

# Research in PUBLIC POLICY

Bulletin of the Centre for Market and Public Organisation



## Working Mums and Overweight Kids: Is there a link?

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Selective Education: Who Benefits?

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# Working mums and overweight kids: Is there a link?

**Might the rise in childhood obesity be connected with the increasing numbers of mothers in full-time jobs? Award-winning research by *Stephanie von Hinke Kessler Scholder* investigates the effects of maternal employment at different ages of a child on their bodyweight later in life.**

Being obese or overweight means being too heavy for your height. Based on the 'body mass index' or BMI (a standard measure of people's weight-to-height ratio), UK obesity rates for boys aged between 2 and 10 have increased from 10% in 1995 to 15% in 2003. Over the same period, obesity rates for girls in the same age group have gone up from 10% to 13% (ONS, 2005).

Rates of children being overweight have also increased: from 23% to 30% among boys and from 23% to 26% among girls. The Department of Health (2006) forecasts that this measure of excess bodyweight will go up by another 2 and 6 percentage points for boys and girls respectively by 2010.

The rise in weight problems among children has coincided with significant increases in the number of women, including mothers, in paid work. The labour market participation rate for women aged 16-59 rose from 59% in 1971 to 74% in 2007. Several US studies have examined whether there is a link between maternal employment and childhood obesity and come to the same conclusion: that children of full-time working mothers are more likely to be overweight (see Anderson et al, 2003; and Ruhm, 2004).

## **Children whose mothers work full-time when they are aged between 5 and 7 are more likely to be overweight at age 16**

My research takes this issue in a slightly different direction by exploring whether the timing of mothers' employment is an important factor in the relationship with children's excess bodyweight. Specifically, I investigate whether maternal employment at different ages of the child has different effects on the child's weight later in life.

Previous research has found that the timing of mothers' employment is important for various other outcomes for

children. For example, studies by Jane Waldfogel and colleagues (2002) and by Paul Gregg and colleagues (2005) find negative effects of maternal employment in the first year of the child's life on their educational and behavioural outcomes later in life. But in these studies, employment later in the child's life does not have a significant effect on children's outcomes.

## **Maternal employment and overweight children: does timing matter?**

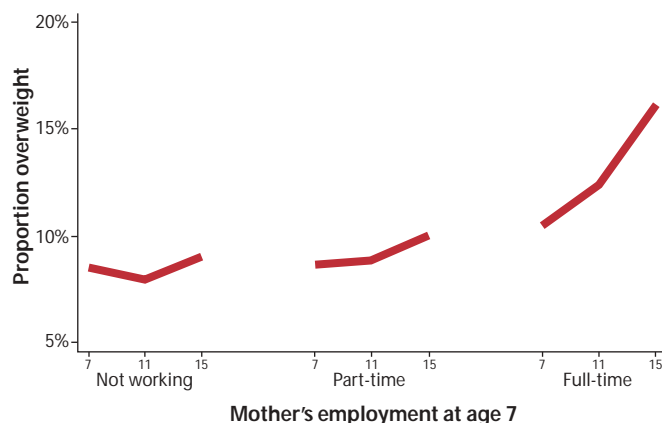
To examine the timing effect of maternal employment in the context of childhood obesity, my analysis uses data from two British birth cohorts: the 1958 National Child Development Study and the 1970 British Cohort Study.

I find consistent evidence of a significant positive association between maternal full-time employment during mid-childhood – ages 5 to 7 – and the probability that the child is overweight at age 16. But there is no evidence that part-time employment or full-time employment at earlier or later stages of the child's life lead to a higher probability of being overweight at age 16.

The results suggest that children whose mothers are full-time employed during mid-childhood are 5 to 8 percentage points more likely to be overweight. This is a substantial increase relative to the overall proportion of children that are overweight at age 16: 10% for the children born in 1958 and 12% for those born in 1970.

Figure 1 illustrates this for the 1958 cohort. The vertical axis displays the proportion of overweight children. Each line represents three observations; one for children aged 7, one for age 11 and one for age 16. Thus, they represent the change over time in the proportion of overweight children. The line on the left is for non-working mothers; the line in the middle is for part-time working mothers; and the line on the right is for full-time working

**Figure 1: Proportion of children who are overweight at ages 7, 11 and 16 by mother's employment status**



mothers. A number of inferences can be drawn from the graph:

- The proportion of overweight children generally increases with age for all employment categories.
- Mother's full-time employment is associated with the highest proportion of overweight children at all ages.
- Full-time employed mothers also experience the largest increases in the proportion of overweight children.

I focus on whether children are overweight at age 16 for several reasons. First, the analysis shows that a child's weight at that age is more predictive of adult weight than measures at earlier stages of a child's life. Second, the BMI is a common measure to indicate an adult's overweight status, but it is a less accurate indicator for children as they experience changes in body composition depending on their age and gender.

One example of these age- and gender-specific changes is called the 'adiposity rebound'. This refers to the increase in BMI that occurs after a nadir observed in children around the age of 4 to 6. From then on, the BMI begins a gradual increase into adulthood. But the timing of the adiposity rebound varies between children, making it more difficult to determine whether a high BMI truly reflects the child's overweight status or whether it is due to an early onset of the adiposity rebound. Another more obvious example is puberty.

### Is maternal employment during mid-childhood bad for children?

The positive relationship between maternal employment in mid-childhood and overweight status at age 16 does not necessarily mean that the former causes the latter. It is possible that the association is actually driven by other (observed or unobserved) factors that affect both maternal employment and childhood obesity.

For example, several studies show that problems of excess bodyweight are more common for lower incomes families. If a mother works because of a very low household income, the results could be representing the effect of poverty on the child's weight-to-height ratio, rather than that of her employment. In further analysis, I control for as many of these factors as possible, but different specifications do not change the results.

Indeed, my analysis suggests that the relationship is stronger for families of lower socio-economic status. (This result contrasts with US studies, which show that the relationship is driven by the *higher* socio-economic classes, despite the fact that their children are least likely to be overweight.) I also find that the effect of maternal employment is the same for boys and girls.

### How might maternal employment affect children's weight?

Previous research suggests a variety of possible pathways by which maternal employment might affect children's weight. When a mother decides to work outside the home, there are several changes in the household that can affect children's (and parents') balance of calorie intake and expenditure.

First, some studies suggest that the decrease in time that mothers spend at home is compensated by a decrease in time spent on housework like meal preparation (see Nock and Kingston, 1988). Possibly due to greater time constraints and decreased energy levels, employed mothers might decide to eat out more or purchase more ready-made meals.

Second, when mothers spend more time away from home, their children will spend more time with other family members or in nurseries or schools. This means that the quality of childcare and the type of food the child is given in these settings is important. Studies of the effects of childcare quality on children's cognitive and behavioural outcomes generally find that quality matters. This suggests that, apart from child development, childcare quality may affect nutritional intake and children's eating patterns.

### Mid-childhood maternal employment does not have an immediate impact on children's weight: rather, the effect emerges as they get older

Third, without parental supervision, children may make poor nutritional choices. Research by Robert Klesges and colleagues (1991) shows that unsupervised and unmonitored children tend to choose unhealthy foods that are high in calories but low in nutritional value. Both the threat of parental monitoring and actual parental monitoring lower the number of non-nutritious foods chosen and the total calorie content of a meal. Similarly, unsupervised children may be more likely to stay indoors (watching TV or playing computer games) rather than engaging in more energetic activities outdoors.



Finally, when mothers decide to work, household income will increase. This could have positive effects on the child's health in terms of being able to purchase more healthy and high-quality foods. Alternatively, the mother's income might be viewed as 'extra' income to be spent on luxuries like restaurant meals.

## Why does mid-childhood employment seem to be so significant?

Studies of the effect of maternal employment on educational and behavioural outcomes later in life generally emphasise the importance of employment during children's early years. In contrast, my study shows that it is mid-childhood employment that matters in relation to children's excess bodyweight.

But I also show that mid-childhood employment does not have an immediate impact on the child's weight. Rather, the effect appears and strengthens as children get older. This suggests that employment during mid-childhood sets up a pattern that persists through childhood into adolescence. So the next question is why?

Unfortunately, this question cannot be addressed with the available data. But there are some possible mechanisms, the first of which is that food preferences and habit formation in children might develop around that age. Previous research generally does not support this hypothesis, instead arguing that the formation of food preferences begins very early in the child's life (see, for example, Birch and Fisher, 1998).

A second possibility relates to the natural growth pattern in children. Mid-childhood is the period when the child is experiencing the adiposity rebound. During this phase in children's lives, the body goes through major changes. If mothers are substituting childcare at this particular time, this might have further consequences for the child. Various behaviours or routines in the household might change in reaction to mothers starting employment outside the home. In this important period, these changes may affect children's physical development, and perhaps also have longer-lasting effects.

Third, mid-childhood is the period when children start school. Perhaps the combination of mothers starting work and the child starting school is affecting the child's weight. This hypothesis would suggest that the decrease in supervision due to maternal employment is increasing the child's BMI. Perhaps after-school activities differ for children whose mothers work compared with children whose mothers are at home.

But these are speculations and should be explored further in future research. This might then shed more light on the various factors related to the rapidly rising obesity rates in the UK and elsewhere in the developed world.

This article summarises 'Maternal Employment and Overweight Children: Does Timing Matter?' by Stephanie von Hinke Kessler Scholder, CMPO Working Paper No. 07/180.

In July 2007, the author was awarded the International Health Economics Association (iHEA) prize for the best student paper in health economics. The study was selected by an international panel of experts at the sixth world congress of the iHEA in Copenhagen.

For the full paper, see:

<http://www.bris.ac.uk/Depts/CMPO/workingpapers/wp180.pdf>

To listen to an audio interview with Stephanie von Hinke Kessler Scholder, visit:

<http://www.bris.ac.uk/Depts/CMPO/audio/main.htm>

## Further reading

Patricia Anderson, Kristin Butcher and Phillip Levine (2003), 'Maternal Employment and Overweight Children', *Journal of Health Economics* 22(3): 477-504.

Leann Birch and Jennifer Fisher (1998), 'Development of Eating Behaviors among Children and Adolescents', *Pediatrics* 101: 539-49.

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Robert Klesges, RJ Stein, Linda Eck, TR Isbell and Lisa Klesges (1991), 'Parental Influence on Food Selection in Young Children and its Relationships to Childhood Obesity', *American Journal of Clinical Nutrition* 53: 859-64.

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# Early years development: What happens when dad does the childcare?

There is increasing evidence from a diverse range of research that the experiences of children in the first years of life can have a lasting impact on their future prospects. Research in developmental psychology and neuroscience has explored the mechanics of brain development and the learning process, while social scientists have taken a keen interest in the concept of 'school readiness' – the skills and abilities that children bring with them when they start school.

At the same time that evidence on the importance of early experience has been mounting, there have been dramatic changes in the social roles of mothers and fathers. Maternal employment is now the norm for mothers of children under the age of 3 in two-parent families.

There is also increasing evidence that fathers both wish to and are becoming more actively involved in their children's lives. The introduction of paid paternity leave for the first time in the UK in 2003 is one example of the way in which governments around the world are attempting to promote greater gender equality in family life as well as in the workplace.

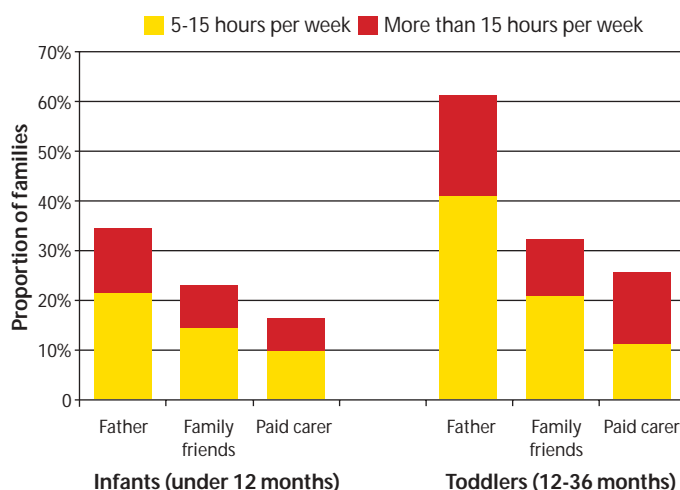
## Boys who spent at least 15 hours a week in their fathers' care as toddlers perform worse on academic assessments when they start school

My research looks at the early childcare experiences of over 6,000 children who were born in and around the city of Bristol in the early 1990s and who lived at least their early lives in a household with both parents. I investigate whether children who spent a lot of time in the care of their fathers differed from other children in terms of their academic and behavioural readiness for school at age 4.

## The balance of childcare between mothers and fathers

Figure 1 shows that fathers were more widely used as a source of primary childcare in the first three years than either relatives or childminders and nurseries. Around a third of children were regularly cared for by their fathers (without their mothers present) for at least five hours a week in the first year of life (infants), with this figure rising to two-thirds for children aged 1

**Figure 1: Non-maternal childcare used in 6,010 intact families in the first three years of life**



and 2 (toddlers). Furthermore, 13% of infants and 20% of toddlers were regularly left alone with their fathers for more than 15 hours a week.

It is not clear how the substitution of father's caregiving for mother's caregiving might affect children's development. On one hand, mothers may be biologically and culturally better adapted for the task. The importance of breastfeeding for children's health is well known, and an obvious example of how maternal care is potentially superior.

The caregiving skills and knowledge of women may also be better, on average, than those of men. This could be because they are passed on to daughters in a way that sons are excluded from or because social stereotypes mean that women feel more comfortable and confident in caring for young children.

Furthermore, proponents of attachment theory have highlighted the potentially harmful emotional effects of the separation of mother and infant in the first year of life. These effects may be magnified if maternal absence is due to employment that increases tiredness and stress, and hence reduces a mother's sensitivity to the child's needs.

**More children than ever before are spending substantial amounts of time in the first years of life in the sole care of their fathers. Research by Elizabeth Washbrook explores the potential consequences for their cognitive and social development.**

On the other hand, fathers may be equally competent as mothers at early caregiving. Like the mother, the father is a stable and consistent figure in the child's home environment and has an emotional stake in the child's well-being. The division of childcare between parents may mean that each parent has more energy and enthusiasm to devote to the task when it is their 'turn'. Indeed, children may derive positive benefits from exposure to two different parenting styles if fathers and mothers both bring something unique to the caregiving relationship.

### **Some fathers appear not to provide the same quality of intellectual stimulation as mothers, at least to their sons**

One problem that must be addressed when investigating this question is that families in which fathers provide childcare may differ systematically from traditional households in other ways. We risk confusing the effects of paternal childcare with the effects of these other non-related factors.

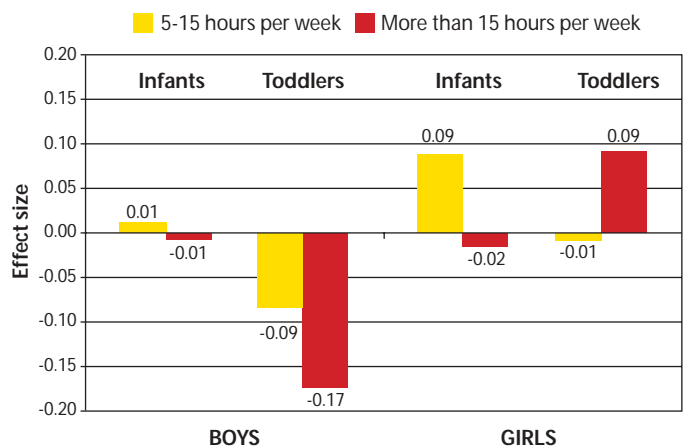
For example, if fathers step in when mothers suffer from post-natal depression, and depression damages children's upbringing in other ways, then we could mistake the effects of post-natal depression for the effects of paternal childcare. Alternatively, if it is more affluent, educated fathers who are most likely to become involved in childcare, then estimates of the effects could be biased upwards.

To deal with this problem, my study controls statistically for a host of maternal, paternal and child characteristics in the analysis. In effect, I equalise these characteristics across all families, and then explore whether there are any significant differences in the outcomes of children experiencing paternal care. I also control for the time and mode of childcare when the child is absent from the parents altogether. The effects examined are thus those of switching childcare time away from the mother and towards the father.

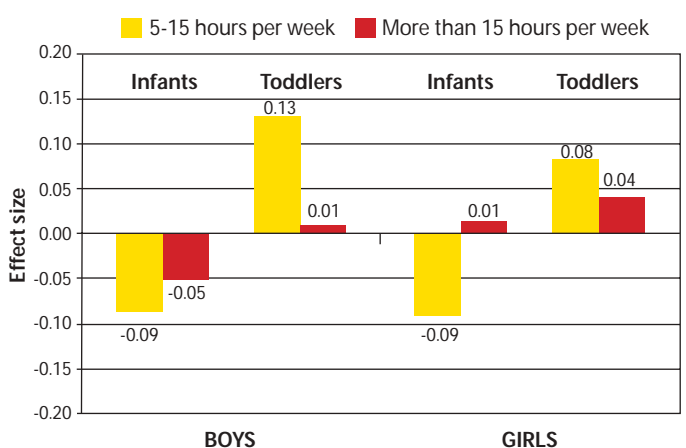
### **The effects of paternal childcare on children's school readiness at age 4**

The central findings of my research are summarised in Figure 2. This indicates that the effects of time alone with the father depend crucially on the gender of the child, the age at which

**Figure 2a: The effects of paternal childcare on children's academic readiness for school at the age of 4**



**Figure 2b: The effects of paternal childcare on children's behavioural readiness for school at the age of 4**



the care took place and the number of hours per week of care provided.

I find robust evidence that boys – but not girls – who spent at least 15 hours a week in paternal care when they were toddlers performed worse on academic assessments when they started school. This cannot be explained by the economic or psychological characteristics of parents in these families, nor by the characteristics of the child.

This finding raises concerns that, on average, fathers do not provide the same degree of cognitive stimulation to sons that is provided by mothers. When in charge, fathers may be more inclined to see their task as fulfilled by monitoring the child and seeing to their physical needs, and so less inclined to devise creative activities that develop the child's intellectual skills.

### **There seem to be no significant effects on children – either positive or negative – of paternal involvement in childcare in the first year of life**

There are two potential explanations for why girls seem immune to this effect: fathers may interact differently with sons and daughters; or daughters may simply be less sensitive to the degree of cognitive stimulation in the home environment. Detailed case studies from developmental psychology are needed to unravel the mechanisms behind these effects.

On the other hand, I find that moderate amounts of paternal care of toddlers are associated with better behavioural outcomes at the start of school, and this is the case for both boys and girls. Psychologists have argued that because mothers and fathers represent different types of interaction to children, children are likely to develop different expectations of them, which should in turn increase their awareness of different social styles and perhaps contribute to the development of social competence.

### **It is when children pass their first birthdays that parenting differences between mothers and fathers start to matter**

My results are supportive of this view. Interestingly, however, I find that the beneficial effects of paternal care only arise when that care begins after the first year of life. Paternal care that is maintained over the first three years, or paternal care in excess of 15 hours a week, has no effect in comparison to mother-only care. Moderate hours of paternal care that are not maintained

after the first year are associated with greater behavioural problems, but this type of arrangement is rare and accounts for only 4% of all intact households.

Indeed, with the exception of this small and unrepresentative group, I find no significant effects on children – either positive or negative – of paternal involvement in childcare in the first year of life. This is perhaps surprising, given that breastfeeding and the formation of mother-infant attachments are expected to be of key importance in this very early period. Rather, it is when children pass their first birthdays – and presumably become more sensitive to the nature of their environments – that parenting differences between mothers and fathers start to matter.

A corollary of this is that I find no evidence that children will be harmed by the introduction or extension of paternity leave that encourages paternal care of infants. In fact, if paternity leave encourages fathers to undertake moderate childcare responsibilities when their children are toddlers, this may have beneficial effects on children's social development.

One note of warning: in society the way it currently is, some fathers do not appear to provide the same quality of intellectual stimulation as mothers, at least to their sons. We should not simply assume that children will be unaffected by the dismantling of traditional gender roles, but consider their needs, as well as those of their parents, when thinking about the roles that mothers and fathers should play in the twenty-first century.

**This article summarises 'Fathers, Childcare and Children's Readiness to Learn' by Elizabeth Washbrook, CMPO Working Paper No. 07/175.**

**For the full paper, see:**

**<http://www.bris.ac.uk/Depts/CMPO/workingpapers/wp175.pdf>**



# Selective education: Who benefits?

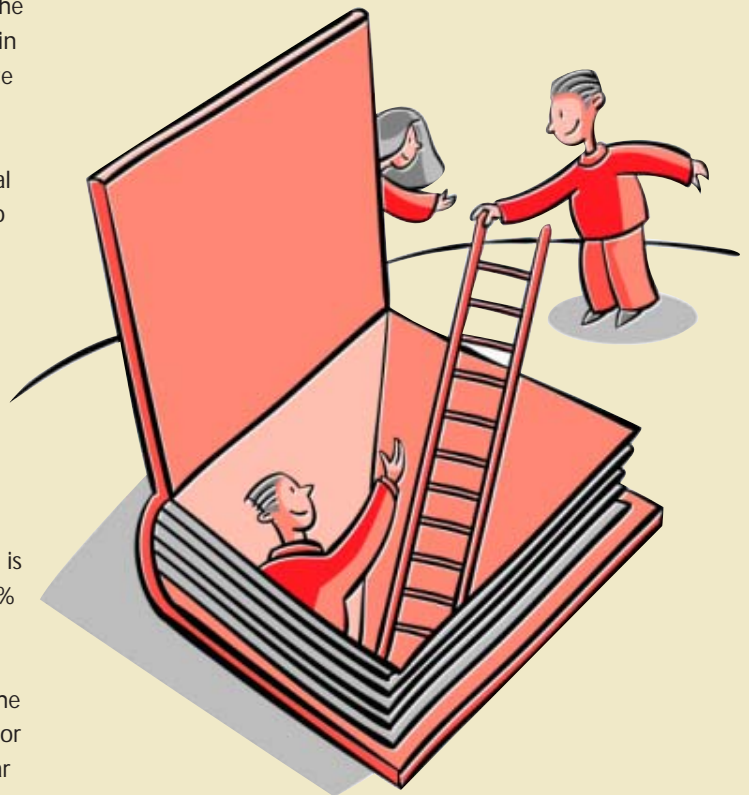
After a sustained period in abeyance, public discussion about the role of selective education in Britain has emerged strongly again over the past few months. In part this was triggered by a debate within the Conservative Party on whether grammar schools should play an increased role in the delivery of secondary education. In part it is down to some commentators on national newspapers linking the decline of intergenerational mobility to the ending of the opportunities that grammar schools gave to bright children from poorer families in opening doors through educational achievement.

This issue of *Research in Public Policy* features three articles by leading researchers on the impact of grammar schools and selective education more broadly. The key questions are: do grammar schools offer opportunities to poorer children? Do grammar schools raise the educational achievement of pupils without damaging attainment among those not selected? And is the current proportion attending grammar schools – about 22% in England – set at the right level?

The first question is relatively easy to answer. David Jesson of the University of York presents powerful evidence that very few poor children go to grammar schools in England: just 2% of grammar school pupils receive free school meals – that is just 500 children. Using a measure of very localised area deprivation, this study indicates that grammar school pupils are drawn very heavily from the most affluent parts of England.

Furthermore, Jesson shows that around 15% of pupils that go to grammar schools come from outside the state sector at the junior level. These pupils will be largely coming from fee-paying schools. So grammar schools are rarely attended by poor children and hence do not represent a 'ladder of opportunity'. This may have changed from 30-plus years ago but now grammar schools are largely attended by children from more affluent families.

The other questions are much harder to answer. It is not easy to assess what would happen to a child in Buckinghamshire, for



example, if they lived in another local education authority (LEA). Pupils in LEAs with selective education clearly cannot be compared with all other pupils, as selective areas are generally more affluent and are not inner city areas.

Likewise when we compare achievement among those that get into grammar schools with those that do not within an LEA, we have to separate the effect of the child being bright (doing well at the 'eleven-plus' test) from the effect of the school they attend. This is further complicated by the potential effects of having a different mix of pupils. Finally, there is the question of how to measure attainment.

The studies reported here have used a number of techniques to overcome these problems. Damon Clark uses a unique dataset collected in the early 1970s in the East Ridings area of Yorkshire. This contains the actual eleven-plus test scores (data that are surprisingly difficult to obtain) as well as the results of tests carried out in the fourth year of secondary school and O-level results achieved for both those attending the grammar schools and those not making it in.

Unsurprisingly, pupils at grammar schools achieved higher marks at the eleven-plus, but there is a small zone in which pupils with the same score attended both types of schools. Clark shows that pupils on the borderline between the two regimes who attended grammar schools took more O-levels and especially more advanced O-levels such as Latin. He also shows almost no step change in the results of maths and literacy tests. This suggests that while grammar schools are more academically focused and they raise the numbers of O-levels taken and grades attained, they do not change underlying numeracy or literacy.

Eric Maurin and Sandra McNally use a natural experiment in Northern Ireland where access to grammar schools was widened in 1989, so that another 15% of all pupils could attend. These researchers do not observe actual eleven-plus scores but they do observe if there is any coincident change in pupil attainment

with the expansion and whether poorer or more affluent students benefit more. Another change where more girls entered grammar schools at the expense of boys is also considered. The results suggest that expanding entry boosted attainment and that poorer children who benefited from the expansion also saw at least as large improvements in attainment.

These studies – together with work by CMPO researchers\* – suggest that in England grammar schools are massively underpopulated by poor children and hence do not offer a ladder of opportunity to the poor. Grammar schools, which have greater academic focus than other schools in the same areas, do improve exam achievement (the number of GCSE A\*-C passes) and poorer children do at least benefit equally in this regard. But grammar schools do not raise underlying numerical and literary functioning. The sorting of people into able and less able is not a major factor here: it is more about school functioning than pupil mix.

Furthermore, the results suggest that restricting pupil entry to just over 20% is a hangover from the days when only one in five were expected to do A-levels and even fewer attend university. In today's Britain, where we expect around 50% to attend university, this cut-off appears inappropriate.

The Northern Irish experience suggests that widening the window to somewhat lower ability children raises overall attainment. Northern Ireland has somewhere around 35% of pupils in grammar schools. The results suggest that making a fully selective system less selective (that is, by allowing more pupils to enter grammar school) is beneficial in terms of average outcomes.

\* 'The Result of 11 Plus Selection: An Investigation into Opportunities and Outcomes for Pupils in Selective LEAs' by Adele Atkinson, Paul Gregg and Brendon McConnell, CMPO Working Paper No. 06/150 (<http://www.bris.ac.uk/Depts/CMPO/workingpapers/wp150.pdf>).

# A ladder of opportunity?

## The pupil intake and performance of England's grammar schools

**Supporters of grammar schools claim that they offer the chance for children from disadvantaged backgrounds to make more of themselves. Analysis by *David Jesson* indicates that while a small number of poorer pupils may benefit, grammar school places mostly go to the offspring of the more prosperous.**

There are currently 164 grammar schools in England. They are located in 36 of the 150 local authorities, and of these 36, only 15 have substantial numbers of pupils educated in grammar schools. Recent debates, particularly within the Conservative party, have focused on whether grammar schools offer a 'ladder of opportunity' for children from poorer family backgrounds to achieve levels of success higher than their peers might otherwise expect. I have been looking at the evidence.

One notable feature of grammar schools is the high performance of their pupils in exams. For some, this is sufficient to justify their retention or argue for their expansion. I also tackle this issue. My analysis of grammar school intakes and outcomes uses data from the annual schools census (completed by every secondary school in January of each year) to gain insights into the socio-economic characteristics of their enrolments. I also have data on pupils' progress over the five years from age 11 to 16.

### The socio-economic context of grammar schools

Local authorities can be classified into three groups: those with no grammar schools (of which there are 114); those with some grammar schools (21 local authorities with a total of 53 grammar schools); and those with a fully selective system for allocating school places (15 local authorities with a total of 111 grammar schools). This group consists of the following (in descending order of percentage of pupils educated in grammars): Buckinghamshire, Trafford, Slough, Sutton, Southend, Kent, Medway, Torbay, Bexley, Wirral, Lincolnshire, Reading, Poole, Bournemouth and Kingston.

Three complementary measures provide information about the comparative composition of grammar school pupils as opposed to those of other, non-selective schools: the percentage of pupils eligible for free school meals; the 'income deprivation affecting children index' (IDACI), a government measure of the proportion of children under 16 in an area living in low-income households; and the proportion of pupils recruited from private fee-paying schools.

Table 1 shows the percentage of pupils eligible for free school meals in grammars and other schools in each of the three types of local authority. Grammar schools clearly have very few pupils eligible for free school meals, while non-selective schools (both in areas of partial selection and full selection) have figures close to the national average.

**Table 1**

Local authority type	Percentage of pupils eligible for free school meals	
	Grammar schools	Other schools
No grammar schools (114)	13%	
Partially selective (21)	2%	14%
Fully selective (15)	2%	12%
Overall	2%	13%

So using this measure of disadvantage, there is considerable polarisation between grammars and other schools, with the former in no way having a representative sample of the pupils in their areas. In fact, out of over 22,000 pupils entering grammar schools annually, substantially less than 500 are classified as eligible for free school meals. This is hardly providing a ladder of opportunity for disadvantaged pupils.

**Table 2**

Group	1	2	3	4	5	6	7	8	9	10
IDACI	.567	.393	.294	.219	.163	.120	.087	.062	.041	.021
Level	Severe		Average disadvantage						Low	

The IDACI measure of disadvantage ranges from 0 to 1 with an average value of 0.21. Table 2, which shows the grouping of IDACI measures into 10 equal-sized groups, provides a framework for identifying the extent to which schools recruit pupils from 'severely disadvantaged' (the highest 20%) and 'low disadvantage' (the lowest 20%) communities. This classification is used in Table 3 comparing schools in the three types of local authority.

**Table 3**

Local authority type	Percentage of pupils with severe and low disadvantage			
	Grammar schools		Other schools	
No grammar schools (114)	Severe 21%	Low 20%		
	Severe	Low	Severe	Low
Partially selective (21)	6%	35%	20%	18%
Fully selective (15)	5%	34%	16%	16%
Total selective (36)	5%	34%	19%	17%
All schools	20 %		20 %	

Again, there is a very clear polarisation of grammar school intakes: over one third of their pupils come from low disadvantage communities; and only 5% from those with severe disadvantage, compared with national figures of 20% in each category. This provides further evidence against the claim that grammar schools provide a ladder of opportunity for less advantaged pupils.

### Entry to grammar schools from non-state schools

A third aspect of grammar schools' recruitment adds further to our understanding of the kinds of pupils they select. Pupils transfer between state and independent schools in each direction at certain key points in their lives. Interestingly, there appears to be a distinct migration from outside the state sector into the state system at the age of 11 and above, but predominantly into state grammar schools. This again reinforces the advantaged nature of grammar schools' populations: 14% of their pupils come from this source. Table 4 shows the proportion of pupils in each type of school.

**Table 4**

Local authority type	Percentage of pupils from state and non-state schools			
	Grammar schools		Other schools	
No grammar schools (114)	State junior 95%	Non-state 5%		
	State	Non-state	State	Non-state
Partially selective (21)	85%	15%	96%	4%
Fully selective (15)	87%	13%	95%	5%
Total selective (36)	86%	14%	96%	4%

Entry to many grammar schools is typically through competitive tests open to all pupils of the appropriate age. Whereas pupils in state schools follow the national curriculum and sit the key stage 2 tests in the year of the selection tests, pupils in non-state schools are not required to follow this route, and many private schools do not enter their pupils for these tests.

This provides the opportunity for these schools to coach pupils for grammar school entrance exams as part of their routine. Coaching for state school pupils has to take place outside the

time allocated to the national curriculum, and hence involves the use of private tutors – at a cost that is beyond the means of many families suffering income deprivation or whose children are eligible for free school meals.

Table 4 provides further evidence of the bias apparent in grammar school selection processes – away from children from disadvantaged backgrounds. Parents who can afford to send their children to private fee-paying schools have a distinct advantage in securing places at local grammar schools over pupils from state junior schools who are similarly able. In effect, relatively advantaged parents secure a scarce resource for their offspring directly at the expense of other equally able pupils in the state sector.

### Far from providing 'ladders of opportunity' for pupils from disadvantaged backgrounds, grammar schools are more like 'ghettos of the advantaged'

Further analysis shows that the 10 grammar schools with the highest level of recruitment of pupils from non-state schools recruited over one third of their pupils from these types of institutions. The next 10 recruited over a quarter of their pupils from this source while the next 10 enrolled over 20% of their pupils from such schools. This is an issue that clearly requires further investigation and action.

Taken together this evidence shows clearly how far grammar schools are from providing the ladder of opportunity for children from disadvantaged backgrounds that many of their supporters claim. Indeed, a more appropriate description might be that they are 'ghettos of the advantaged', doing little to alleviate the divisions in the society they are intended to serve.

### Grammar school performance at GCSEs

Each year school league tables generate much press comment on the nation's 'top schools'. Many are grammars, fuelling supporters' claims that these schools provide excellence in education. But since 2006, schools have been officially classified by a 'value-added' measure, which compares schools on the progress that pupils make over the full five years of secondary education. The measure classifies schools into three types: those making average progress, and those making above or below average progress.

This measure shows that while grammar schools have high 'absolute' outcomes, this is only to be expected given the nature of their highly selected and able pupil populations. This does not mean that there are no grammar schools classified as excellent, but it does cut down their number considerably – from 164 to just 19.

Over the nation as a whole, a quarter of all secondary schools are assessed as providing above average progress for their pupils. The

Table 5

GCSE evaluation 2006	No. of grammar schools	Percentage	Percentage of non-selective schools
Progress between the ages of 11 and 16			
Above average	19	12%	25%
Average	129	78%	50%
Below average	16	10%	25%

figure for grammar schools – 12% – is only around half that proportion. But this is counterbalanced by the much smaller proportion of grammar schools evaluated as providing below average progress. That is a statistical consequence of the relatively small size of most grammar schools. But what it does show is that the 16 below average schools have very much lower performance than expected – these are poorly performing schools.

Table 5 shows that the great majority of grammar schools provide average progress for their pupils. This does not, however, support any claim that these schools, as a whole, are providing anything more than the progress that might be expected given the attainments and other characteristics of their pupils on entry.

### Out of over 22,000 pupils entering grammar schools annually, substantially less than 500 are eligible for free school meals

This is a matter of serious concern and raises doubts about one of the most regular claims of excellence made on behalf of these schools. If it is the case that the majority do only as well as the great majority of non-selective schools, then there should be considerably less emphasis on claims that these schools provide excellent education. No doubt many of them do well with particular groups of pupils, but overall their performance is as good as would be predicted given their intakes, and certainly no better than that made in the nation's comprehensive schools.

Table 6

Pupil characteristic	GCSE school performance evaluation by 'value-added'			
	Below average grammars		Other grammars	
	16		148	
Eligibility for free school meals	4%		2%	
	Levels of disadvantage			
IDACI level	Severe	Low	Severe	Low
	8%	28%	5%	35%

And there is still the problem of the 16 grammar schools assessed as providing below average progress for their 2,500 pupils. Table 6 shows that in comparison with the other 148 grammar schools, these 16 schools had double the level of pupils eligible for free school meals along with higher proportions of

pupils from severely disadvantaged communities and lower proportions from those with low disadvantage.

The numbers of pupils involved are relatively small so it is unwise to make too much of this finding. Nevertheless, it is significant that the schools that had the worst performance were also the ones with higher levels of disadvantage. This suggests that the term excellence should not be universally applied to grammar school performance. These schools need to look very carefully at their performance to discover why they are not providing the progress that other schools have achieved with pupils like theirs.

### Simply being a grammar school is no guarantee of excellent performance

Grammar schools need to investigate their performance data as intelligently as the thousands of other secondary schools in the country. There is no suggestion that simply being a grammar school is any guarantee of excellent performance.

## Conclusions

In earlier years when grammar schools were much more prevalent, it is clear that, in many cases, they did offer a ladder of opportunity much more widely than those few remaining today. Over the intervening period, much has changed in the social and economic make-up of the country, and the reforms aimed at changing the structure of educational opportunity have changed also.

It is ironic therefore that the political fall-out over David Cameron's foray into this field should have been so violent and abusive – for it was a previous Conservative secretary of state for education, Margaret Thatcher, who was responsible for the 'abolition' of more grammar schools than any other holder of her office either before or since.

My analysis shows that grammar schools do not offer a ladder of opportunity to any but a very small number of disadvantaged pupils. In fact, their recruitment policies tend to favour pupils from more prosperous communities where eligibility for free school meals and other measures of deprivation are at very low levels.

Finally, although in league table terms, grammar schools have high levels of GCSE results, analysis of the pupils who provide these levels of outcome shows that, for the great majority of these schools, this is only to be expected, and that there are also a number of them providing poor progress for their pupils.

**David Jesson is visiting professor at the Centre for Performance Evaluation and Resource Management at the University of York**



# Selection versus comprehensives:

## Which delivers the best educational outcomes?

The 'eleven-plus' system established by Rab Butler's 1944 Education Act is one of Britain's most controversial institutions. In 1965, Harold Wilson government's required local authorities to abolish the separation of children into grammars and secondary moderns – and the ensuing battles as some refused were to rage into the early 1980s.

Even in the 1990s, when few grammar schools remained (164 from a total of more than 3,000 secondary schools), New Labour agonised over their fate before finally letting local referenda decide. And just recently, Conservative MPs have clashed over whether new grammar schools should be built in response to population growth in the small number of areas that still have them.

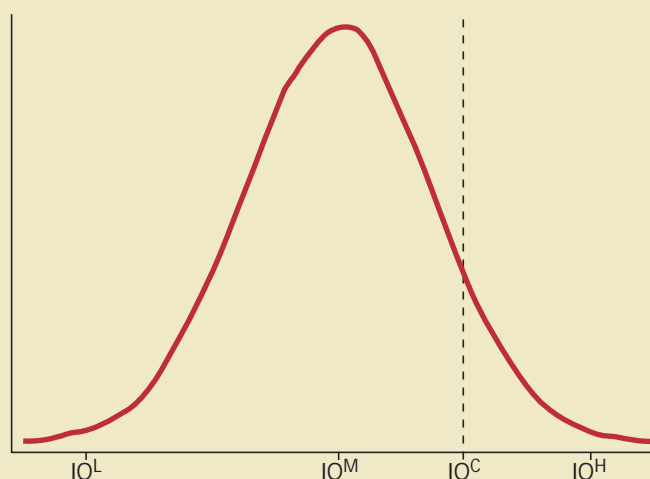
For all the noise made by these debates, the central question is always the same: should different types of school cater for different types of children or should children of all abilities be schooled together?

To illustrate, consider Figure 1, which depicts the familiar bell-shaped distribution of IQ. The concept of IQ is a controversial one, but we can presumably agree that at the age when children transfer to secondary school, there is a distribution of academic ability revealed, for example, in key stage 2 results or, where grammar schools still exist, in eleven-plus scores.

In Figure 1,  $IQ^L$ ,  $IQ^M$  and  $IQ^H$  mark the IQ levels of low-, medium- and high-ability pupils;  $IQ^C$  is the IQ level that separates the 'bottom' 80% from the 'top' 20%. In a selective system, grammar school places typically go to the top 20% of pupils (those with IQ greater than  $IQ^C$ ) with the rest assigned to secondary modern schools; in a comprehensive system, all children attend the same type of school.

In practice, there are more grammar school places in some selective areas than others, and private schools and residential segregation mean that comprehensive schools are never entirely comprehensive. Yet nothing is lost by focusing on these stylised selective and comprehensive worlds.

Figure 1: IQ distribution



The question of whether all children should attend the same type of school is a complex one: the selective system may be better for some children, the comprehensive system better for others. One way of answering this question would be to see which system works best on average. In addition, we could see which system works best for particular types of pupil, such as those of very low or very high ability.

**It is hard to construct credible comparisons across individuals, local authorities or countries that experience different school systems but are otherwise similar**

Unfortunately, despite what many politicians would like to believe, we simply do not know which system works best for particular types of pupil or even on average. The problem is that we do not observe the counterfactual. We do not know what the 2007 figure for the fraction of pupils achieving five or more higher-grade GCSEs would be had the Wilson government not required local authorities to abolish the eleven-plus. And we do not know what this figure would be for Kent, the local authority with the highest number of grammar schools in England, had it gone comprehensive.

**Should children of different ability attend different types of school or should all children be taught together? *Damon Clark* reveals the huge difficulties in answering this question with systematic evidence rather than arguments based on anecdote, prejudice or personal experience.**

The same question confronts politicians attributing their success to the virtues of King George Grammar or their struggle against the odds laid by Newtown Secondary Modern: how do they know what would have happened had they attended a different school?

Researchers try to solve this problem by comparing individuals, local authorities or countries that experience different school systems but are otherwise similar. Yet credible comparisons are extremely hard to construct.

For example, we could compare exam performance in Britain (a largely comprehensive system, in which 58.5% of pupils achieved five or more higher-grade GCSEs in 2007) and Northern Ireland (a still selective system, in which the equivalent fraction was 71.7% in 2007) and conclude that Northern Ireland's superior performance demonstrates the superiority of selection. But Britain and Northern Ireland differ in important ways, and few would want to draw conclusions based on this comparison.

Across-authority comparisons are similarly problematic. During the recent Conservative party row, Graham Brady MP noted that the 2006 GCSE figure for selective Trafford was 70%, while it was only 59% for comprehensive Bury. Brady claimed this proved that selection 'works best for all children' since Bury has a 'similar socio-economic profile':

Yet when the very same pupils took their key stage 2 tests in 2001, *before they had even entered secondary school*, the proportions attaining level 4 in English were 36% in Trafford and 31% in Bury. Either Trafford is blessed with excellent primary schools or the socio-economic profiles of these places are not as similar as Brady claims. Compelling work by Alan Manning and Steve Pischke (2006) uses a similar argument to argue that across-authority comparisons are, in general, not valid.

Although across-authority comparisons are unlikely to be credible, one type of within-authority comparison may be. In particular, in a selective system, a comparison of outcomes among pupils with IQ scores just below and just above  $IQ^c$  will reveal the effect of attending grammar schools (as opposed to

secondary moderns) for borderline pupils with scores close to  $IQ^c$ . This is credible to the extent that these two sets of pupils are essentially the same, the only difference being that one achieved slightly better eleven-plus scores.

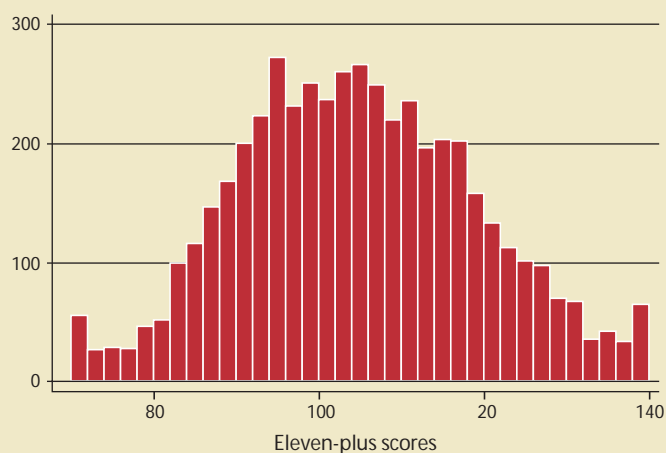
There are two points to make about this comparison. The first is that it is the only within-authority comparison that makes sense. Comparing outcomes among *all* pupils that attended secondary moderns (all those with IQ lower than  $IQ^c$ ) and *all* pupils that attended grammars (all those with IQ greater than  $IQ^c$ ) would no doubt reveal that grammar school pupils have better outcomes.

**Within-authority comparisons are far less ambitious but can reveal something about the impact of going to a grammar school on borderline eleven-plus pupils**

But we would expect higher-ability pupils to have better outcomes irrespective of the type of school attended. Even analysis that controls for a large number of pupil characteristics will be of limited use. Among pupils with similar characteristics, those that attended grammar schools are still those selected on the basis of their eleven-plus performance – and we would still expect them to have better outcomes irrespective of the type of school they attended.

The second point is that this within-authority comparison is far less ambitious than an across-authority comparison. A credible across-authority comparison could tell us about the effects of secondary modern (rather than comprehensive) schools on low-ability pupils, the effects of grammar (rather than comprehensive) schools on high-ability pupils and the effects of selective and comprehensive systems on average outcomes. The within-authority comparison tells us only about the effects of attending grammar (rather than secondary modern) schools on borderline pupils.

The trade-off here is between an interesting question that we cannot credibly answer and a less interesting question that we can hope to answer convincingly.

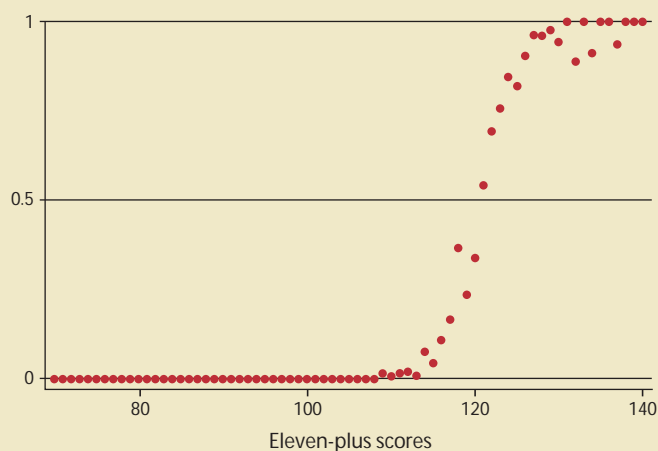
**Figure 2a: Distribution of eleven-plus scores**

## Evidence from the East Ridings

The problem with the within-district comparison is that eleven-plus scores are rarely available. Fortunately, I have been able to obtain a dataset containing the scores of several cohorts of pupils attending schools in the East Ridings in the early 1970s. These data also contain basic demographic information, details of O-levels studied and scores on tests done by all East Ridings pupils in their fourth year of secondary school.

Figure 2a shows the distribution of these pupils' eleven-plus scores, which roughly follow the bell curve depicted in Figure 1. Figure 2b shows the relationship between these scores and the probability of attending a grammar school.

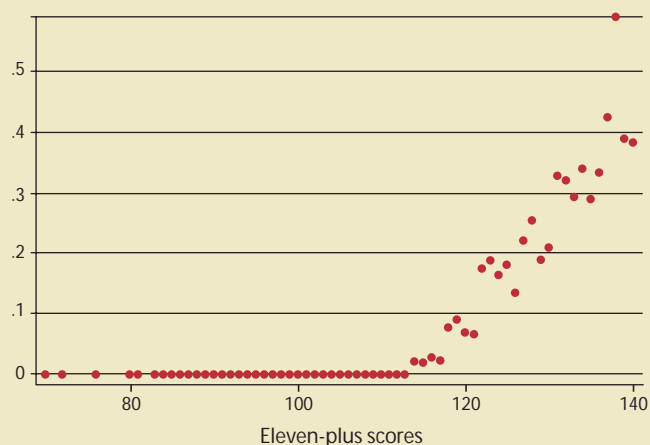
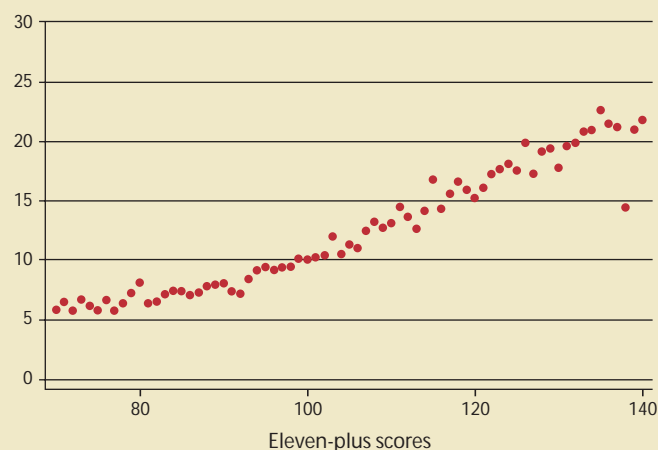
Unlike in Figure 1, there is no single threshold at which all pupils scoring higher attended a grammar school and all those scoring lower attended a secondary modern. That is because the East Ridings based school assignment on both the eleven-plus and the pupil ratings of primary school head teachers. There is still, however, a sharp change in the probability of attending grammar school over a narrow range of eleven-plus

**Figure 2b: Fraction attending grammar school**

scores, and so a within-district approach can still be implemented, focusing on the change in outcomes over this borderline range.

Figure 2c shows that the probability of taking a classics O-level (Latin and/or Greek) increased sharply over this borderline range. This is not surprising since pupils at secondary moderns could not pursue these courses. I find that attending grammar school had similar effects on the probability of studying other advanced O-levels and increased the total number of O-levels that pupils sat. I also find that these effects were especially large for pupils of lower socio-economic status who, relative to pupils of higher socio-economic status, were less likely to take O-levels in secondary moderns.

Figure 2d looks at the scores obtained on the fourth year maths test. Although pupils with better eleven-plus scores did better on this test, maths test scores do not change sharply over the borderline eleven-plus range. This implies that grammar schools did not improve performance on this test, a conclusion confirmed by a more sophisticated statistical technique based on the same basic idea.

**Figure 2c: Fraction taking classics O-level****Figure 2d: Maths scores on fourth year tests**

I estimate that attending grammar school had small and statistically insignificant effects on maths scores and I find similarly small effects on scores in English and science. The conclusion is that while grammar schools affected the number and type of O-levels pupils sat, they did not change basic learning outcomes, at least for pupils with borderline eleven-plus scores.

## Implications

What can this within-authority comparison tell us about the question with which we started out: should pupils of different ability attend different types of school or should all pupils be schooled together? The East Ridings results suggest that grammar schools provided opportunities denied to pupils in secondary moderns, but did not improve basic learning outcomes.

### **Evidence from the East Ridings suggests that grammar schools provided opportunities denied to pupils in secondary moderns, but did not improve basic learning outcomes**

A strong interpretation of these results is that the selective versus comprehensive issue is not important: grammar abolitionists are right to claim the transition to comprehensive education destroyed nothing of value; grammar supporters are right to claim the comprehensive movement delivered nothing that could not have been achieved by widening secondary modern opportunities. The issue for historians and political scientists is whether these opportunities – the raising of the school leaving age, the merging of O-levels and CSEs into GCSEs and the expansion of further and higher education – could have been achieved without comprehensive schools.

On their own, the East Ridings results cannot support such a strong interpretation. They are based on a comparison of schools within one local authority and, because they apply to pupils with borderline eleven-plus scores, they do not tell us how grammar schools affect the most able pupils or how secondary moderns affect the least able. Research using data from other local authorities could help to assess whether these results generalise, although this within-authority approach will only ever identify effects for borderline pupils.

Evidence from other countries can help fill this gap, and a recent US study by Julie Cullen, Brian Jacob and Steven Levitt

(Cullen et al, 2006) is particularly relevant. They looked at the effects of attending various types of schools in Chicago, a city that allows parents to choose schools but uses lotteries when schools are over-subscribed. Not surprisingly, the socio-economic profile of lottery winners and losers is the same: the winners simply got lucky and were able to attend 'better' schools, defined as those with pupils who have higher socio-economic status and are more able.

### **It is hard to argue with the cross-party 'standards not structures' consensus that leaves grammar schools alone and the eleven-plus issue behind**

More surprisingly, but consistent with the East Ridings results, this study finds no significant differences in the educational outcomes of winners and losers. The results do not tell us which factors are most important for educational achievement – smaller classes, better teaching, effective management and so on – but they do tell us that these do not automatically gravitate to schools with pupils who are of high ability and high socio-economic status.

Like the East Ridings results, this type of study provides only indirect suggestive evidence on the impact of selective versus comprehensive systems. Nevertheless, without stronger evidence that school type matters, it is hard to argue with the cross-party 'standards not structures' consensus that leaves grammar schools alone and the eleven-plus issue behind.

**Damon Clark is assistant professor of economics at the University of Florida. This research was supported by a National Academy of Education Spencer Postdoctoral Fellowship. The full version of the paper is available at: <http://bear.cba.ufl.edu/clarkd/>**

## Further reading

Julie Berry Cullen, Brian Jacob and Steven Levitt (2006), 'The Effect of School Choice on Pupil Outcomes: Evidence from Randomized Lotteries', *Econometrica* 74(5): 1191-230.

Alan Manning and Jörn-Steffen Pischke (2006), 'Comprehensive versus Selective Schooling in England and Wales: What Do We Know', Centre for the Economics of Education Discussion Paper No. 66 (<http://cee.lse.ac.uk/cee%20dps/ceedp66.pdf>).

# Widening access to grammar schools:

## The educational impact in Northern Ireland

It is difficult to know whether widening access to schools that provide a more academically orientated, general education makes a difference to average educational achievement. Although there has been a shift in this direction in many OECD countries, reforms have been difficult to evaluate because they are often accompanied by other important changes to the educational system or because they have been introduced at the same time everywhere so there are no comparison groups.

But the consequences of such reform are deeply controversial and very much a current policy issue. In particular, opponents argue that increasing access to the more academic track harms the quality of education for everyone without improving the prospects of those able to attend the academic track.

Our research makes use of a unique 'natural experiment' to identify the net effects on overall educational outcomes of widening access to schools that provide a more academically orientated, general education. Specifically, we consider the consequences of a reform that affected access to grammar schools in Northern Ireland, when England is used as the comparison group.

Our approach identifies the consequence of reform in the context of a selective system of education. But it does *not* allow one to say whether a fully selective system of education like Northern Ireland's is better or worse than a fully comprehensive system like England's.

The two regions of the UK differ in that the grammar school system has been retained in Northern Ireland whereas it was gradually dismantled in England in the 1960s and 1970s. The hallmark of the grammar school system is that children are selected on the basis of measured ability at the age of 10 or 11 whereas in the comprehensive system, children of different abilities are educated in the same schools.

Although the education systems of England and Northern Ireland are also different in other respects (for example, schools in the latter are mostly segregated by religion), there are

important similarities. The two regions have broadly the same curriculum and they have the same exams at the ages of 16 (GCSEs) and 18 (A-levels).

The important considerations for our research are that the exams are comparable across the two regions and that the reform only occurred in one of them. That reform consisted of widening access to the more academic track within Northern Ireland at the time of the 'open enrolment' reform in the late 1980s. This is the only differential change that happened across the two regions.

Our research shows that the reform enabled a very significant increase in the number of Northern Irish pupils who could attend the more academic track (grammar schools) at the end of primary school, between the pre-reform birth cohort (children born in 1978) and the post-reform birth cohort (those born in 1979). By comparing educational outcomes in Northern Ireland and England before and after the reform, we can identify the effect of widening access to the academic track on overall educational attainment.

Using administrative data before and after the reform, we find that the open enrolment reform of 1989 (which affected the 1979 birth cohort) had a clear impact in Northern Ireland relative to England. A 15 percentage point increase in the number of pupils enabled to attend grammar school (at the age of 11) was accompanied by shifts of similar magnitude in the number achieving five or more GCSEs at A\*-C and one or more A-level. This suggests a strong causal effect of expanding the more academic track on overall educational achievement.

Just before the reform, there was a change affecting admissions in a qualitative way. Up to 1988, girls and boys were assessed in different categories so that the same percentage of entrants to the admission test would obtain a given grade (determining whether or not they could be admitted to grammar school). Following a high court ruling in June 1988, this practice was discontinued and from then on, girls and boys were assessed together (affecting grammar school intakes in 1989, the 1978 birth cohort).



**What are the overall effects on educational attainment of widening access to the more academic track? Research by *Eric Maurin* and *Sandra McNally* investigates using the 'natural experiment' of the grammar school system in Northern Ireland, which has survived long after it was dismantled in England.**

This change was to the advantage of girls since they outperformed boys on the verbal reasoning tests that were the basis of selection. The one-year gap between this qualitative change to admissions and the open enrolment reform generated significant upward and downward shifts in the relative proportion of girls enabled to attend grammar school across the cohorts born between 1977 and 1980.

We find that these shifts have been followed by parallel shifts in girls' subsequent relative outcomes at the ages of 16 and 18. This confirms the considerable effect of grammar school entry on educational outcomes using a different source of identification to that used for comparing outcomes over time between England and Northern Ireland. We also replicate this latter analysis for boys and girls separately and confirm our earlier results.

Thus, whether we compare girls and boys within Northern Ireland or make comparisons by gender between Northern Ireland and England, it is clear that grammar school reforms have a strong impact on educational outcomes and that the design of the educational system – in this case, the mechanism of entry into grammar school – has consequences for gender differences in educational outcomes.

As well as considering the overall effect of expanding the academic track on educational outcomes, we are able to use the same experiment to consider whether the selective system is a contributory factor to observed inequalities between socio-economic groups with regard to later educational outcomes. Specifically, we can analyse the effect of the reform according to whether children are eligible for free school meals, which roughly corresponds to families in the bottom quarter of the income distribution.

We find that there were big differences before and after the reform between the probabilities of children from lower and higher income groups entering grammar school and achieving good educational outcomes at the ages of 16 and 18. But the reform had an equal impact on children with and without free school meals in terms of entry to grammar school and

educational achievement at the ages of 16 and 18 (although it did not change relative prospects – which are strongly in favour of those from more advantaged backgrounds).

We conclude that the effect of attending grammar school is similar for those from higher and lower income groups. Therefore, the barriers that make it difficult for children eligible for free school meals to enter grammar schools in the first place (such as lower test scores at the age of 11 because of lower parental resources) have a long-term effect on inequality.

In other words, an expansion of grammar school places is potentially beneficial to both groups but access to grammar schools is very unequal. Therefore, whatever pre-existing inequality there is between socio-economic groups (in terms of educational attainment at age 11) is exacerbated by the school system.

Although this research cannot be interpreted as evaluating the overall effects of a comprehensive or selective ('tracked') system of education, it is an example of where widening access to the more academic track has generated positive net effects in the context of a selective system. It illustrates the high price that pupils pay for being excluded from the academic track, even when they are some way down the ability distribution within their birth cohort.

**Eric Maurin is research director at the École des Hautes Études en Sciences Sociales in Paris and professor at the Paris School of Economics. Sandra McNally is a research fellow at the Centre for Economic Performance and a deputy director of the Centre for the Economics of Education (CEE).**

**Their study – 'Educational Effects of Widening Access to the Academic Track: A Natural Experiment' – is available as CEE Discussion Paper No. 85:**  
<http://cee.lse.ac.uk/cee%20dps/ceedp85.pdf>

# Knowledge transfer:

## The links between university research and business innovation

As part of the largest ever study of the social and economic impact of UK higher education, *Helen Simpson* and colleagues are investigating the links between university research and innovation in the private sector. Here, she examines whether firms are locating R&D facilities close to top university departments.

During Gordon Brown's time as Chancellor, the government made improving the UK's productivity one of its top priorities, and set an ambitious target of increasing expenditure on research and development (R&D) to 2.5% of GDP by 2014.

On taking office as Prime Minister in June, Brown announced the creation of a new Department for Innovation, Universities and Skills, covering science and innovation together with higher education and skills (previously under the separate remits of the Department of Trade and Industry and the Department for Education and Skills respectively).

Establishment of the new department signals the synergies that the Prime Minister perceives between these policy areas, and the importance of 'technology transfer' from universities to the private sector and commercial exploitation of the research base. In research with colleagues at the Institute for Fiscal Studies (IFS), I am exploring these links between research in higher education institutions and private sector innovative activity.

### Private sector R&D labs in Britain are disproportionately clustered around highly rated university departments

As a first step, we ask whether firms are choosing to locate their R&D facilities near to university research departments, and whether the quality of university research matters for the extent of geographical clustering.

For example, do firms in the pharmaceuticals industry locate their R&D labs near to chemistry and medical science departments carrying out world-class frontier research? Evidence that they do might imply that close geographical proximity to universities enables firms to capitalise more effectively on the expertise of university scientists.

We know from survey evidence that the research base is an important source of knowledge for businesses, and that there are a number of routes through which businesses might benefit.

Geographical proximity is likely to be crucial if the main way knowledge is transferred is via face-to-face interaction.

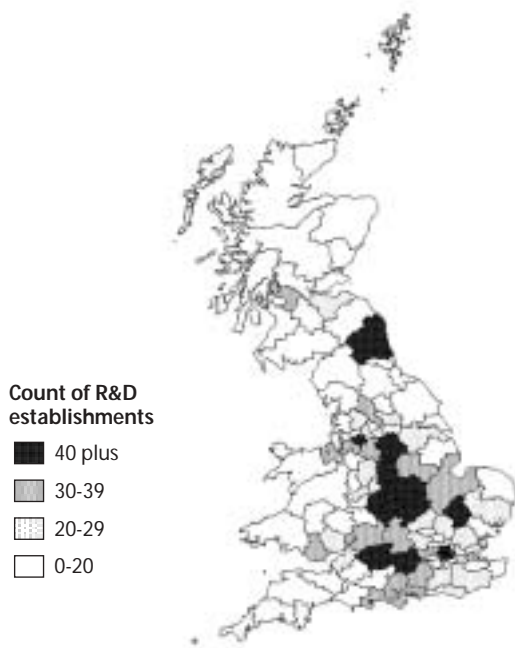
But if the main route is through codified knowledge such as journal articles, then proximity may be less relevant. Knowledge may also be transferred through formal collaboration agreements, 'spin-out' companies or consultancy. In addition to providing new knowledge, university research departments may also support business R&D by supplying trained scientists.

Our research relates the location pattern of private-sector R&D establishments in Britain to the presence of nearby relevant university research departments. It uses data from the 'research assessment exercise' (RAE), conducted periodically by the Higher Education Funding Council for England in order to produce ratings of research quality that can be used to allocate the main grant for research use among universities.

In the last RAE, completed in 2001, each academic department's submission was rated within a scale of 1, 2, 3, 4, 5 and 5\*. The higher the number on the scale, the higher the department's research quality was rated. We used these classifications to separate research departments into those rated 5 or 5\*, which are deemed to perform world-class cutting edge research, and those rated 4 or below.

Figures 1 and 2 illustrate graphically the basic relationship underlying the empirical research. Figure 1 shows the distribution of R&D-performing establishments for six industries across postcode areas, while Figure 2 shows the distribution of 5 and 5\* university departments of scientific relevance to those industries. Postcode areas with higher numbers of R&D establishments or 5 and 5\* departments are represented by darker shaded areas.

Comparison of the figures shows a positive correlation between the location of R&D-performing establishments and the presence of high quality relevant university research departments. Our findings suggest that in some industries, private-sector R&D labs are disproportionately clustered around highly-rated university research departments.



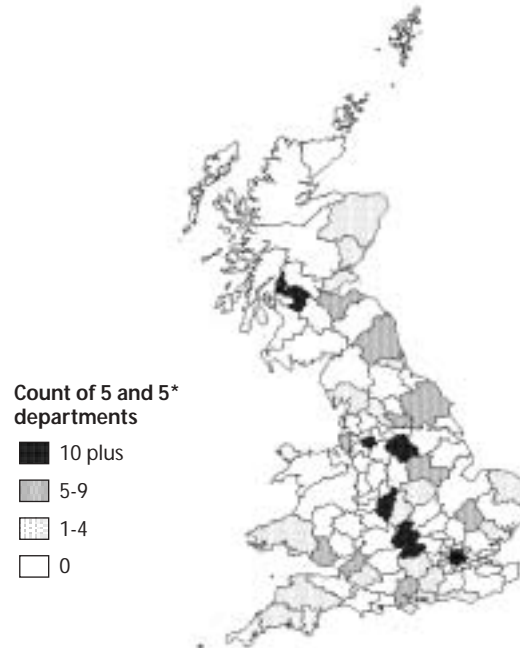
**Figure 1: Distribution of R&D establishments in pharmaceuticals, chemicals, machinery, electrical machinery, TV and radio equipment, and motor vehicles**

Interestingly, this phenomenon is not driven just by university spin-outs: in some industries, foreign-owned firms are choosing to locate in close proximity to high quality research. This suggests that internationally mobile multinational firms may be sourcing cutting-edge technologies from universities in Britain.

### **Multinational firms may be sourcing cutting-edge technologies from British universities**

The clustering of R&D facilities close to university departments is particularly strong in the pharmaceuticals and chemicals sectors, which conduct a significant proportion of R&D in this country. For example, our research suggests that a postcode area (for example, 'OX' for Oxford) with a chemistry department rated 5 or 5\* is likely to have around twice as many labs doing R&D in pharmaceuticals and around three times as many foreign-owned pharmaceuticals R&D labs compared with a postcode area with no 5 or 5\* rated chemistry departments.

In some sectors, clustering is not limited only to the most highly rated research departments. For example, we find evidence that foreign-owned labs in machinery sectors are likely to be located near to materials science and electrical engineering departments rated 4 or below by the RAE. This suggests that firms may also benefit from proximity to potentially more applied, commercially-oriented research activity.



**Figure 2: Distribution of 5 and 5\* research departments in biology, chemistry, medical sciences, materials science, computer science, electrical and mechanical engineering**

So as well as confirming the importance of maintaining world-class research centres in order to attract international R&D investment, our research suggests that departments rated 4 or below may play important roles in some areas of technology transfer and in attracting investment.

While these findings on geographical clustering are indicative, they do not provide direct evidence on firms' connections with universities. The next stage of the research is to examine university-business interactions more explicitly. We will investigate whether proximity to university departments of varying research quality is related to the likelihood that firms actively engage in formal co-operative R&D arrangements with universities and, more informally, use information and knowledge generated by universities to help them innovate.

**This article draws on research reported in 'University Research and the Location of Business R&D' by Laura Abramovsky, Rupert Harrison and Helen Simpson, published in the March 2007 issue of the *Economic Journal*.**

**Helen Simpson's research with colleagues at the IFS is being carried out under the ESRC's Impact of Higher Education Institutions on Regional Economies Initiative. For further information, see: <http://ewds.strath.ac.uk/impact> To listen to an audio interview with Helen Simpson, visit <http://www.bris.ac.uk/Depts/CMPO/audio/main.htm>**

# Keeping up with the Schmidts:

## The impact of neighbourhoods on personal happiness in Germany

**Does having rich neighbours make you unhappier? *Gundi Knies* uses data from Germany to investigate how people's life satisfaction is affected by the neighbourhood in which they live – and how public policy may respond.**

It is generally thought that the more income people have the happier they will be. But we also care about how we are doing compared with others: the well-worn phrase 'keeping up with the Joneses' captures a common desire to be seen to be doing as well as our neighbours or contemporaries using the measure of accumulated material goods. Failure to keep up with the Joneses is seen as demonstrating socio-economic or cultural inferiority – an undesirable circumstance for pursuing happiness.

There are arguments both for and against the idea that having richer neighbours causes unhappiness. In support is the fact that when others are more affluent, one's relative consumption position is lower. For example, in the local housing market, it is not some absolute sum of money that ensures that the richest person gets the best-quality land and property. Instead, the income position of all people who want land and property will determine who gets what and how much it costs to get the best spot.

The implications for happiness are that if we observe two otherwise identical individuals living in different neighbourhoods, the one with richer neighbours will be unhappier because their income will not have allowed them to find as nice a place as would be possible in the neighbourhood with less affluent competitors.

Against this 'keeping up with the Joneses' effect, people may actually appreciate the neighbourhood they live in for the range and quality of local amenities it offers even though having richer neighbours makes it more expensive to live there.

Neighbourhood context plays an important role in people's happiness in many direct and indirect ways. All decisions people take in their lives are influenced by the local social network and the local circumstances. They are based on personal values, aspirations, preferences and perceived opportunities, which are all context-dependent: whether or not people get married depends on whether a suitable partner is available. Whether a person is considered suitable depends on values, aspirations and

preferences, which are shaped, on the one hand, by personal characteristics such as education and socio-economic status, and on the other hand by interaction with local social networks.

### **Most Germans are not made unhappier by having rich neighbours**

By means of neighbours' personal characteristics, neighbourhoods influence individual preferences directly through the social networks they provide and indirectly through the way they transform the characteristics of neighbours – for example, through the quality and quantity of schools, the enforcement of law and order and the housing market. If the neighbourhood does not provide access to good schools, it will be impossible to get a good education, which might be an obstacle to getting a well-paid job. Limited access to a high income also implies reduced access to goods and services.

### **Evidence on neighbourhoods and happiness in Germany**

My research investigates whether people in Germany are unhappier if they live among richer neighbours, and what other aspects of the neighbourhood are associated with being happier. The study uses the German Socio-Economic Panel Study (which has collected information on a representative sample of German households over many years) together with micro-marketing data at different spatial scales.

The data confirm the finding of most previous happiness research: that having family, being healthy, being employed and being financially well off all have a positive effect on happiness. But in contrast with most previous work, I find that people in Germany are not unhappier the more income their neighbours have: indeed, if anything, they are happier. The only negative effect of rich neighbours on happiness is for families with young children. For these households, it is a struggle to 'keep up with the Schmidts'.

The research also looks at whether there are effects of the type of community people live in and the impact of a wide range of local amenities typically found in German neighbourhoods. These range from day-to-day amenities, such as doctor's practices, shops, bank accounts and public transport, to amenities that people may use in their leisure time, such as green space, gyms, bars and restaurants.

### **The only negative effect of rich neighbours on happiness is for families with young children**

The results suggest that people value living in property they own and in villages or small towns: this might be correlated with people's increasing desire for both more space and more privacy. But these are not the only aspects of their neighbourhoods that people value. Neighbourhoods need to be of overall good quality, offering a wide range of public facilities, including day-to-day infrastructure and recreational facilities.

In addition, the research establishes that it is the prosperity in the broader area (German postcode areas of an average of 9,000 people) and of the nearest 400 households (market cell area) that contributes most to people's happiness. People need to be able to find jobs in the broader area, and they need others who will provide them with infrastructure and services close to their homes.

### **Implications for public policy**

Investigating what kinds of neighbourhood contribute to greater personal happiness is not an end in itself. Demonstrating that prosperity in the neighbourhood, living in rural communities (preferably in a one's own property) and with good access to public facilities all lead to greater happiness also has implications for public policy. People will move to the neighbourhoods that promise them the greatest happiness, and an aim of public policy should surely be to increase national levels of happiness.

### **People in Germany value living in a property they own and in villages or small towns**

In the past, public policy in Germany appears to have failed somewhat in this respect. Over the last two decades, Germany has seen two major trends in urban and regional development. On the one hand, there has been a movement away from East Germany to the more prosperous regions of West Germany. On the other hand, as in many other countries, there has been a nationwide move away from inner cities to suburban areas.

A side effect of those residential choices is that for some regions in Germany, the future looks grim. Entire regions, particularly in East Germany, are losing population. Some cities, such as Schwedt near the German-Polish border (north-east of Berlin in the federal state of Brandenburg) have already started to demolish entire quarters to remove an infrastructure that has

become redundant due to low demand for housing.

The move to the suburbs is predominantly driven by young families demanding greater space for personal use than is available at affordable prices in the inner city, and who want to see their children grow up in a healthy environment. These young families are made unhappy when they compare their income with others around them.

One policy solution would be to renovate housing and public services in the inner city where excess supply and low quality keep the prices low. Provided price increases are not too large, this might attract back young people who would then be living in neighbourhoods where others' income is lower. Population decline could make it easier for cities to provide an attractive stock of larger dwellings in a pleasant residential environment, and at prices that everyone – in particular young families – can afford.

Some aspects of life that are associated with greater happiness may not be achieved in the future. For example, demanding greater residential mobility from people in order to take up jobs in remote parts of the country has negative implications for people's local social relationships. One thing that makes people living in smaller communities happier may be that their local environment provides a relatively stable social environment where people know each other personally, where people trust each other and where social control is higher (and conversely social deviance is smaller).

Home ownership, which is associated with greater happiness and more stable local environments, may be less likely for individuals who are uncertain about where they will be able to find and keep a job. Higher residential mobility may also represent an obstacle to family formation as people will not have the time to get to know suitable partners well enough to start a family.

It is important for public policy to realise and be guided by the fact that many aspects of life have a neighbourhood dimension to them.

**This article summarises the findings of Gundi Knies' doctoral thesis, 'Neighbourhood Effects in Germany', submitted in January 2007. Some of her results are also reported in 'Keeping up with the Schmidts: An Empirical Test of Relative Deprivation Theory in the Neighbourhood Context' by Gundi Knies, Simon Burgess and Carol Propper, CMPO Working Paper No. 07/173.**

**For the full paper, see:**

**<http://www.bris.ac.uk/Depts/CMPO/workingpapers/wp173.pdf>**

**Gundi Knies completed her doctorate at CMPO and is now a senior research officer at the Institute for Social and Economic Research at the University of Essex.**



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