% of their FSM students achieve 5+A\*-C(EM). In schools that are 5km or more apart, this falls to 37%. The three-year average in state-maintained schools for all FSM students in this analysis is 42.6% and for all non-FSM students is 64.9%.
- The majority of schools where the proportion of FSM students attaining 5+A\*-C(EM) is above the national average for all students are within 1km of another school.
- Even after taking into account school and student characteristics (proportion of students who speak English as an additional language [EAL], students with special educational needs [SEN], FSM students and total student population), FSM students' 5+A\*-C(EM) attainment still declines by an average of 0.745 percentage points for every additional kilometre between schools.

## Context

Recent qualitative research, including work done by The Future Leaders Trust, has examined the challenges facing coastal schools. Numerous factors affect these schools, including the decline of maritime industry and tourism, poor transport infrastructure and relative geographical isolation.

Following this work, we undertook an analysis of relative geographical isolation. We explored the relationship between school performance and distance between schools, including, but not limited to, coastal schools. A full methodology is given below.

By calculating the distances between all state-maintained mainstream secondary schools, this report asks if greater distance – relative geographical isolation – can be correlated to a decrease in the attainment of FSM students in 5+A\*-C(EM). All the performance statistics refer to three-year averages unless specified.

## Methodology

A list of secondary schools in England was compiled based on the Department for Education's (DfE) 2014 GCSE statistical release. This was linked to additional school data (from the DfE) including the number of students in the school, the proportion of FSM, EAL and SEN students, and the KS2 Average Point Score of the 2014 cohort.

Independent schools, alternative provision and special schools were removed from the dataset, leaving only mainstream, state-maintained secondary schools, including sponsored academies, converter academies, city technical colleges, foundation schools, free schools, community maintained schools, voluntary aided schools, voluntary controlled schools, studio schools and university technical colleges.

The distance as the crow flies between each school was calculated, based on coordinates sourced from postcodes, using the 'geonear' package for Stata developed by Robert Picard and available from the Boston College Statistical Software Components archive (SSC).

Performance was measured as: three-year average of 5+ A\*-C(EM) attainment for all students, FSM students and non-FSM students.

Simple linear regressions were performed to understand the relationship between a school's performance and the distance to the next nearest school. Multiple linear regressions were run to control for the pupil characteristics discussed above.

Additional analyses were run looking at the one-year average of 5+ A\*-C(EM) of FSM students and non-FSM students; three-year average progress rates in English and maths for FSM and non-FSM students; one-year average progress rates in English and maths for FSM and non-FSM students; excluding schools in London, as well as London and Manchester, to control for the potential effect of large population centres. All outputs from these analyses can be made available on request.

## Detailed findings

### Distances between schools

As the crow flies, 68.1% of state-maintained, mainstream secondary schools are within 2km of another secondary school.

**Table 1: The distribution of schools**

Distance to nearest school (km)	Number of schools	Percentage of schools	Cumulative percentage
0-1	1152	35.4%	35.4%
1-2	1066	32.8%	68.1%
2-3	400	12.3%	80.4%
3-4	159	4.88%	85.3%
4-5	93	2.86%	88.1%
5-6	69	2.12%	90.2%
6-7	51	1.57%	91.8%
7-8	65	2.00%	93.8%
8-9	35	1.07%	94.9%
9+	167	5.13%	100%

### FSM students' achievement decreases as isolation increases

At a whole-school level, students' attainment of 5+ A\*-C(EM) over three years is not significantly related to a school's distance from other schools.<sup>1</sup>

However, when analysed separately, there is a statistically significant decline in average GCSE attainment over three years for both FSM and non-FSM students. There is minimal difference in the overall headline results because more isolated schools have fewer FSM students on average. This is strong evidence against the null hypothesis that there is no correlation between school isolation and school performance.

The average decline in attainment for every kilometre is relatively small – around 1 percentage point per kilometre for FSM students.<sup>2</sup> However, this results in a substantial difference in the attainment of FSM students in the most isolated schools.

While 49% of FSM students in schools within 1km of their nearest neighbour attained 5+A\*-C(EM), this falls to 37% in schools over 5km from their nearest neighbour.

The average attainment of FSM students is not lowest in the most geographically isolated schools but levels never return to those found in the least isolated areas. Furthermore, most of these very isolated schools operate in unusual circumstances and can be considered outliers. The small number of extremely isolated schools also makes variations in their performance difficult to evaluate: only 0.52% of mainstream state-maintained secondary schools in England are 15km or more from their nearest neighbour.

The decline in GCSE attainment for non-FSM students is not as substantial, decreasing by about one third of one percent per kilometre on average.

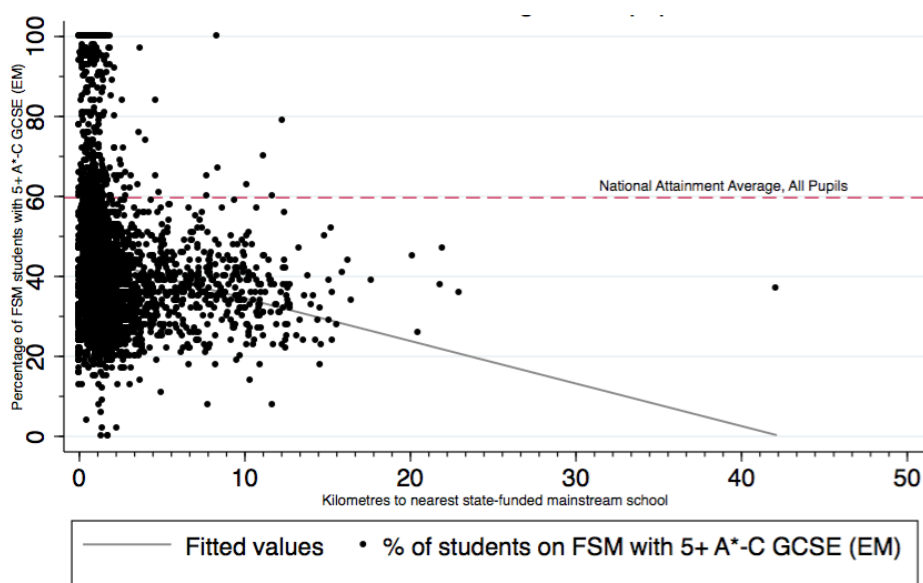
<sup>1</sup> (t=-1.69, P>|t| = 0.091)

<sup>2</sup> FSM (t = -9.99, P>|t|<0.001) non-FSM (t = -3.91, P>|t|<0.001)

**Table 2: Average attainment and the distance between schools<sup>3</sup>**

Distance to nearest school (km)	FSM attainment, three-year average 5+ A*-C (EM)	Non-FSM attainment, three-year average 5+ A*-C (EM)	Number of schools
0-1	48.8%	67.7%	995
1-2	41.7%	63.6%	1014
2-3	37.5%	63.0%	482
3-4	36.5%	63.4%	156
4-5	38.2%	65.6%	90
5-6	38.7%	65.7%	67
6-7	35.9%	63.8%	49
7-8	37.6%	64.6%	62
8-9	40.2%	65.4%	34
9+	35.9%	62.2%	164
<b>Sample average<sup>4</sup></b>	42.6%	64.9%	
<b>National average</b>	38.7%	65.9%	

Nationally 58.7% of students attained 5+A\*-C(EM) over the past three years. Figure 1 shows that almost all of the schools where FSM students performed better than this average are located very close to other schools.

**Figure 1 – Change in the percentage of students on free school meals achieving 5+ A\*-C GCSE (EM) relative to school isolation**

### More FSM students achieve in less isolated schools

There are 615 schools in the country where FSM students out-perform the national average for all students at 5+A\*-C(EM). These schools are more likely to be geographically close to other schools:

<sup>3</sup> The number of schools in Table 2 is slightly lower than Table 1 because not every schools is able to report the attainment of FSM and non-FSM students.

<sup>4</sup> The attainment rate of FSM students in our sample is higher than the national average because of the exclusion of non-mainstream state-maintained schools, such as special schools and pupil referral units.

- 62.6% (370) of the schools where FSM students out-perform the national average for all students at 5+A\*-C(EM) are within 1km of their nearest neighbour. In contrast, only 35.4% of all schools in this analysis are this close to each other.
- 38.2% (231) of these schools are further than 1km from their nearest neighbour and only 6.0% (37) are further than 3km apart.

These schools are also less likely to have a high proportion of FSM students:

- 38.2% (235) of the 615 schools where FSM students out-perform the national average have a proportion of FSM students equal to or greater than the sample average.<sup>5</sup>
- Of these 235 schools, 80 are sponsored academies, 56 are free schools, 28 are converter academies, 21 are community schools, 18 are studio schools, 14 are UTCs, 15 are voluntary aided and 3 are foundations schools. Four of them are schools with selective intakes.
- 72.8% (171) of these schools are within 1km of their nearest neighbour. 31.1% (73) of these 235 schools are in London.

This means there are only 64 schools more than 1km from their nearest neighbour where both the proportion of FSM students in the school and their attainment exceeds the national average.

### **Controlling for pupil characteristics: proportion of FSM, EAL and SEN students**

The observations around achievement and relative geographical isolation could relate to the characteristics of students in schools that are closest together.

Previous research has shown that FSM students tend to perform better in schools where there are many other FSM students.<sup>6</sup> FSM students and SEN students also tend to have lower GCSE attainment.<sup>7</sup> EAL students tend to have lower GCSE achievement than students who speak English as a first language, but the attainment gap is actually slightly smaller for FSM students who speak English as an additional language than students than for those who speak English as a first language.<sup>8,9</sup>

Therefore the regression of FSM students' attainment on distance was repeated, controlling for the number of students in the school and the proportion of FSM, SEN and EAL students.

### **FSM students' attainment in isolated areas still declines after controlling for other variables**

Although reduced by controlling for student characteristics, the decline in FSM students' attainment with the increase in distance between schools remained significant,<sup>10</sup> with an average decline in attainment of 0.7 percentage points per kilometre.

As a final control, the prior attainment of students in the 2014 cohort (Key Stage 2 Average Point Score) was added to the model. With this additional factor controlled for, the relationship between distance to the nearest school and attainment of 5+A\*-C(EM) for FSM and non-FSM students remained significant for all schools.<sup>11</sup>

The analysis was also repeated excluding London and Manchester because both cities have been part of major school improvement initiatives and their high population density could impact results. Results remained broadly the same in both cases.

<sup>5</sup> This may appear to contradict findings that FSM students tend to do better when in a school where there are more FSM students. However, this reflects a difference between an overall trend across all schools and the specific characteristics of the few exceptional schools where FSM pupils exceed the national average. Averages from our full sample do support the previous research: in our sample, in schools with above average numbers of free school meal students 44.1% of FSM students attained 5+A\*-C GCSE (EM), compared to 39.1% in schools with below average numbers of FSM students

<sup>6</sup> Macleod, Shona et al. Supporting the Attainment of Disadvantaged Pupils: Articulating Success and Good Practice. London: Department for Education, 2015.

<sup>7</sup> Ibid

<sup>8</sup> "EAL Achievement." National Association for Language Development in the Curriculum, 2014. Web. 17 Nov. 2015.

<sup>9</sup> Strand, Steve, Lars Malmberg, and James Hall. English as an Additional Language (EAL) and Educational Achievement in England: An Analysis of the National Pupil Database. Oxford: Department of Education, University of Oxford, 2015. Google Scholar. Web. 17 Nov. 2015.

<sup>10</sup> (t = -7.81, P>|t|<0.001)

<sup>11</sup> (FSM: t = -2.86, P>|t|=0.004; non-FSM: t = -2.03, P>|t|=0.043)

## Conclusions

This research was intended to investigate whether extreme isolation relates to students' performance but actually showed that comparatively small increases in the distance between schools correlated with decreased academic attainment for both FSM and non-FSM students, even when other explanatory variables were controlled for.

### FSM students

FSM students already have lower attainment than their wealthier peers across the country. However, they also fare much worse in relatively geographically isolated schools.

Of the schools where FSM students had attainment rates of 5+ A\*-C(EM) that were above the national average for all students, 62.6% were 1km or less away from their nearest neighbour.

### Impact of isolation

Controlling for pupil characteristics like EAL does not fully remove this effect, suggesting that the decrease in attainment observed as the distance between schools increases is not just a consequence of the different pupil demographics. It would appear that schools without close neighbours are facing additional performance challenges.

### No school left behind

National averages can mask substantial variation and this report indicates that where schools are located further apart, FSM students are falling behind even more than national headline statistics suggest. We must do more to ensure good performance is evenly distributed.

Our analysis shows that FSM students can exceed expectations in isolated schools, but that this is the exception rather than the rule.

Every child deserves a good education, regardless of the school they attend or where it is located. We should not let the stronger performance of FSM students in the least isolated schools mask the challenges facing schools that are further apart from their neighbours.

## The Future Leaders Trust

The Future Leaders Trust is an independent charity with the mission to raise the achievement of children, regardless of background, and to provide them with equal choices and opportunities in life. By developing a network of exceptional school leaders, they are transforming challenging schools and working to eradicate educational disadvantage.

The Talented Leaders programme recruits exceptional head teachers and outstanding deputy heads who have a proven leadership track record. They are matched with schools across England that are in need of great leadership. Find out more [here](#).



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