Report for Sutton Trust

Recent Changes in Intergenerational Mobility in Britain

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Jo Blanden*

Stephen Machin**

* *Economics Department, University of Surrey and Centre for Economic Performance, London School of Economics.*

** *Department of Economics, University College London and Centre for Economic Performance, London School of Economics.*

Abstract

This report investigates recent changes in social mobility by considering relationships between intermediate outcomes (degree attainment, test scores and non-cognitive abilities) and parental income for cohorts born between 1970 and 2000. There is no evidence that these relationships have changed in a consistent way over this period. This is in stark contrast with the strengthening relationship between intermediate outcomes and parental income that accompanied the previously well documented decline in social mobility that occurred for birth cohorts from 1958 and 1970. Our findings suggest that the decline in intergenerational mobility that occurred between these cohorts is not ongoing, but neither has there been any significant improvement.

Acknowledgements

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1. Introduction

Commentators across the political spectrum agree that minimising the relationship between family background and later economic and social status is an important goal for public policy. If an individual's income is strongly related to his or her parent's income those at the bottom may not achieve their potential. However, it is difficult to imagine a world with no link between incomes across generations; genetic inheritance and the transmission of knowledge and culture within the family will mean that children from better-off families are more equipped to succeed in the labour market. In order to understand more about the extent and causes of intergenerational transmissions it is helpful and important to compare levels of intergenerational mobility over time.

Blanden, Gregg and Machin (2005) highlighted the fall in intergenerational mobility that occurred in a comparison of cohorts born in 1970 compared to those born in 1958. More specifically, adult earnings of the second cohort were more closely linked to their parental income as teenagers than was the case for the first cohort. This work also highlighted the strong links in economic position across generations in the UK compared to Canada and the Scandinavian countries. However, these results relate to individuals growing up in Britain in the 1970s and 1980s. In fact the 1958 cohort is, at the time of writing, almost aged 50 and the 1970 cohort nearing 40. Thus they tell us little (probably nothing) about children growing up in more recent policy environments. This is particularly the case if policy needs to be targeted toward early years as a number of influential authors have proposed (e.g. Carneiro and Heckman, 2004).

Finding recent evidence on the extent to which family background influences children's outcomes in the UK is all the more important in the light of the Government's

concerted policy focus in this direction since 1997. The Government has directed additional funds into schools in inner-city areas through the Excellence in Cities Programme; provided pre-school services through Sure Start and has made substantial in-roads into reducing child poverty. Earlier in the year the then Secretary of State for Education anticipated the positive impact that these policies would have on intergenerational mobility.

"The progress we have made since 1997 – particularly at schools in deprived areas – means that there is every reason to expect that today's generation of poor children will have a much better chance to escape the limitations of their background."

Alan Johnson, Secretary of State for Education, 17th May 2007

One of the objectives of the research described in this report is to begin to gather evidence to evaluate this claim. We begin by laying out a methodological framework that draws together measures of intergenerational mobility with parameters that can be estimated for younger cohorts. We then use this framework to reconsider previous evidence on mobility from the original British birth cohorts before undertaking an analysis of other longitudinal data sources that have been, as yet, untapped for social mobility research.

2. Methods

Analytical Framework

The extent of intergenerational income mobility is often measured by the following summary statistic, the coefficient β in the following statistical regression:

$$\ln Y_i^{children} = \beta \ln Y_i^{parents} + \varepsilon_i$$

where $\ln Y_i^{children}$ is the log of some measure of earnings or income for adult children, and $\ln Y_i^{parents}$ is the log of the same measure of earnings or income of their parents, *i* identifies the family to which parents and children belong and ε_i is an error term. β is then the elasticity of children's income with respect to their parents' income and (1-β) can be thought of as measuring intergenerational mobility.

There are several important issues to take account of in this simple framework:

i) Changing income distributions:

Differences in the variance of $\ln Y$ between generations will distort estimates of β which is why inequality adjusted parameters have to be considered throughout (Solon, 1992). This is in fact the partial correlation between parents and children's status. This inequality adjusted measure of β is obtained simply by scaling β by the ratio of the standard deviation of parents' income to the standard deviation of sons' earnings[1]. An alternative way of obtaining the correlation is to standardise income and earnings before estimating the intergenerational mobility regression (both variables are scaled to have a mean of 0 and a standard deviation of 1). We therefore use standardised parental income to account for changing inequality in our estimates of the relationship between intermediate outcomes and parental income.

ii) Permanent versus transitory income

[1] $\text{Corr}_{\ln Y^{parents},\, \ln Y^{son}} = \beta(\frac{SD^{\ln Y^{parents}}}{SD^{\ln Y^{son}}})$

Ideally we would seek to measure parents' and children's status with a measure of permanent incomes. A common approach to approximate this is to use income averaged over a number of periods (Solon, 1989, Mazumder, 2001). In cases where averaged income is not available we would be concerned that the measures of income available are not measured with equal accuracy over time. As shown by Solon (1992), and Zimmerman (1992) measurement error in parental income will lead to an attenuation of the estimated β and lead to difficulties in making correct inferences about changes over time. To avoid this we adopt a two stage procedure where supplement our measures of parental income with predicted income from a regression of income on more permanent 'income proxy' characteristics such as education, employment and housing status.

We thus estimate predicted income as $\ln \hat{Y}_i^{parents} = \hat{\delta} X_i$ where the $\hat{\delta}$ are coefficients from a first stage equation that relates family income to a range of income proxies, X_i, so that the two stage β_{2SLS} is estimated as

$$\ln Y_i^{children} = \beta_{2SLS} \ln \hat{Y}_i^{parents} + \varepsilon_i$$

This two-stage least squares (2SLS) approach has been shown to provide an estimate of β which is biased upwards compared to its true value if the characteristics used to predict income have an independent influence on children's outcomes (Solon, 1992). In this case we must think of β based on current income and β_{2SLS} as providing lower and upper bounds on the true estimate.

iii) More recent cohorts

The difficulty we face when wishing to estimate mobility for more recent cohorts is the lack of information about Y for children since recent birth cohorts are too young to be established in the labour market. However, one can use a simple framework where

earlier age outcomes can be related to parental income to say something about the extent of mobility for these cohorts.

Consider two stages:

Stage 1: The relationship between earlier age intervening factors, Z, and family income: $Z_i = \theta Y_i^{parents} + \xi_i$

Stage 2: The relationship between child income (as an adult) and these earlier age factors $\ln Y_i^{child} = \lambda Z_i + \zeta_i$

Here θ measures the sensitivity of the earlier age intervening factors Z to parental income and λ the income 'returns' to Z. Putting the two together by substituting the first stage into the second stage gives the usual intergenerational function above:

$$\ln Y_i^{children} = \lambda\theta \ln Y_i^{parents} + \varepsilon_i$$

Now it becomes evident that the intergenerational parameter is the product of the two parameters from Stage 1 and 2 (i.e. $\beta = \lambda\theta$).

Why is this framework useful? Because we can estimate λ and θ as well as the overall β for generations where children have grown into adults and, importantly, the Stage 1 parameter θ for young cohorts who have not yet reached adulthood. This is what we do in this report.

In summary we:

- Begin by recapping how β changed between the 1958 and 1970 birth cohorts.
- Look at how the relationship between the earlier age intervening factors, Z, and family income changed at the same time as the cross-cohort comparison in a) above (i.e. how θ changed at the same time as β).

- Assess changes in θ for more recent cohorts, and contrast with changes for the older cohorts when we know β shifted.

iv) Data Sources

The datasets we use in our comparative work are summarised in the brief Table below and these will be described in more detail in later sections.

Dataset	Year of birth	Earnings observed	Degree recorded	Tests taken	Behavioural questions answered
1958 Cohort	1958	1991	1991*	1969	1965 and 1969
1970 Cohort	1970	2004	2000*	1980	1975 and 1980
BHPS first pseudo cohort	1976 (average)	N/A	1999 (average)	N/A	N/A
BHPS second pseudo cohort	1980 (average)	N/A	2002 (average)	N/A	N/A
'Kids of' 1958 Cohort	1985 (average)	N/A	N/A	1991	1991
'Kids of' 1970 Cohort	1999 (average)	N/A	N/A	2004	2004
Millennium Cohort	2000-2001	N/A	N/A	2006	2006

* When making comparisons with the BHPS degree attainment in the cohorts is measured at age 23.

As outlined in the above Table the intermediate outcomes (Z) we consider are degree attainment, performance in a reading or vocabulary tests and rating on externalising behaviour measures for both the older and newer cohorts. In almost all of our datasets mothers are asked a number of items from the Rutter A scale (this is the version of the Rutter behaviour scale which is asked of parents, see Rutter et al 1970). We combine selected items into an externalising behaviour measure by taking the first factor of a principal components analysis (as detailed in Table 1A and B of the appendix).

The Table also demonstrates why we need to look at earlier age intervening outcomes to say anything about more recent changes in social mobility. In almost all cases the N/A entries show that the most recent cohorts – the ones that are most relevant

for contemporary policy debates – are characterised by missing information since these cohorts are simply not old enough to have got to these stages in the life cycle. Our two-stage framework allows us to discuss likely social mobility for these more recent cohorts.

3. Recap of Existing Evidence on Changes in Mobility

In order to investigate intergenerational income mobility we need information on fathers' earnings or parental income as children are growing up and then information on the same children's earnings as adults. The 1958 (National Child Development Study or NCDS) and 1970 (British Cohort Study, or BCS) cohorts provide this information. These datasets selected all babies born in Britain in a single week in the springs of 1958 and 1970 respectively and rich information is obtained through childhood and into adult life. Data collection is ongoing, and data collected in 2004 has recently been released. For both cohorts parental income data is obtained at age 16. Adult earnings information is available at age 33 for the 1958 cohort and age 34 for the 1970 cohort (i.e. in 1991 and 2004). Using data from age 34 improves the comparability of data across the cohorts, and should lead to more accurate estimates of changes over time compared to previous work (see Haider and Solon, 2006, for a careful discussion of the possible impacts of lifecycle bias).

Tables 1a and 1b report information on intergenerational mobility for these cohorts in the form of transition matrices. The Tables show the proportion of sons in each parental income quartile that move into each quartile of their adult earnings distribution. We focus here on sons so that results are less directly influenced by women's labour market participation decisions. The extent of immobility can be summarised by an

immobility index that computes the sum of the leading diagonal and its adjacent cells. These are reported at the bottom of the Tables. These numbers can be interpreted relative to the immobility index in the case of perfect mobility. If all individuals had an equal chance of experiencing an adult income in each quartile all cells would contain .25 and the sum of the diagonal band would be 2.5.

The Tables show a fall in intergenerational mobility. In all cases there is a higher probability of sons remaining in the same quartile as their parents in the 1970 cohort compared with the 1958 cohort. For example, for sons in the bottom quartile the proportion remaining in the bottom quartile is 30 percent for the 1958 cohort and 38 percent in the 1970 cohort. Equally, there is a smaller chance of large movements in the second cohort with 18 percent rising of those who start in the quintile bottom moving to the top quintile in the 1958 cohort and 11 percent doing so in the 1970 cohort. The immobility indices reflect this fall in mobility, at 2.81 and 2.95 respectively.

In Table 2 we provide estimates of average mobility for sons and daughters, again using earnings data from 33 for the first cohort and 34 for the second. The figures for the 1970 cohort differ slightly from those in Blanden et al (2005) and Blanden et al (2007) for this reason. The average measure of intergenerational mobility shows a sharp (and statistically significant) fall, with β estimated as 0.205 for the 1958 cohort of sons and 0.330 for the 1970 cohort of sons. As shown in the second row estimates of β_{2SLS} are higher in both cohorts and these statistics also rise strongly across the cohorts. As discussed in Section 2 care must be taken in interpreting both β and β_{2SLS} when income inequality is changing. Columns 3 and 4 in each row show the partial correlation for each cohort with the final cohort showing the difference over time. This adjustment does

not change our conclusions: the evidence indicates that intergenerational mobility has fallen across these cohorts for sons. Panel B shows similar qualitative results for women, although the changes are slightly smaller in magnitude.

4. Why Did Mobility Decline Across the Cohorts?

Cross-cohort changes in the relationship between Z and family income

Table 3 summarises the association between family income at age 16 and several intermediate outcomes for the original cohort members. This reveals a sharp rise in the association between family income and degree attainment with the linear probability coefficient on standardised income rising from 0.05 to 0.11. This rise in the inequality of access to higher education has been explored in detail elsewhere (Blanden and Machin, 2004) and shown to have a made a substantial contribution to the fall in intergenerational income mobility discussed above (Blanden, Gregg and Macmillan, 2007).

As shown in the second panel of Table 3 there is also a statistically significant increase in the association between percentile in reading test and parental income. The Ordinary Least Squares specification shows that in the 1958 cohort a one standard deviation increase in income is associated with a 5.64 point increase in test score percentile, while in the 1970 cohort a one standard deviation increase in income leads to an 8.53 percentile increase. The third panel reveals the association between our externalising scores, using tobit models to account for the clustering at the lowest level of behavioural problems. As we would expect there is a negative association between family income and the externalising score (scaled to have a mean of zero and standard deviation of one). At both younger and older ages the association between behaviour and parental

income has grown across the cohorts. We know these 'non-cognitive' traits tend to be related to later labour market outcomes (Heckman, Stixrud and Urzua, 2006) and if this association has not declined over cohorts then this rising association will contribute to the change in intergenerational mobility.

As with the intergenerational income regressions in the previous section all our models are also estimated using the 2SLS framework. This confirms the findings of rising associations with income. It is reassuring that the findings are consistent across all the variables used. The difficulty with comparisons based on reading scores in these datasets is that the tests used are not identical, so it might be that they are picking up different skills. In this case we use also two variables that we know are comparable across the cohorts (degree and externalising behaviour) meaning that it is not necessary to rely on test scores alone.

Distributional analysis of changes

In our analysis of intergenerational income mobility in these two cohorts we explored both linear (regression) models and nonlinear (transition matrix) approaches. We can do the same for our intermediate outcomes. Table 4 presents the relationship between intermediate outcomes and age 16 income in an alternative form, by showing the mean of the outcome within the top and bottom income quintiles and then the difference between these, which we describe as 'inequality'.

Once again, there is a clear expansion of inequality by parental income across the cohorts. For the poorest 20 percent in terms of parental income 5 percent of the 1958 cohort achieved a degree, this compares with 20 percent for the richest fifth. Comparable

figures for the 1970 cohort are 7 percent and 37 percent. Inequality in degree attainment has therefore widened from 15 percentage points to 30 percentage points.

The second set of results provides test score percentiles by income group. The gap between the richest and poorest groups here is 16 percentiles for 11 year olds in the 1958 cohort and 25 percentiles for 10 year olds in the 1970 cohorts. Again we find a substantial (and statistically significant) expansion in inequality. This pattern is replicated in the results for externalising behaviour where inequality at both young ages (7 and 5) and mid-childhood (11 and 10) increases by about one fifth of a standard deviation between the cohorts.

5. More Recent Evidence – Summary of Data

British Household Panel Survey

In this section we consider updated evidence on the relationship between intermediate outcomes and parental background. Our first source of information is the British Household Panel Survey. This survey began in 1991 and has collected evidence on 5000 households for all subsequent years. The longitudinal element of this data enables us to measure children's family income at age 16 and then to observe their educational achievements; here we consider whether they obtain a degree by age 23. As there are now 14 years worth of 16 year olds available we split these into younger and older pseudo cohorts.

'Kids of' Cohort Data

As discussed above the 1958 and 1970 cohorts have made an important contribution to understanding mobility for those growing up in the 1970s and 1980s. The

intergenerational story told by these data has been extended by collecting information on the children of the original cohort members. In 1991, data were collected about natural or adopted co-resident children for one third of the 1958 cohort members (those born in a week in 1958). 3000 children were included aged between 3 and 17 years old. Tests administered were the Peabody Individual Attainment test (for maths and reading) and the Peabody Picture Vocabulary test. The mother also answered a questionnaire providing more information on the behaviour and home environment of the children.

In 2004 a similar data collection exercise was conducted for the children of the 1970 cohort. In this case, data on children were collected for half of the cohort. Age-appropriate assessments of word and number skills from the British Ability Scales were carried out to gauge children's cognitive skills and attainment. Similar behavioural measures are taken from parents in both cohorts. Those that we use can be seen in Appendix Tables 1A and 1B.

For both datasets the impact of age in months within age in years is removed before converting reading/vocab test scores into percentiles within age in years. This relative measure is used in our analysis. This is useful as children of the 1970 cohort aged 3-5 are given a vocabulary test, whereas older children are tested in reading. By converting to percentiles we should have a comparable measure across all age groups. The PIAT reading score is available for all sampled children of the 1958 cohort from 5 onwards, and a small number of four-year-olds.

Both datasets of the 'kids of' can be matched with information from the main surveys which provides details of parental education, family income and earnings, among numerous other characteristics. Information on family income is formed from adding

together information on all of the cohort member's and their partner's sources of income. It is necessary to clean this data very carefully, comparing reported net and gross earnings and checking recorded benefit amounts against benefit levels for the relevant years against those on the Institute for Fiscal Studies 'Fiscal facts' website www.ifs.org/fiscalfacts.

Millennium Cohort Study

Another source of evidence which contains information on children's performance and their family background is the Millennium Cohort Study (MCS), which includes a large sample of children born in 2000 and 2001. The intention is to follow these children through life on a similar basis to the original cohorts. So far information is available at 9 months, 3 years and 5 years. Cognitive test scores and behavioural reports are available at ages 3 and 5. We adjust for differing ages at the time the test was taken and use percentiles of the vocabulary test as our main measure. Once again questions are asked about the children's behaviour which are highly comparable with those available from the other data sources we use.

There are several ways of constructing parental income from the questions available in the MCS. The most straight-forward is to use the categorical variables. Parents are asked to indicate the category that their total take-home income falls into (they are coded into weekly, monthly and annual amounts for the respondents' ease). The categories offered for the respondent to choose from vary depending on whether the child lives in a one or two parent family. We convert the categorical information into a continuous measure by treating income as the midpoint of the category stated. In addition to the categorical total income questions parents are also asked in detail about all

the sources of income they have and the period to which each applies. Using these questions it is therefore possible to code up continuous net income measures (more similar to what is available in the 1991 and 2004 birth cohort surveys). We compare our results using different income variables.

The existence of two waves of data in the MCS allows us to show how achievement evolves for young children from different family income backgrounds. We return to this analysis below.

6. More Recent Evidence

More recent evidence on cross-cohort changes in the relationship between Z and family income

Table 5 shows a similar analysis to the earlier Table 3 for the more recent data. These estimates are based on the most comparable approaches to using the data for the 'kids of' and the MCS data. Among the issues we confronted were the selection of age groups within the 'kids of' data, the construction of an MCS sample to mimic the 'kids of' and the appropriate family income measure to use. We explore these issues in the appendix as well as showing estimates for alternative approaches.[2]

The upper panel of the Table reports coefficients on income from linear probability models of obtaining a degree by age 23. These are shown for the BCS data (those born in 1970) and then for those in the BHPS born on average in 1976 and 1980. Unlike the previous cross-cohort comparison of Table 3, where the income coefficient rose steeply, there is no evidence of change for these cohorts.

[2] It should be noted that sample sizes for the 'kids of' and BHPS are rather smaller than those for the original cohorts. We are therefore not able to be as accurate in our estimates as is made clear by the larger reported standard errors.

The middle panel considers test scores, for the Ordinary Least Squares regression models there is no evidence that there has been a substantial change in the relationship between income and test scores, with a 1 standard deviation change in income leading to a 5-6 percentile change in reading/vocab score.[3] Notice that the estimates of the test-score income relationships in these recent cohorts around age 5 tends to be a little lower than for the 1970 cohort at age 10, this does not necessarily indicate that this relationship has declined, but more likely reflects the increasing influence of family background on attainment as children age (as shall be discussed further below).

The lower panel of Table 5 then looks at the behavioural measures at around age 5, again showing no significant change, and if anything a slight decline in the relationship between parental income and behaviour.

More recent distributional analysis

A distributional analysis is given in Table 6. There is much less evidence of a rise in the link between family income and degree attainment in more recent periods. The small increases in graduation rates that occurred for the (on average) 1975 cohorts compared with the 1970 group were evenly distributed across young people from different family income groups, consequently, there was no evidence of a strong widening of educational inequality. Comparing across the two BHPS samples there is a very slight widening of educational inequality with graduation rates among the poorest income groups dropping from 11 to 10 percent and graduation rates among the richest 20 percent growing by 4 percent. However, the small samples in the BHPS mean that we

[3] It is the case that the 2SLS for the MCS show a rise in the association between income and test scores compared to the 'kids of' data. We are reluctant to make too much of this as this appears to be an outlying estimate.

cannot draw strong conclusions from these small changes; the summary should be thought of as 'no change'.

This is also the case for the results based on test scores and externalising behaviour, in the original cohorts test score inequality grew by 9 percentage points from 1969 to 1980, from 1991 to 2006 the change was less than 4 points and not statistically significant. The rise in inequality in behaviour in the more recent cohorts was .04 between 1991 (the 'kids of' the 1958 cohort) and the MCS compared with .24 across the 1958 and 1970 cohorts.

Taking the linear and nonlinear results together it seems that all the large increases in educational inequality occurred between the 1958 and 1970 cohorts at the same time as the changes in intergenerational mobility. Unless changes in intergenerational mobility have been driven by very different forces in more recent years, these results suggest that we might expect to observe little change in intergenerational income mobility for the cohorts born from around 1970[4] onwards.

7. Family Background Effects as Children Age (MCS)

Our analysis of early test scores as an indicator of future intergenerational income mobility rests on the premise that early ability differences persist and matter for later educational attainment and earnings. These issues are addressed by Feinstein (2003) and Feinstein and Duckworth (2006) using the original data from the children in the 1970 British Cohort Study and Carneiro and Heckman (2003) for the US.

Feinstein and Duckworth (2006) investigate the relationship between test scores at age 5, final educational achievement and earnings, finding that early performance in a

[4] Note that our data does not allow us to pinpoint precisely when the fall in mobility stopped.

copying designs test has strong correlations with earnings at age 30 and highest educational qualifications (.31 and .22 respectively).

Both Feinstein (2003) and Carneiro and Heckman (2003) show that gaps in attainment by family background increase as children age. We have modelled our analysis on Feinstein (2003) who studies the evolution of inequality by socio-economic group in cognitive attainment for a subset of children in the 1970 cohort who were tested at 22 months, 42 months, 5 years and 10 years. The two observations at age 3 and 5 from the MCS should present us with some scope to examine if the trends in the 2000s are at all similar to the inequalities found by Feinstein for the 1970s.

We can repeat Feinstein's analysis for the MCS using mean income over ages 3 and 5 as the family background measure, with first results shown in Figure 1. The percentile gap in attainment between those in the top and bottom quartile of the family income distribution is 18 percentiles at age 3, widening very slightly to 21 percentiles at age 5. Results are very similar if we use socio-economic status as our measure of family background and these findings are consistent with the changes reported in Feinstein (2003) over similar ages.[5] The evidence suggests that the evolution of inequality for those born in 2000 is similar to what it was for those born in 1970; although more than two periods of data are needed to be more concrete on this point.

Figure 2 reproduces the most influential finding from Feinstein (2003), this Figure shows that even those from with lower SES who do well (top quartile) in test scores at 22 months have their relative performance bypassed between age 5 and 10 by those who are in the bottom quartile of test score achievement at 22 months but in the highest SES

[5] It should be noted that the growth in inequality reported by Feinstein from 22 months to 10 years is much larger than this, and appears to be primarily driven by decline in performance by lower SES groups between 22 and 42 months.

group. This result has been taken to imply that the interaction of schooling with SES has more influence on outcomes than early ability. For our purposes it should be noted that while the gap between high ability-low social class and high social class-low ability children narrows between 22 and 42 months, the two trajectories do not cross until later ages.

Figure 3 uses the data from the Millennium Cohort Study to reproduce Feinstein's analysis for children growing up in the 2000s. It is clear that Feinstein's results are replicated; high achievers at age 3 with low SES are losing ground while low achievers with high SES are improving their percentile scores more quickly than other children. Another feature of our data which is also found by Feinstein in the 1970 cohort is that there is a relatively larger improvement in performance among initially low achievers from high social backgrounds compared to the fall for the high achievers at 3 with low SES. Figure 4 shows the same analysis based on family income rather than SES; the findings are almost identical.

8. Conclusions

In this report we have presented new evidence on what has been happening to aspects of intergenerational mobility in Britain. It seems that the oft-cited finding of a fall in intergenerational mobility between the 1958 and 1970 cohorts appears to have been an episode caused by the particular circumstances of the time. Social mobility worsened and took a step change downwards, leaving the UK near the bottom of the intergenerational league table of mobility, and on a different trajectory relative to other countries in the world where there is less evidence of changes over time. This fall in

mobility was accompanied by strong increases in educational inequalities (e.g. a very sharp rise in the association between educational attainment and family income and stronger links between test scores and behavioural measures and family income).

Looking at the connection between these earlier age intervening factors (education attainment, test scores, behavioural measures) and family income for more recent cohorts finds little evidence of change and thus it appears that changes in social mobility may well have flattened out. However, at the same time, they have not reversed nor started to improve.

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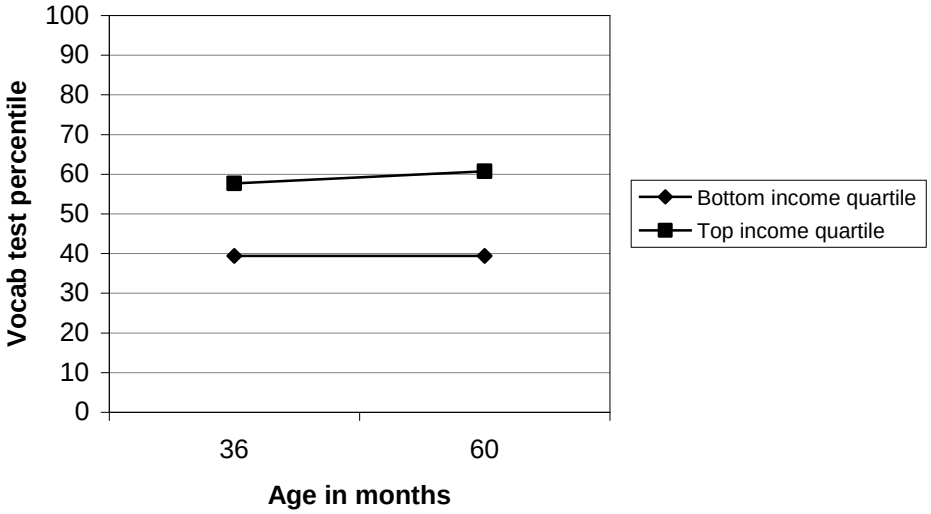
Figure 1: Test Score Inequality by Income Quartile at Age 3 and 5 in the MCS



Note: Income quartiles are defined by the mean of the age 3 and 5 midpoints of the income categories at these two ages.

Figure 2: Evolution of Test Scores by Early Ability and Socio-Economic Status in the 1970 Cohort from Feinstein 2003.

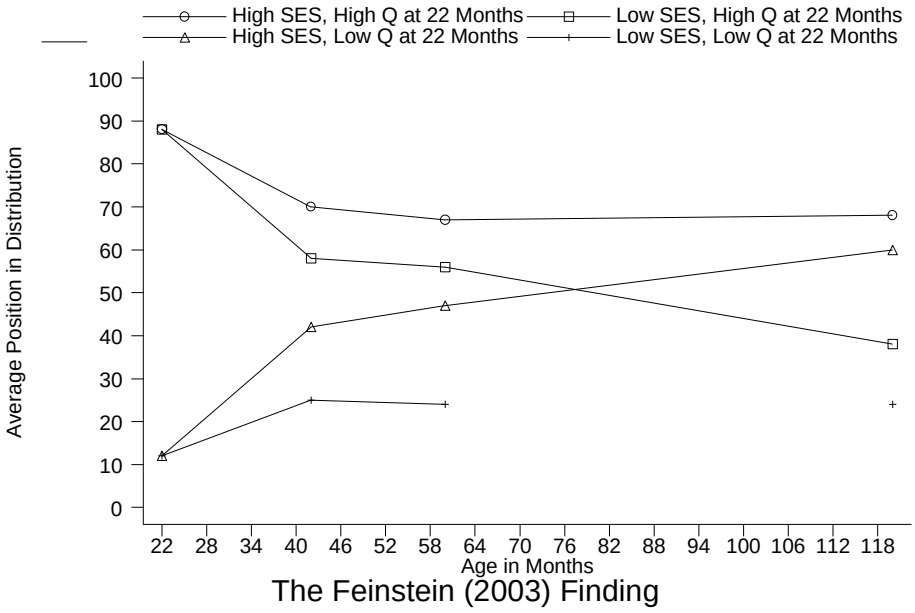
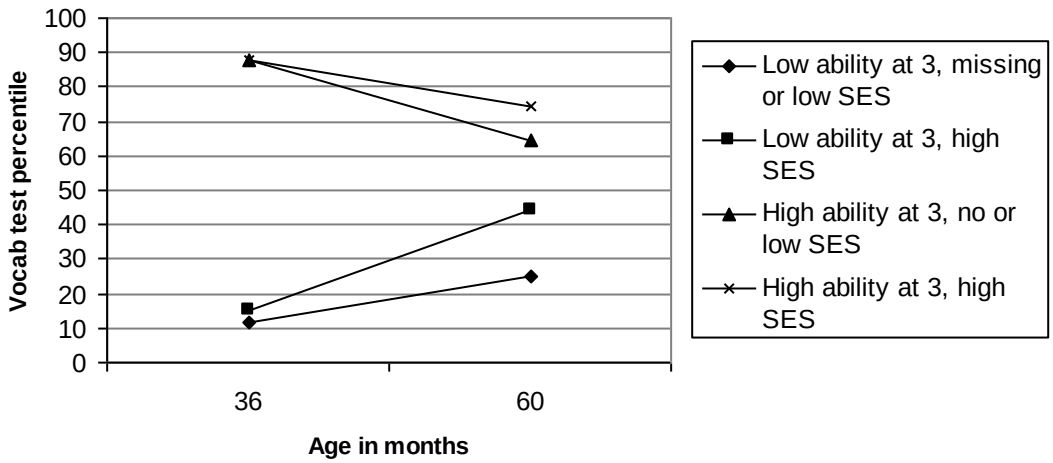
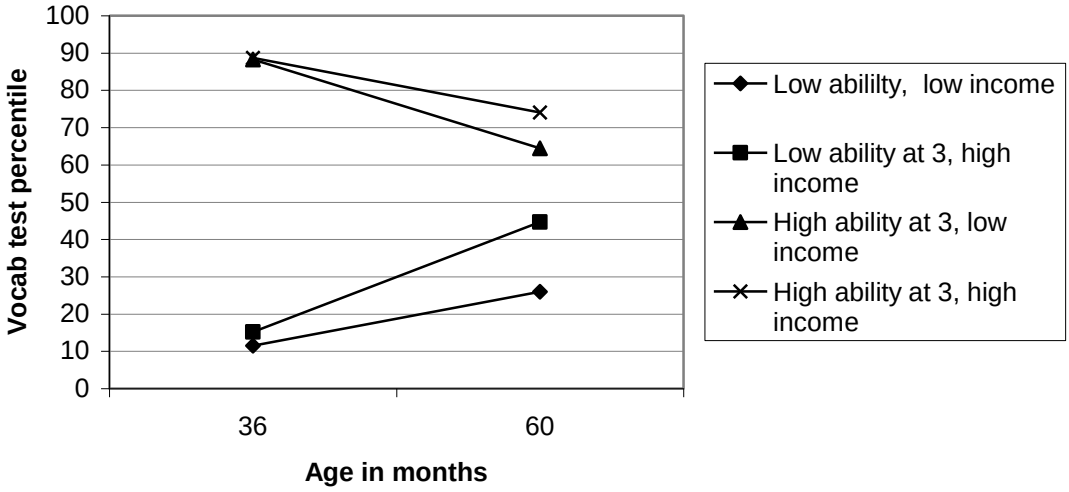


Figure 3: Evolution of Test Scores by Early Ability and Socio-Economic Status in the MCS



Notes:
Low SES is defined when father's occupation is routine or semi routine and mother's occupation is the same or missing
High SES is defined as father's occupation is managerial or professional and mother's occupation is the same or missing.
Missing SES is defined in cases when father isn't working or there's no father and mother isn't working.
Low ability is defined as bottom quartile in vocab score at age 3, high ability is defined as top quartile in vocab score at age 3.

Figure 4: Evolution of Test Scores by Early Ability and Family Income in the MCS



Low income is bottom quartile of family income averaged over the age three and five surveys. High income is top quartile.
Low ability is defined as bottom quartile in vocabulary score at age three, high ability is defined as top quartile in vocabulary score at age three.

Table 1a :
Intergenerational Income Mobility Transition Matrix for the 1958 Cohort

	Sons' quartile			
Parental income	Lowest quartile	2nd quartile	3rd quartile	Top quartile
Lowest quartile	.30	.29	.24	.18
2nd quartile	.31	.27	.24	.19
3rd quartile	.22	.25	.25	.28
Top quartile	.18	.20	.27	.35

Notes: Sample size 2163; Immobility Index 2.806.

Table 1b :
Intergenerational Income Mobility Transition Matrix for the 1970 Cohort

	Sons' quartile			
Parental income	Lowest quartile	2nd quartile	3rd quartile	Top quartile
Lowest quartile	.37	.27	.22	.13
2nd quartile	.29	.30	.24	.17
3rd quartile	.22	.25	.28	.25
Top quartile	.13	.18	.24	.45

Notes: Sample size 1703; Immobility Index 2.955.

Table 2: Linear Estimates of Intergenerational Income Persistence

	Intergenerational Elasticities, β		Intergenerational Partial Correlations		
	1991 (1958 Cohort, Age 33)	2004 (1970 Cohort, Age 34)	1991 (1958 Cohort, Age 33)	2004 (1970 Cohort, Age 34)	Cross-Cohort Change in Inequality Adjusted β
A. Sons					
OLS	.21 (.03)	.33 (.03)	.17 (.021)	.30 (.02)	.13 (.03)
2SLS	.33 (.04)	.50 (.05)	.27 (.035)	.45 (.04)	.18 (.05)
B. Daughters					
OLS	.36 (.05)	.43 (.05)	.17 (.023)	.25 (.024)	.08 (.03)
2SLS	.55 (.08)	.63 (.07)	.26 (.036)	.37 (.043)	.11 (.06)

Notes: Instrumental variables used are mother and fathers' education, employment status and housing tenure at age 16. Sample sizes are 2163 for the 1958 cohort and 1703 for the 1970 cohort.

Table 3: Associations between Intermediate Outcomes and Parental Income in the Cohorts

	Standardized Log(Income) Sensitivities, θ		
	1958 Cohort	1970 Cohort	Cross-Cohort Change in θ
Degree by Age 33/30, OLS	0.05	0.11	0.06
	(0.003)	(0.01)	(0.01)
Degree by Age 33/30, 2SLS	0.10	0.21	0.11
	(0.01)	(0.01)	(0.01)
Test Scores (Age 11, 1958 Cohort; Age 10, 1970 Cohort), OLS	5.64	8.53	2.89
	(0.32)	(0.36)	(0.49)
Test Scores (Age 11, 1958 Cohort; Age 10, 1970 Cohort), 2SLS	11.88	15.59	3.73
	(0.56)	(0.63)	(0.84)
Behavioural (Age 11, 1958 Cohort; Age 10, 1970 Cohort), OLS	-0.06	-0.12	-0.06
	(0.01)	(0.02)	(0.02)
Behavioural (Age 11, 1958 Cohort; Age 10, 1970 Cohort), 2SLS	-0.10	-0.18	-0.08
	(0.02)	(0.02)	(0.03)
Behavioural (Age 7, 1958 Cohort; Age 5, 1970 Cohort), OLS	-0.06	-0.15	-0.09
	(0.01)	(0.02)	(0.02)
Behavioural (Age 7, 1958 Cohort; Age 5, 1970 Cohort), 2SLS	-0.13	-0.22	-0.09
	(0.02)	(0.02)	(0.03)

Notes: Instrumental variables used are mother and fathers' education, employment status and housing tenure at age 16. The degree coefficients are estimated using a linear probability model, although marginal effects from a probit model are almost identical. The behavioural score models are fitted using a tobit as in all cases around 15% of cases have the lowest score. Parental income data is standardised to have mean 0 and standard deviation 1. Sample sizes: Row 1: 8901; 5544. Row 2: 7766; 5983. Row 3: 7580; 6296. Row 4: 7709; 5616.

Table 4: Inequalities in Intermediate Outcomes by Parental Income in the Cohorts

		Lowest 20 Percent of Family Income	Middle 60 Percent of Family Income	Highest 20 Percent of Family Income	Inequality
Degree Acquisition	1981 (1958 Cohort Age 23)	0.05	0.08	0.20	0.15 (0.01)
	1993 (1970 Cohort Age 23)	0.07	0.15	0.37	0.30 (0.05)
Cross-Cohort Change					0.15 (0.02)
Test Score Percentile	1969 (1958 Cohort Age 11)	42.59	49.16	58.81	16.22 (1.05)
	1980 (1970 Cohort Age 10)	38.12	50.35	63.44	25.32 (1.10)
Cross-Cohort Change					9.10 (1.51)
Externalising Behaviour Score	1969 (1958 Cohort Age 11)	0.04	0.03	-0.11	-0.15 (0.04)
	1980 (1970 Cohort Age 10)	0.18	0.00	-0.16	-0.35 (0.04)
Cross-Cohort Change					-0.20 (0.05)
Externalising Behaviour Score	1965 (1958 Cohort Age 7)	0.06	0.02	-0.12	-0.17 (0.03)
	1975 (1970 Cohort Age 5)	0.23	-0.02	-0.18	-0.41 (0.04)
Cross-Cohort Change					-0.24 (0.05)

Notes: Sample sizes are as for Table 3. Standard errors are in parentheses.

Table 5: Associations between Intermediate Outcomes and Parental Income in More Recent Cohorts

	Standardised Log(Income) Sensitivities, θ			
	1970 Cohort (Age 23 in 1993)	BHPS (Age 23 in 1998)	BHPS (Age 23 in 2002)	Cross-Cohort Change in θ (1993-2002)
Degree by Age 23, OLS	0.10	0.08	0.09	-0.02
	(0.01)	(0.02)	(0.02)	(0.02)
Degree by Age 23, 2SLS	0.18	0.20	0.18	0.00
	(0.01)	(0.03)	(0.04)	(0.04)
	'Kids of' 1958 Cohort (Aged 5-7 in 1991)	'Kids of' 1970 Cohort (Aged 4-6 in 2004)	MCS (Aged 5 in 2006) Comparable	Cross-Cohort Change in θ, 1991-2006
Test Scores, OLS	4.60	5.27	6.13	1.53
	(1.47)	(1.23)	(0.71)	(1.64)
Test Scores, 2SLS	7. 10	7.47	13.50	6.40
	(1.77)	(1.69)	(1.08)	(2.07)
Behavioural, OLS	-0.19	-0.14	-0.18	0.00
	(0.05)	(0.04)	(0.02)	(0.06)
Behavioural, 2SLS	-0.25	-0.27	-0.31	-0.06
	(0.06)	(0.06)	(0.04)	(0.07)

Notes: Standard errors are displayed in parentheses. The degree coefficients are estimated using a linear probability model. As it is necessary to weight the MCS data we report regression models for the behavioural scores. Tobit models for the 'kids of' data can be found in the Appendix. 'Kids of' are restricted to the children of female cohort members. Sample sizes from left to right: Row 1: 4707; 725; 363. Row 2: 384, 541, 2700. Row 3: 366, 545, 2585.

Table 6: Inequality in Intermediate Outcomes by Parental Income in More Recent Cohorts

		Lowest 20 Percent of Family Income	Middle 60 Percent of Family Income	Highest 20 Percent of Family Income	Educational Inequality
Degree Acquisition	1993 (1970 Cohort Age 23)	0.07	0.15	0.37	0.30 (0.01)
	1998 (BHPS Age 23)	0.11	0.23	0.40	0.30 (0.05)
	2002 (BHPS Age 23)	0.10	0.21	0.44	0.34 (0.05)
Cross-Cohort Change (1993-2002)					0.04 (0.07)
Test Scores	1991 ('Kids of' 1958 Cohort Age 5-7)	38.39	52.84	52.74	14.35 (4.73)
	2004 ('Kids of' 1970 Cohort Aged 4-6)	40.76	50.86	56.90	15.14 (3.92)
	2006 (MCS Comparable Age 5)	40.38	51.33	58.44	18.06 (1.98)
Cross-Cohort Change (1991-2006)					3.71 (5.13)
Behavioural	1991 ('Kids of' 1958 Cohort Age 5-7)	0.31	-0.04	-0.19	-0.50 (0.17)
	2004 ('Kids of' 1970 Cohort Aged 4-6)	0.25	-0.05	-0.10	-0.35 (0.14)
	2006 (MCS Comparable)	0.27	-0.00	-0.27	-0.54 (0.07)
Cross-Cohort Change (1991-2006)					-0.04 (0.18)

Notes: MCS data is weighted using longitudinal weights. Sample sizes are as for Table 5. Standard errors are provided in parentheses.

Data Issues Appendix

'Kids of' Data

Our aim in this paper is to discover as much as possible about trends in intergenerational transmissions for recent cohorts of children. It is therefore essential to base our conclusions upon representative samples of children. The children of cohort members pose a difficulty in this regard, as while the initial sample of parents were representative of cohorts of births the children are not. In particular, the older children in the 'kids of' sample were born to younger parents, who are more likely to be more poorly educated or differ from other cohort members in other unobservable ways. In addition the pattern of this selection into fertility may be different for cohort members born in 1958 and 1970.

To evaluate this we can consider figures from Birth Statistics 2004 (ONS, 2004) which allow us to compare fertility rates of women born in 1958 and those born in 1970. By 1991 women equivalent to the 1958 cohort had given birth to 1711 children per 1000 women, while by 2004 the full cohort equivalent to the 1970 cohort had given birth to 1564 babies per 1000 women. Assuming that overall fertility is not declining across these cohorts this figures indicate that the 1970 cohort members are likely to be earlier in their child-bearing career than the 1958 cohort at the point when we observe them, despite being a year older. This indicates that it might be legitimate to compare slightly older children from the children of the 1958 cohort compared with the children of the 1970 cohort. Given that the 1970 cohort is one year older than the 1958 cohort at the time of the sample this means we would be sensible to compare 3-5 year olds from the BCS with 4-6 year olds in the NCDS and so on.

There is a further issue; as the sampling frame is co-resident natural or adoptive children of male cohort members are less likely to be included as they are more likely to live with their mothers. In fact 65 percent of the children of the 1958 cohort who are tested are in the sample because their mother is the cohort member, while in the 1970 cohort, 68 percent of the sample have cohort member mothers. This statistic also tends to vary by age, with the proportion of fathers much higher among younger children. We therefore concentrate on the children of female cohort members.

Appendix Table 2 shows the income association for different age groups from the 'kids of' data for a range of different models. The top-left panel gives the association

between parental income and test scores using the OLS model. These comparisons indicate that the strength of the association between parental income and test score percentile is constant between the two 'kids of' datasets. 4-6 year old children of the 1970 cohort have a coefficient on family income in a test score regression of 5.265 compared with 4.600 for 5-7 year olds from the 1958 cohort. For slightly older children 5-7 year olds in the 1970 cohort have a coefficient of 5.525, compared with 5.775 for the next age group in the NCDS. This pattern of constancy continues up to the 6-8 age group in the 1970 cohort and the 7-9 year olds in the 1958 cohort. After this income coefficients in the BCS fall-off rapidly, with an insignificant association between family income and reading score among the 8-10 year olds. Fertility statistics indicate that children of women in the BCS over eight years old would make up just one third of the births by this age.

The top-right panel presents the coefficients for the same dependent variable from a 2SLS specification, as before income is predicted on the basis of parental education, employment and housing tenure. Once again, there is very little evidence of strong changes across the cohorts, with very similar coefficients across 1991 and 2004 for all age groups until we reach children of the 1970 cohort at age 7-9.

The lower panel shows the results for two alternative dependent variables, percentile in the maths/number tests and externalising behaviour score. The association between the maths test and parental income is lower over all than it was for reading but there is no strong evidence of changes over time. For the externalising score there is evidence of a slight decline in the association with parental income between 1991 and 2004 with the coefficient from the tobit regression at -.2 to -.3 in 1991 and at -.1 to -.2 in 2004.[6]

It therefore seems that comparisons of children of the 1958 cohort aged 5-7 and children of the 1970 cohort aged 4-6 might be appropriate for comparison with the MCS at age 5. We now discuss the best way of using the MCS data to make these comparisons legitimate.

[6] Additional results experimenting with non-standardised income, using children of all cohort members and income equivalising are available on request.

MCS Data

The MCS data provides information on a sample if children born from 2000-2001. We weight the data throughout to achieve a representative sample of children born in this period. As noted above, the 'kids of' are representative of children of mothers born in certain years. In order to check what difference this makes we also limit the MCS data to those children with mothers aged 33-35.

The top left panel of Appendix Table 3 shows the test score – standardised income relationships for all in the MCS, with the panel below showing these estimates for the restricted sample. The estimates for the full sample show that a 1 standard deviation increase in parental income is associated with a 6.6 increase in vocab score. Estimates for the smaller sample of age 33-35 mothers are slightly lower. This is also true for the behavioural measures. Within these comparisons we also show the effect of using income based on parents' reported category of take home income and a constructed net income measure. These alternatives make little differences to the estimated coefficient.

For comparability with the 'kids of' data we use the restricted sample of mothers and the constructed net income measure. Appendix Table 3 shows that these choices are having only a very slight impact on our estimates.

Appendix Table 1A: Elements Used to Make Externalising Scores in Original Cohorts

1958 Cohort Age 7	1970 Cohort Age 5	1958 Cohort Age 11	1970 Cohort Age 10
Generally destructive	Destroys belongings (d027)	Destroys own, others, things	Destroys belongings (m45)
Squirmy, fidgety	Squirmy, fidgety (d026)	Squirmy, fidgety	Squirmy, fidgety (m44)
Irritable	Irritable (d032)	Irritable, quick tempered	Irritable (m50)
Fights other children	Fights with other children (d028)	Fights other children	Fights other children (m46)
Disobedient	Disobedient (d038)	Disobedient at home	Often disobedient (m56)
Temper tantrums	Child has temper tantrums (d009) Never in last year Not in last month Not in last week More than once a week	Not available	Not available
Never, sometimes, frequently	Does not apply, applies, certainly applies	Never, sometimes, Frequently	Answers are given on a 1-100 scale, amd recoded to give proportions in 'frequently, sometimes, never' to match NCDS at 11.

Appendix Table 1B: Elements Used to Make Externalising Scores in More Recent Cohorts

Kids of 1958 Cohort aged 4-6	Kids of 1958 cohort aged 7+	Kids of 1970 cohort	MCS Age 5
Restless or overly active (n518219)	Restless, has difficulty staying seated long (n518345)	Restless, overactive over past 6 months (q1b)	Restless, overly active, cannot stay still (cmsdro)
Stubborn, sullen or irritable (n518330)	Irritable and is quick to 'fly off the handle' (n518352)	Temper tantrums in last 2 months (q1e)	Often has temper tantrums (cmsdtt)
Bullies or is cruel to other children (n518321)	Bullies other children (n518362)	Child often had fights or bullied over children in last 6 month (q1l)	Fights with or bullies over children (cmsdfb)
Disobedient at home (n518329)	Often disobedient (n518357)	Child has been generally obedient over last 6 months (q1g)	Child is generally obedient (cmsdor)
Not true, sometimes true, often true	Does not apply, applies somewhat, certainly applies	Not true, somewhat true, certainly true	Not true, somewhat true, certainly true

Appendix Table 2: Relationship between Test Scores and Income for Different Age Groups of 'Kids of' Female Cohort Members

	Kids of Cohort Members			
	Income coefficients from regression of percentile of reading/vocab tests – OLS		Income coefficients from regression of percentile of reading/vocab tests – 2SLS	
	1991	2004	1991	2004
Age group	1958 Cohort	1970 Cohort	1958 Cohort	1970 Cohort
3-5		5.028 (1.209) [567]		6.805 (1.647) [567]
4-6	1.746 (1.788) [277]	5.265 [1.229) [541]	5.285 (2.198) [277]	7.473 (1.687) [541]
5-7	4.600 (1.474) [384]	5.525 (1.195) [579]	7.097 (1.767) [384]	6.937 (1.672) [579]
6-8	5.775 (1.523) [355]	3.448 (1.273) [517]	7.506 (1.783) [355]	5.809 (1.831) [517]
7-9	5.208 (1.611) [328]	.900 (1.307) [493]	7.849 (1.884) [328]	2.797 (1.874) [493]
8-10	4.981 (1.584) [334]	-.313 (1.414) [430]	6.937 (1.837) [334]	3.720 (1.985) [430]
	Income coefficients from regression of percentile of number test		Income coefficients from tobit model of externalising behaviour	
Age group	1958 Cohort	1970 Cohort	1958 Cohort	1970 Cohort
3-5		3.665 (1.218) [566]		-.106 (.049) [571]
4-6	2.834 (1.761) [281]	2.891 (1.248) [541]	-.134 (.061) [346]	-.148 (.053) [545]
5-7	4.562 (1.470) [387]	2.794 (1.219) [579]	-.223 (.061) [366]	-.164 (.053) [574]
6-8	3.031 (1.532) [358]	1.717 (1.287) [515]	-.342 (.063) [335]	-.120 (.043) [510]
7-9	1.844 (1.631) [329]	.809 (1.318) [491]	-.362 (.067) [307]	-.125 (.060) [486]
8-10	1.819 (1.600) [335]	1.927 (1.417) [428]	-.196 (.070) [301]	-.180 (.062) [430]

Notes: Standard errors in parenthesis. Sample sizes in square brackets.
All regressions include controls for the child's sex, the cohort member's partner's age and a polynomial in the child's age in days at testing.

Appendix Table 3: Relationships between Test Scores and Parental Income in MCS

	ln(income) coefficient in regression of vocab score percentile		ln(income) coefficient in regression of externalising score	
Year	2006	2006	2006	2006
Sample	MCS kids Aged 5	MCS kids Aged 5	MCS kids Aged 5	MCS kids Aged 5
Income measure	Midpoint of income category	Continuous net income	Midpoint of income category	Continuous net income
OLS coefficient	6.582 (.309)	6.625 (.318)	-.190 (.011)	-.173 (.011)
2SLS coefficient	13.230 (.458)	14.782 (.502)	-.392 (.018)	-.430 (.019)
Sample	13675	13675	13000	13000
	Mums 33-35 years old			
	ln(income) coefficient in regression of vocab score percentile		ln(income) coefficient in regression of externalising score	
Year	2006	2006	2006	2006
Sample	MCS kids Aged 5	MCS kids Aged 5	MCS kids Aged 5	MCS kids Aged 5
Income measure	Midpoint of income category	Continuous net income	Midpoint of income category	Continuous net income
OLS coefficient	6.420 (.607)	6.132 (.709)	-.181 (.023)	-.173 (.026)
2SLS coefficient	12.130 (.974)	13.500 (1.084)	-.307 (.036)	-.370 (.042)
Sample	2700	2700	2585	2585

Notes:
Standard errors in parenthesis.
All regressions include controls for the child's sex, parents' age and a polynomial in the child's age in days at testing.
Income variables are standardised.
The results for the MCS sample are limited to those who have valid observations for both income variables. Results change only slightly if this restriction is lifted.
As weights are required we use a regression model for the behavioural models rather than the preferred tobit model.