

The 11-plus is a loaded dice

Analysis of Kent 11-plus data

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About Education Datalab

Education Datalab is a research organisation that produces independent, cutting-edge analysis of education policy and practice. It is part of FFT, a non-profit organisation that offers services to schools and local authorities, allowing them to benchmark pupil performance.

Part i: An introduction to the work

Welcome to the first in a series of articles from Education Datalab on the experience of those who sit the 11-plus in Kent – determining who does, and who doesn't get into grammar school.

This work looks at data relating to thousands of children in Kent, and concludes that getting into a grammar school in Kent is akin to rolling a loaded dice. We say this for two reasons.

A dice

We say that getting into a grammar school in Kent is akin to rolling a dice because of the arbitrariness of who passes the test. Only one in four children in Kent get into grammar school each year, and there are several key ways in which the question of who gets in is a matter of chance.

Loaded

We say that the dice is loaded because the odds are not equal for all children – with poor children those who are less likely to get in. Several parts of the process contribute to this – taken together they have the net effect of stacking the odds further against disadvantaged children attempting to get into grammar school.

The number of children who went to grammar school in Kent in 2016 **5,249**

The number of children who went to a non-selective secondary in Kent in 2016 **16,588**

While the situation will be different in other parts of the country that have grammar schools, and will be different again if selection is introduced nationally, Kent provides a useful case study of how a combination of strict tests and subjective appeals work together to determine who gets into a grammar school.

One point to note is that our data covers only those who sit the 11-plus, so we have not looked at all at who enters the test. It is likely that there are also inequalities in who is sitting the test, with disadvantaged children less likely to sit it.

Why focus on Kent?

Kent is just one local authority, but is one of the parts of the country where selectivity is most heavily embedded, with 32 out of England's total of 163 grammar schools found in the county (excluding Medway).

Kent has 67 non-selective secondary schools, with [an average of 28% of children in any given year attending a grammar school](#) [PDF].

The county comprises both rural and urban communities, from the wealthy commuter-belt towns in the west to the more disadvantaged communities in the east. A total of [9.5% of the pupils in its secondary schools are eligible for free school meals](#) (FSM), compared to 13.2% nationally.

Kent also has features that lend it to analysis. The fact that it is bounded by the sea on many sides means cross-local authority border flows aren't as great as in some other parts of the country.

The data

This analysis is based on data obtained under the Freedom of Information Act by the [Kent Education Network](#), a group opposed to selective education.

Our analysis utilises data relating to pupils who sat the 11-plus in September 2015 for entry to grammar school in September 2016. This data has a number of shortcomings: some elements relate to all students sitting the test, while others are a sample of test-takers who attended Kent state primary schools. Nevertheless, taken together it is capable of providing insight into some critical aspects of gaining a place at a grammar school.

Part ii: How does the 11-plus work in Kent?

So, pupils sit a test and those with the highest scores get to go to grammar school. Right? Wrong.

The process of securing a place at a Kent grammar is complicated because in order to gain access to a grammar school, the parent, child and their primary school must go through the following process.

- **The parent must register the child for the 11-plus test in the July before the exam.** Kent does not currently run an automatic enrolment process for those living in the county, unlike Buckinghamshire.
- **The child may be prepared for the test, either by a school, tutor, parent, or otherwise.** It is important to note that Kent specifically proscribes 11-plus test preparation being carried out in state primaries.
- There are then three ways in which a child can secure entry to a grammar school in Kent:
 1. **Pass the 11-plus test.** Around 36% of test-takers achieve scores in the Kent 11-plus that alone may give them access to a grammar school.
 2. **Entry via a headteacher panel.** Where a child does not automatically pass the 11-plus test, their headteacher can choose to put them forward for consideration by a panel.
 3. **Entry following an appeal.** Finally, the parents of a child not deemed suitable for a grammar through the previous avenues can apply for a grammar school place in the standard admissions round and appeal after secondary school places are allocated. This is a risky and drawn-out process, but [typically results in 600 extra pupils being allocated a grammar school place each year](#) (this figure includes those who passed but are appealing to an oversubscribed grammar).

It's also worth noting that passing the 11-plus is not enough alone to gain entry to any grammar school of choice.

While most Kent grammar schools simply require an 11-plus test pass, using catchment areas to deal with oversubscription, there are 11 'super-selective' grammar schools which make use of 11-plus test scores to prioritise applicants for admission, either ranking all applicants by score, or prioritising those who have scored above a given level.

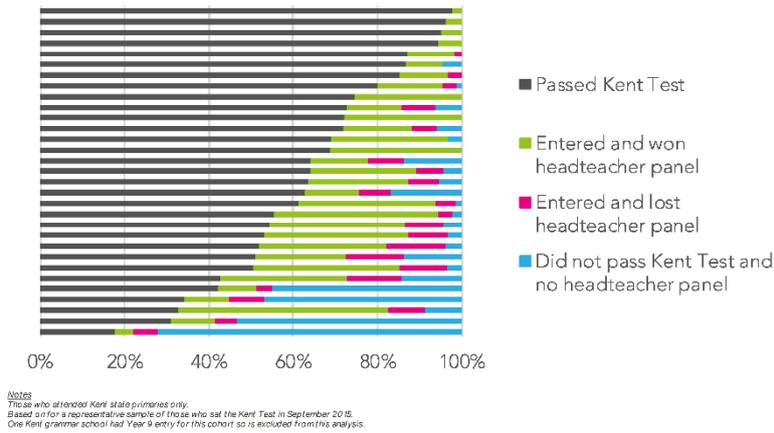
To complicate matters further there are five grammar schools (only four in 2015 when our pupils took the test) which operate their own 11-plus test, with children able to qualify for these schools under the general, council-operated 11-plus – the *Kent Test* – or through the school's own test.

What route do children take?

The chart below shows the significant variation in routes to gaining a grammar school place by school for those at Kent state primary school who sat the Kent Test.

Each bar represents a grammar school in Kent.

Routes to attending each of Kent's grammar schools



At the top are the super-selective grammar schools where nearly all students achieved high enough 11-plus paper marks to avoid the need to go through the headteacher panel. Also in the upper half are those in the west of the county where numbers passing the 11-plus outstrip places available, meaning there are fewer places awarded via headteacher panels.

Of those transitioning from a Kent state primary to a grammar school:

62% *Passed the Kent Test*

20% *Did not pass Kent Test but successful at headteacher panel*

18% *Secured entry through another means (school test or appeal)*

Those schools in the bottom half are in parts of the county where headteacher panels are more generous in passing students.

Finally, at the bottom are the four Kent grammars that run their own additional test. Note that our data is based on those who sat the Kent test, so it does not include pupils who only take the school test. It reveals, therefore, huge numbers who fail the Kent Test and yet are likely passing the school's own test.

The pink and blue bars relate to those who failed the Kent Test, and either did not attend a headteacher panel, or else were unsuccessful at such a panel. As such, they will have got in either following a successful parental appeal, or after passing a school test.

Part 1: The rules you set determine who passes

With a limited number of places at grammar schools available, the 11-plus is effectively a competition between children. As with any such competition, the rules determine who has the best chance of winning.

The 11-plus test, known locally as the Kent Test, is created by GL Assessment and administered by Kent County Council. Kent children take this test in their primary schools during September, with out-of-county children taking it the following weekend. Since 2014 it has comprised both reasoning and curriculum-aligned elements, the latter of which are designed to reduce the effect of coaching.

Children are assessed in four different elements, from which three paper marks are awarded:

1. A 25-minute multiple-choice paper in English, testing comprehension, spelling, grammar and punctuation.
2. A 25-minute multiple choice paper in maths, with national curriculum topics that should have been covered by able children by the start of Year 6.
3. A reasoning test with about 20 minutes of test time on verbal reasoning, and 4-5 minutes of test time on each of non-verbal and spatial reasoning.
4. An unmarked writing exercise of 40 minutes, with 10 minutes for planning and 30 minutes for writing. This exercise is not part of the test but a headteacher panel may consider it if the child is unsuccessful at passing the test.

Each of the first three test papers are marked and scores are age-standardised, with August-born children given a higher standardised score than September-born children for the same mark. The three scores are then combined to decide whether a student should automatically be considered suitable for a grammar school according to the following rule:

- The student's aggregated standardised score across the three papers must be 320 or above;
- The student must score at least 106 in each of the three papers.

The second criterion is critical: although 7,804 students in 2015 achieved an aggregated score of 320 or above, 2,616 of these failed to achieve at least 106 on each of the three papers.

The test is identifying children who are (highly able) all-rounders, then, rather than children with particular aptitude in only one or two areas.

Small changes in the qualifying rules alters who passes

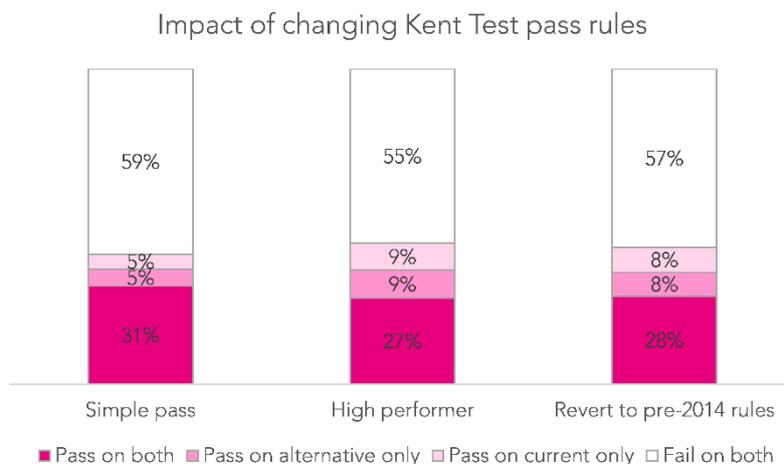
We might ask the question: what would happen if the rules on who gets in are tweaked?

This is important, because while these are the rules that are in place at present, it hasn't always been thus, and in the future, or elsewhere, a different set of rules could be chosen. It's necessary to understand how this choice of rules determines who does, and who doesn't get into Kent's grammar schools.

The chart below compares the status quo to three alternatives:

1. A 'simple pass' system, where a total of 337 marks are required across the three papers, with no need to achieve a particular score in an individual paper. This is the system typically used by grammar schools in other parts of the country;
2. A 'high performer' system, where a child must display particular aptitude in one area – achieving a score of 120 or higher in any one paper;

- The pre-2014 system – under which there was no English paper; assessment of a children's reasoning ability accordingly making up more of the overall test.



It shows that the bulk of children would get in under neither the current system, nor any alternative being looked at. Of those who do get in under the current system, the majority would also get in under the alternative.

But there is a sizeable group of children – ranging from five to nine per cent of the total, translating into 800-1,300 children – who get in under the current system, but would not if the rules were changed, with an equivalent number of children who don't currently get in replacing them.

That translates to between around one in seven ('simple pass' system) and one in four ('high performer' system) of those who currently pass the Kent test being vulnerable to a change in rules.

Only a minority of these children who currently fail but would pass under one of our alternatives find a route to a grammar place via the headteacher panel.

In the case of each of these three alternatives, our modelling suggests fewer children eligible for free school meals – a widely used proxy for disadvantage – would pass the test, although behaviour change would complicate the effect of a move to a different system to some extent.

We wouldn't advocate for a move to any of these three alternatives for this reason, without fixes to other parts of the process. But all are plausible alternatives to the rules currently in place – and would have a big effect on who passed the test were they to be brought in.

Conclusion

Relatively small changes to the rules that determine whether a child has passed or failed the Kent Test would lead to material changes in who is considered to have passed the test. While other parts of the process, such as headteacher panels, lessen the impact of this, it is important to be aware how much the question of who automatically gains a place is determined by the particular rules that are in place.

Part 2: Some children will be being passed or failed incorrectly – but we have no idea how many

All tests are unreliable to some extent, so a person's score is partly a matter of chance. This means that for some, the decision to offer a grammar school place or not will be something of a lottery.

['Evidence on the effects of selective educational systems', Robert Coe and others for the Sutton Trust, 2008 \[PDF\]](#)

The idea of a school entrance test is to sort children into how academically capable they are, so that schools do not need to cater for children with different educational needs.

With less than two hours of testing time, there will always be academically capable children who fail and less capable children who pass. In fact, no 11-plus test will ever sort children perfectly, even if we were to ask 10-year-olds to sit a test every day for a whole month.

Classification accuracy

For a second, let us imagine one small tweak to how the 11-plus system works currently.

Imagine if, alongside your letter stating whether your child had passed the 11-plus, the assessment companies gave you an additional piece of information – the probability that they have been misclassified by the test.

One parent might be told their child had passed, and yet the probability she should, in fact, have failed was 39%. Another would be told their child has failed, but the probability he should have passed was 47%.

This is related to something known in the education literature as [classification accuracy](#) – essentially the degree to which pass/fail allocations agree with those that would be based on examinees' true score (the thing that, imperfectly, we are trying to assess).

For any test, classification at the pass mark tends to 50%. That might seem counterintuitive at first glance. But tests can be thought of as only covering a fraction of the total material that could be covered. So whether a child scores exactly one mark below the pass mark, or one mark above the pass mark is equally likely – a 50% chance of either.

The big unknown

In the case of the 11-plus for the group of children whose performance sits exactly at the pass mark this 50-50 chance shapes their identity and lives forever. And the 11-plus in Kent has a quirky characteristic that means a large proportion of test-takers have a high risk of being misclassified.

Rather than rely on a simple overall pass mark, under the Kent Test students must gain at least 320 overall *and* at least 106 on each of the reasoning, maths and English papers.

So there are four elements in which a child is being assessed as being either above, or below, the required standard.

In 2015, for example, 144 Kent Test-takers achieved exactly the overall pass mark of 320, but a total of 400 children would have failed if they had dropped just one mark on one of the three papers – this is 8% of those who pass the 11-plus. And for these children, for the element of the test which they were one mark off the pass mark, there was a 50% chance that they should actually have achieved the pass mark.

Assessing classification accuracy

While we know the classification accuracy for those just one mark away from passing or failing, we don't know how quickly the accuracy improves as we look to children achieving slightly higher or lower scores than this. Without the candidate marks on individual test questions we cannot estimate this.

And while the commercial assessment companies that run 11-plus tests will routinely check the [classification accuracy](#) of their tests, as well as the *classification consistency* (the probability that a candidate would be classified the same over successive administrations of the test) they do not publish data on this.

There are some clues that the classification accuracy of the Kent Test could be quite low.

One way of looking at this is to compare performance in the 11-plus to performance in SATs taken just eight months later.

For example, the English element of Kent Test shows a correlation of 0.62 with reading and 0.60 with grammar, punctuation and spelling (GPS) at KS2; both the maths and the reasoning elements of the Kent Test are correlated at 0.68 with the maths KS2.

So, we can say that the Kent Test has low predictive validity for an academic test taken shortly afterwards.

To be clear, we are not suggesting that SATs tests are any more reliable – simply that we have two tests that claim to measure performance in similar domains (i.e. how good is a child at maths and English), and yet they frequently disagree.

The myth that the 11-plus separates children effectively into those who can and cannot benefit from the grammar school education is only sustained because we are not transparent about the extent to which the system *must* be misclassifying some children through this relatively short test.

Society needs to be confident that the most academically capable children will reliably pass the 11-plus, regardless of the particular test questions that are set on the day.

Publishing classification accuracy statistics would likely reveal the unreliability present in the 11-plus's attempts to identify the ablest children from those in the top half of the distribution.

If each child learnt how confident we were that they have been correctly classified, then I suspect we would feel the 11-plus process would feel quite unjust.

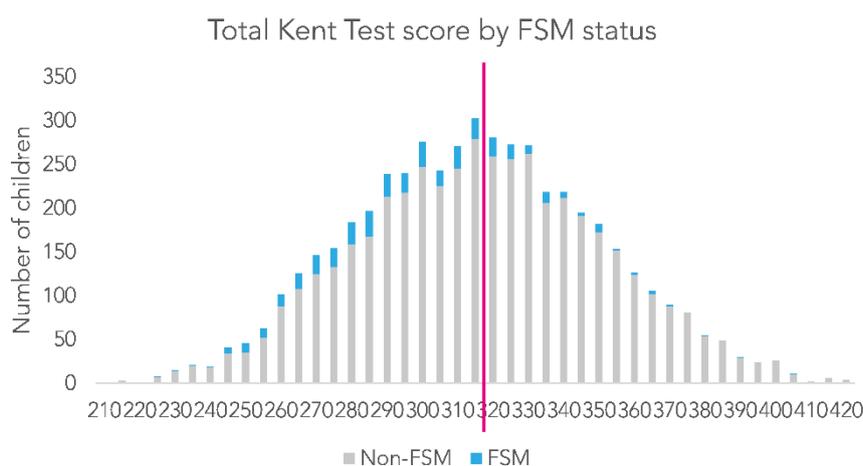
Conclusion

No test classifies those who take it with perfect accuracy. But the data that we would need to be able to reach an informed conclusion on how accurately the Kent Test classifies children as either passing or failing is not currently made available by the assessment company responsible.

Part 3: The reasoning part of the test is loaded against poorer children

Children who are eligible for free school meals (FSM) are less likely to sit the 11-plus in Kent. And when they do, they are far less likely to pass it: just 12% of FSM-eligible students pass the test, compared to 30% of those not FSM-eligible.

The chart below shows the difficulty in helping FSM pupils achieve access to grammar schools. It's clear that those few FSM pupils who take the Kent Test are heavily weighted towards quite low scores, and even those who achieve the 320 pass mark often only just do so.



However, we think this distribution of scores understates the true academic capabilities of FSM-eligible students.

FSM pupils suffer from lack of reasoning preparation

Reasoning (verbal, non-verbal and spatial) makes up a third of the Kent Test¹. Kent state primary schools are explicitly asked not to prepare their pupils for the 11-plus. This means that the only students who are able to gain familiarity with the reasoning questions used are those whose parents help them practice, those who pay for private coaching, and those at private schools.

By contrast, the English and maths parts of the test cover national curriculum materials, though clearly attainment can be raised through tuition here too.

We think this lack of specific 11-plus preparation among some students – such as FSM-eligible students – explains why the FSM-gap in average paper marks is greatest in reasoning, at 7.7 points, compared to maths (6.8 points) and English (3.9 points). If the 11-plus is a dice, then the reasoning component contributes to the dice being loaded against disadvantaged children.

The type of primary school attended also affects how much higher a candidate's reasoning score is, compared to their English and maths scores – we could call this a 'reasoning premium'. For children who attended a private school in Kent this reasoning premium is 3.7 marks higher than the reasoning premium observed for those with the same maths and English 11-plus scores who attended a Kent state primary. Reasoning premiums are also 0.8 and 1.7 marks higher than those observed in Kent state primaries for those who attended state, and private, schools outside Kent respectively. This suggests those at Kent private schools are the most prepared for the reasoning test – most likely, because their schools are preparing them for it.

¹ It was two-thirds prior to 2014.

Among state primaries in Kent, there is also a link between the size of the reasoning premium observed and the proportion of children at the school who are FSM-eligible. This may be because schools are discretely preparing them for the reasoning element of the 11-plus or, more likely, that a school's free school meals percentage acts as a proxy for the child's social background and therefore probability of preparation via private tuition or at home. A 10 percentage point fall in the school FSM percentage is associated with a 1.1 point increase in the reasoning premium a student achieves.

FSM pupils perform better in SATs than they do at the 11-plus

We can compare Kent Test scores to subsequent Key Stage 2 test scores, taken eight months later. Inferences from this type of comparison are necessarily limited, since much preparation for the 11-plus will also directly raise KS2 attainment. However, this comparison may reveal short-term 11-plus test preparation that does not translate into higher performance eight months later.

If we take students with identical test marks in the reading, grammar and maths elements of the SATs, the children who are eligible for free school meals have overall 11-plus scores 8.7 points lower, on average. The FSM point difference is most pronounced on the reasoning part of the 11-plus test, at 3.7 points, and it is least on the English part of the 11-plus test, at just 1.1 points.

These differences are not huge, but they are material. For example, if we simply rank this sample of pupils from the lowest to the highest overall KS2 score (across reading, maths and grammar), whilst holding constant number deemed suitable for a grammar, then the rate of FSM pupils' access to grammar schools would increase from 12 to 16% among test takers.

Conclusion

Children eligible for free school meals score particularly poorly in the reasoning element of the Kent Test compared to other children. There is evidence that other children receive more preparation for this part of the 11-plus through access to private education, or tutoring.

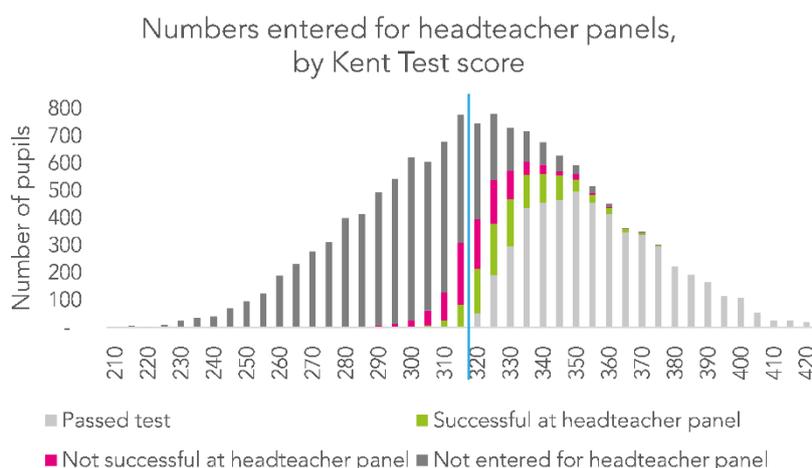
Part 4: Headteacher panels may be no better at identifying the most capable children than the tests are themselves

Passing the 11-plus isn't the only way to get into a Kent grammar school, as we've seen. Headteacher panels review around 2,000 pupils each year, with approximately half the reviews leading to an assessment that the child is suitable for grammar school.

The four headteacher panels give a child's primary school headteacher the opportunity to refer any assessment decisions they disagree with to a panel of local primary and secondary school heads.

The panel decide whether the child would suit a grammar school using additional evidence – test scores, the writing task that is not graded, and any recent work and assessments their headteacher provides.

The chart below shows the total standardised 11-plus score of those entered for the headteacher panel from all schools. A majority of those entered for the headteacher panel achieved an aggregated score of over 320, but failed to reach the minimum mark in one or more individual papers.



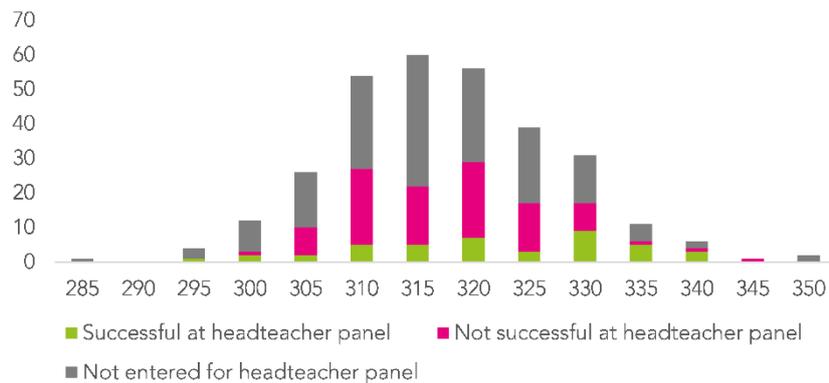
Are the headteacher panels an effective way of identifying highly able students who did not achieve high 11-plus scores? Or should Kent save themselves time and simply award these spare places to the next tranche of highest scorers on the 11-plus?

The 11-plus test and the headteacher panel take place before a child takes Year 6 SATs tests. SATs data can therefore be used as a point of reference that can be used to see whether headteacher panels succeed in identifying some able students who happened not to perform well in the 11-plus².

The chart below shows KS2 performance for Kent Test-takers who achieved an 11-plus score of between 315 and 319 (note that the x-axis shows KS2 scores, though the numbers involved are very similar to 11-plus scores). Those passing the headteacher panel are slightly skewed towards the higher attaining end of the spectrum, as we'd expect. But there are very high attaining students whose primary headteacher failed to enter them for the panel, and other high attainers who were put forward but who failed in the panel.

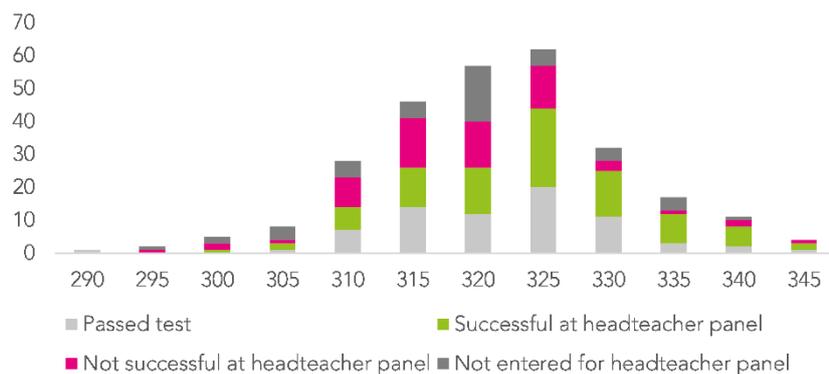
² The data available means it is only possible to do this for a 50% sample of test-takers who are in Kent state primary schools and we cannot split the analysis geographically into the four headteacher panels, unfortunately.

Headteacher panel outcomes by total KS2 score - those with 11-plus scores between 315 and 319



The data for a group who scored more highly in the 11-plus, between 325 and 329, shows a similar pattern. Those who go on to achieve weaker KS2 results are more frequently failed by the panel, but there are some very low achievers who are passed.

Headteacher panel outcomes by total KS2 score - those with 11-plus scores between 325 and 329



This might not be a problem. SATs in themselves shouldn't be considered a perfect measure of ability. But we can consider it to some extent extra evidence of ability. So do headteacher panels identify different children for admission to grammar school to those that would be identified if the next highest-scoring pupils in the 11-plus were let in?

Not really. If we compare the overall SATs scores of these two groups – those passed by the current headteacher panel versus the next best passers on 11-plus score alone – they are almost identical (mean of 326.9 versus 326.8; standard deviation of 9.8 versus 9.6).

This suggests that the primary and secondary headteachers may be no better than a test at deciding who the most academically capable children are. So we would question how much it corrects for issues that exist with the test.

Conclusion

Headteacher panels may be no better at identifying the most academically capable children than the 11-plus tests themselves. This probably limits the extent to which this part of the process corrects for issues that exist with the test.

Part 5: Headteacher panels are not helping disadvantaged children as much as we might expect

Headteacher panels form an important part of the Kent 11-plus process, but as we have seen, there is a question mark over whether they are better at identifying high ability pupils than a simple lowering of the 11-plus pass mark would be.

One group of students who may not be able to realise their full potential in a test, because they are not necessarily being adequately prepared for it, are those eligible for free school meals, and we might hope that a human process such as headteacher panels helps with this.

Data on the proportions of pupils entered for, and successful at, the headteacher panel reveals relatively small differences in success rates for FSM versus non-FSM pupils with the same overall 11-plus score, though.

The table below shows this data, grouping students by their overall 11-plus score. So, for example, FSM students with an 11-plus score of 310-319 have greater success than pupils who are not eligible for free school meals (16% versus 9% successful at panel). But those FSM students with a slightly higher score of 320-329 have less success than others (29% versus 35% successful).

Proportions entering and proportions successful at headteacher panel by Kent Test score

		<269	270-279	280-289	290-299	300-309	310-319	320-329	330-339	340-349	350-359	360-369	370-378
% entered for panel	FSM	0%	0%	0%	0%	4%	42%	65%	64%	100%	100%		
	Not-FSM	0%	0%	1%	3%	9%	34%	68%	77%	79%	90%	85%	100%
% successful at panel	FSM	0%	0%	0%	0%	0%	16%	29%	64%	100%	100%		
	Not-FSM	0%	0%	0%	0%	1%	9%	35%	54%	67%	78%	85%	100%

So, on the one hand this analysis of the headteacher panel reveals that FSM pupils are generally not disadvantaged by the process, when compared to others achieving similar scores. But it could be argued that we should expect them to achieve greater success still, for two reasons.

Firstly, 11-plus scores of disadvantaged children are lower than their KS2 attainment. It could be argued that the headteacher panel should be identifying this greater academic potential, and doing more to correct for disadvantaged children's lower chance of passing the 11-plus.

Secondly, FSM-eligible pupils more frequently live in the east of Kent. There are four headteacher panels, covering four geographical areas and it is generally the case that those in the east are more generous in their decisions than those in the west, [reflecting the pressure on grammar school places in each part of the country](#). So, given disadvantaged pupils more commonly live in the area with the greatest rate of headteacher panel success, it's of some surprise that disadvantaged pupils are not being passed through the process in still greater numbers.

Conclusion

Children eligible for free schools meals generally have a better success rate at headteacher panels than those who are not eligible. But the gap may not be as great as we would expect, given other characteristics of these FSM-eligible children.

Part 6: Conclusions

It is worth summarising some of the things that we have observed in the course of this analysis.

Relatively small changes to the rules that determine whether a child has passed or failed the 11-plus in Kent would lead to material changes in who is considered to have passed the test. And the complexity of the Kent Test pass criteria leaves high proportions of students on the cusp of passing or failing the test.

Headteacher panels may be no better at identifying the most academically capable children than the 11-plus tests themselves – most likely limiting the extent to which this part of the process corrects for issues that exist with the tests.

Children eligible for free school meals score particularly poorly in the reasoning element of the Kent Test compared to other elements – reflecting, perhaps, this being a component where some children's scores are lifted by private education or tutoring.

Children eligible for free school meals generally do have a better success rate at headteacher panels than those who are not eligible, but the gap may not be as great as we would expect, given other characteristics of these FSM-eligible children.

Transparency over test reliability

Kent County Council should ask its commercial test provider to publish full classification accuracy statistics following each round of admissions. Parents should have a right to know this statistic for their child's test result.

Two straightforward changes to the 11-plus process in Kent might make it less time-consuming to administer and equally reliable:

1. Kent should consider implementing a straightforward overall pass mark, as other grammar schools do, to reduce the proportion of pupils just one mark away from passing/failing;
2. Kent should consider removing the headteacher panel and correspondingly lowering the pass mark on the test.

Improving access to grammar schools for disadvantaged students

In general, students who are FSM-eligible do not attend grammar schools because they have [lower attainment at age 11](#). However, there is much that Kent could do to marginally improve the number of children from disadvantaged backgrounds securing places at grammar school.

These include:

1. Allowing state primary schools in Kent to provide 10 hours of practice on reasoning-style questions to all students.
2. Automatically awarding FSM-eligible students extra marks on the 11-plus – particularly the reasoning paper – in recognition of the disparity between their 11-plus marks and subsequent SATs grades.
3. If headteacher panels are to remain part of the process, requiring primary headteachers to put all FSM-eligible students scoring over 300 in the 11-plus forward to the headteacher panel for consideration.

4. Allowing primary headteachers to put forward to the headteacher panel any able FSM-eligible students whose parents did not enter them for the 11-plus, who will be considered on the quality of their primary school work alone.

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