

# Parental Background and Child Outcomes: How Much Does Money Matter and What Else Matters?

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and Frank Windmeijer

Institute for Fiscal Studies and University of Warwick

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The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education and Skills.

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## 1. Introduction

The aim of this project was to consider a range of child and adult outcomes, and address the question “does money matter, and what else matters?” for those outcomes.

The policy context for this project has been the ongoing government commitment to reduce child poverty, and improve child well being. Our aim has been to provide further evidence on the extent to which increasing parental incomes (for example, through continued increases in both in-work and out-of work benefits) is likely to improve outcomes for children, compared to other policy options.

The research context for this project has been the contrast between the extensive knowledge within the research community about the negative outcomes *associated* with low income; and, at the same time, the relative paucity of knowledge about its genuine causal effects. As we pointed out in our original research specification, although low incomes are clearly associated with poor outcomes early in life and further into adulthood, without further research we could not be certain that giving poor parents more money would make for better child or adult outcomes. This is because the observed correlations between parental incomes and child outcomes could be due to other explanations – as well as having low income, poor parents could be poor at parenting, or poor at financial management; or live in poor neighbourhoods perhaps with lower quality schools; or have some other characteristics that may affect child outcomes.

The first stage in our research was to set out the methodological challenges involved in this research agenda, and to provide a review (and non-technical explanation) of the methodological approaches that have been adopted to answer the research questions posed. In doing this we also provided a review of research findings, most from the U.S. academic community (see section 2). Our interpretation of these findings is that the main inputs to the production of child development appear not to be greatly affected by changes in income, once unobserved factors determining both parental income and child outcomes are controlled for. Variation in permanent income across households appears to matter more than temporary income changes; and outcomes are more sensitive to income at a young age relative to at older ages.

The next stage of our research was a series of seven separate research projects, each of which addressed itself to a related issue within this overall research agenda. Sections 3 to 10 below provide a short summary of each of these. Drawing the findings together, we have found that:

### *Parental income and child outcomes:*

- Parental income appears to be an important determinant of whether a child decides to leave school at age 16; permanent income has the biggest effects but short-term income changes around the age of 16 also matter (see section 3).
- Unanticipated variations in Child Benefit (CB) are spent differently from other income – and disproportionately on adult-assignable goods (such as adult clothing, tobacco and alcohol). This suggests that it is parents who gain or lose from such variations in CB. However, children gain when CB is anticipated and incorporated into permanent income. This is consistent with the view that parents place so much weight on the welfare of their children that they fully insure their children against any policy changes

(see section 4) and suggests that they can be made more effective if they can be credibly signalled.

- There is an inverse association between parental socio-economic status and children's smoking prevalence, but this is mostly due to education and parental smoking status, rather than income differences. Our analysis of sibling differences in smoking behaviour suggest that increases in within household income do not lead to a decreased probability of the younger sibling to smoke. This suggests that, if anything, it is permanent, rather than transitory changes in income that affects youth smoking behaviour (see section 5).
- Increases in income amongst lone parents have been accompanied by a significant decrease in material deprivation over time. Material deprivation plays a significant explanatory role in models of parent and child health over and above current income. If material deprivation provides a proxy for long-run, or permanent income, this suggests that permanent income is a more important explanatory factor in determining health status, than current income (see section 6).

### *Education and child outcomes*

- Early education (before the age of 5) appears to have had long-lasting and positive effects on children from the 1958 cohort, leading to improvements in cognitive tests at ages 7, 11 and 16; as well as small gains in educational attainment, employment, and wages. Surprisingly, evidence of its effects on social skills is mixed, but in any case the effects on social skills do not appear to be long-lasting. The additions to wages due to extra schooling before the age of 5 of around 3 per cent, are small compared to the estimated gains from an extra year of schooling later on in a person's school career, which have been estimated at around 6 per cent (see section 7).
- Although parental education appears to be an important determinant of whether or not a young person decides to stay on at school post-16, when we use appropriate methods to account for the endogeneity of parental education, we find that the strong effects of parental education becomes insignificant. This suggests that it is other characteristics of high education parents, rather than their additional education itself, which induces their children to stay on at school (see section 2).
- School quality may also be correlated with unobservable attributes of parents, and so this analysis demands the use of the more sophisticated methods to uncover causal effects. In our analysis of Danish data, using a sibling difference approach to control for observable and unobservable aspects of parental background, we found that the effect of reducing the average class size for compulsory schooling by 1 child (i.e about 5%) is to statistically significantly increase the amount of postcompulsory schooling but only by about about 1%. The costs of such a policy are incurred much earlier than the benefits are received and we find that the discounted benefits of this (in terms of future wages) fail to cover the additional costs. The internal rate of return is just 1%. (see section 8).

### *Other issues*

- Teenage motherhood is frequently associated with negative outcomes both for mothers, and their children; for example teenage mothers have considerably lower family income at age 30 than women who were not teenage mothers. But those who become teenage mothers tend to come from very disadvantaged backgrounds, and once we account for this, we find that the effects of teenage motherhood itself may not be as detrimental as previously thought. This suggests that effective policies would focus on alleviating the longer-term disadvantage experienced by teenage mothers in their own childhoods, rather than simply on interventions in the teenage years to persuade young women to delay child birth. (see section 9)
- There is considerable inequality in child outcomes even at birth. Gestation and birth weight, which have been shown to matter for cognition and health outcomes later in life, vary considerably according to a large number of parental background characteristics, including ethnic group (see section 10).

### *Current and Future work*

An important part of the project was to construct a comprehensive population panel dataset of children and their parents from Danish register data, and to identify twins in the data (distinguishing identical monozygotic, MZ and fraternal dizygotic, DZ twins). Including this information into our data has required lengthy and delicate negotiations with medical researchers and heavily delayed some of the work we wished to do. In replacement we have conducted additional work using both British and Danish data.

Some preliminary analysis of the returns to education using all twins (not just MZ) was contained in our work on class size but we are currently extending this work on education returns, using the zygosity identifier that we now have, and plan to complete this work in July 2005 and present it at the end of project workshop.

The zygosity identifier is also important for our planned work on intergenerational transmission of education and income. The usual result in the literature is that education is positively correlated across generations with mothers education mattering most. Recent US research (Behrman et al AER 2002) suggested an insignificantly negative effect of mothers education on their daughters' educations. We find the conventional positive correlation between parental education and that of the children when we simply pool our twins data (i.e. ignore the fact that they are twins). But our provisional look at the differences in the education of the children of our large sample of Danish MZ twins data that we now have suggests that there is no effect of either parents' education – confirming our work on early school leaving in LFS data which suggested no causal effect of parental education on school leaving. We plan to complete this intergenerational transmission work in August 2005.

Finally, we also plan, in September 2005, to work on the role of maternal labour supply on child outcomes. This has considerable policy relevance because several UK policies that have raised the incomes of poor parents have relied partly on their work incentive properties. There are important difficulties in unravelling the effects of parental work from parental income for child outcomes. However, we plan to exploit a child support



reform that occurred in Denmark in 1992 – the old system implied small lump sum transfers from absent parents (usually fathers) to parents with care (usually mothers), while the new system made the transfers a step function of absent parents income but not a function of the income of the parents with care. The reform provides a natural experiment because the steps provide discontinuities that imply that similar fathers paid quite different amounts. The reform reduced the incentive for the parents with care to work and we have found large labour supply effects amongst working single mothers from the reform. But the reform did not change the labour supply of those mothers who were already not doing paid labour market work. So for some observations there are income gains and reductions in labour supply, while for others there are income gains and no changes in labour supply. We plan to investigate these, experimentally induced, variations in work and income on the outcomes for children. We can also investigate the sensitivity of the outcomes to when in the child's life this change occurred, meaning we can also address the income timing issue.

Our full set of completed research is summarised in the sections 2 to 10 below. Each research paper is available online from the [IFS website](#). Section 11 concludes.

## **2. “How Important is Income in Determining Children’s Outcomes? – A Methodology Review”,**

**by Laura Blow, Alissa Goodman, Greg Kaplan, Ian Walker, Frank Windmeijer**

Policymakers, and many researchers, have been prone to take it as given that more resources improve welfare. Our review is concerned with what seems like a simple question “How much does it improve welfare”? Our conclusions are generally pessimistic about the attempts that have been made to answer this - even this simple question is difficult to answer.

This report has set out some commonly used techniques for estimating the impact of parental income on child outcomes. Since parental income is likely to be endogenous to child outcomes because of unobservable factors, one of two basic approaches needs to be adopted. The first approach is either to create - by means of an experiment - or to search for *exogenous* variations in income. Such variation in income will not be correlated with parental (unobservable) characteristics. The second approach is to difference out the effect of unobservables, generally on the assumption that they are fixed over time, by comparing outcomes for the same households, or similar groups of households, over time.

A reasonable reading of the empirical literature – mostly from the US - suggests that

- the effect of current income on child outcomes is small;
- the effect of permanent income is much larger than the effect of current income, but even this usually decreases as more explanatory variables are included;
- income effects are small compared to the effects of race, gender, and many of the observable characteristics of the parents – it would take very large financial transfers to overcome the disadvantage associated with certain characteristics;
- the income effect is generally found to be non-linear, with larger effects at lower levels of income – having said this, few studies allow for such nonlinearity.
- comparing the effects of different policy interventions suggest that income at different ages matter differentially – with outcomes being more sensitive to variations in income at a young age relative to at older ages. However, although this seems to be a feature of the US evidence, it does not follow that early interventions will necessarily perform better in cost-benefit analyses to other policy interventions – early interventions require upfront costs and entail future benefits that will need to be discounted heavily.

Family background and other family and child characteristics usually have large effects on child development (and later adult outcomes). These findings suggest that the main inputs to the production of child development are fixed ones that are not greatly affected by changes in income. For example, later economic success is much more closely related to family background than it is to family income, even income when young.

Some family background factors, such as parental education, have moderate effects on child development but larger effects on later adult outcomes which suggests that the main mechanisms through which they affect adult outcomes are not particularly well captured by the child-development outcomes. In other words,

- the mechanism through which parental education, for example, might affect the later adult outcomes of their children is through promoting better choices such as later school leaving or through encouraging good social skills.

Even here, there is recent evidence that casts doubt on earlier studies. For example Berhman *et al*, 2002, use a large sample of Minnesota twins who are mothers and compare their differences in schooling with that of their children and they find a **negative** correlation in some specifications and no significant positive effects in any specification.

The literature further suggests that government income-support programs have little direct impact on child development, so that

- the public provision of health and education services may be the most effective means of improving child development.

Thus, while it is clear that there are sizeable differences between the outcomes experienced by children across the range of parental incomes, the evidence mostly implies that income does not *cause* these differences. The implication is that policies that increase the income of poor parents will result in, at best, a small increase in child outcomes compared to the observed differences in child outcomes across the range of parental incomes. Income transfer programmes are not a quick fix for poor child outcomes.

However, while the literature points to few sizeable effects on any one outcome there is a general finding of small effects over a range of outcomes.

- No studies have yet attempted to quantify the combined effect across all outcomes – not least because we have no way of weighting them together until we can put a financial value on the worth of a change in any particular outcome.

In other words, a comprehensive evaluation of the effect of parental income requires a fully fledged cost benefit analysis that quantifies all effects in common currency terms.

### **3. “The Impact of Parental Income and Education on their Children's Schooling”, by Arnaud Chevalier, Colm Harmon, Vincent O’Sullivan and Ian Walker**

A major commitment in the original proposal was to examine the causal effects of parental background on outcomes for children. A number of possible outcomes were suggested in the proposal but the most directly relevant were early school leaving and educational achievement, and this paper concentrates on these.

This particular paper addresses the intergenerational transmission of education and investigates the extent to which early school leaving (at age 16) may be due to variations in permanent income, parental education levels, and shocks to income at this age.

- Least squares estimation reveals conventional results
  - **Stronger positive effects of maternal education than paternal, and stronger effects on sons than daughters**
  - **The effects remain even when parental income is included**
  - **And parental income is typically significant as well as education**

We find that the education effects remain significant even when household income is included. Moreover, decomposing the income when the child is 16 between a permanent component and shocks to income at age 16, only the latter is significant. It would appear that education is an important input even when we control for permanent income but that credit constraints at age 16 are also influential.

- However, when we use instrumental variable methods to simultaneously account for the endogeneity of parental education and paternal income, we find that the
  - **Strong effects of parental education become insignificant** and
  - **Permanent income matters much more**, while
  - **The effects of shocks to household income at 16 remain important** but only half as important as permanent income

This work is based only on two income observations to distinguish between long and short run and we await further Danish research to check the sensitivity of the results to having a (much) longer history of income variation available. Moreover, the results rest on using union status to provide exogenous variation in income - while we do know from a large body of research that there is a well determined union effect on income, it is a maintained hypothesis here that unionised parents are not better parents. Again, our planned Danish research will help to substantiate these UK findings.

A similar pattern of results are reflected in the main measure of scholastic achievement at age 16. These findings have important implications for the design of policies aimed at encouraging pupils to remain in school longer. For example, from a policy perspective, it may be more expensive to raise permanent income than transitory income and identifying the times when transitory income matters could make for cost effective policy.

The aim of the paper was to consider the assertion, most notably in the work of Nobel laureate James Heckman, that economic resources are important for child development but that the timing of those resources is not (or in other words, that credit constraints are not an important influence on development). This is an implication of the permanent income hypothesis.

Our findings by contrast suggest that:

- **Permanent income matters so this implies that policies that contribute to this, such as parental education, and income transfers such as Child Benefit would be supported.**
  - A 10% rise in permanent income induces approximately a 2 percentage point rise (ppt) for boys and a 1.3 ppt rise for girls in the probability of attaining 5+ GCSE's and in the probability of staying on post-16.
  
- **But timing also matters** and this suggests that other policies might be supported. For example, since we find that income variation when the child is 16/17 matters for school leaving, because of credit constraints, then **this would support policies such as EMA.**
  - A one-off increase in income at 16 that is 10% of permanent income would induce a 0.6 ppt rise in the probability of staying on post-16 for girls, and a 0.7 ppt rise in this probability for boys.

This work has been presented at: a conference at CEMFI in Madrid; Swansea Economics Department Seminar; Warwick labour economics workshop; Cardiff Business School economics seminar; and the CEE (due in June).

Further extensions have been suggested during discussions with other researchers and we are currently working on incorporating these suggestions: Control for occupation (1-digit) in the first stage income equation to improve our estimation of permanent income; interacting income surprises with parental occupation controls to see if credit constraint effects are limited to particular classes; include region and time interactions in the 2nd stage schooling decisions equations to account for the effect of the minimum wage on the opportunity costs of schooling (on the grounds that our income surprises may be picking up local labour market shocks that also affect school leaving); to pursue the idea that temporary income shocks may have less effect on those with better credit access and proxy this by housing equity.

A complementary paper, using FRS data, by Arnaud Chevalier , "Parental Education and Child's Education", IZA WP 1153, 2004, supports the findings here.

#### **4. “Who benefits from Child Benefit?”**

**by Laura Blow, Ian Walker, Yu Zhou**

The aim of this paper is to complement existing research on the relationship between child outcomes and household income by investigating the extent to which Child Benefit (CB) affects household expenditure patterns – in particular, we are interested in how CB affects spending on goods that are “assignable” to either children or adults. Despite the fact that CB is cash, we find that policy-induced unanticipated variation in CB is spent differently from other income – disproportionately on adult-assignable goods. Thus, our evidence suggests that it is parents who gain or lose from variations in CB. This is consistent with the view that parents place so much weight on the welfare of their children that they fully insure their children against such policy shocks.

Child Benefit (CB) is a lump sum cash transfer that is made to all parents depending only on the number of children in the household. Since transfers like CB are usually motivated by concern for the welfare of children, it is of importance to the analysis of child welfare whether we can establish if child benefits tend to be spent on child-related goods or whether a pound of income from child-related benefits is spent in the same way as an additional pound from any other source. Thus, this paper takes a direct approach as to whether “money matters” by investigating the effect of variations in transfers to households with children on household spending decisions. We seek to establish the extent to which they affect household spending decisions since this is one mechanism through which a causal effect may operate. We are particularly concerned with spending on “child goods” and use spending on children’s clothing to reflect this. In contrast, we also look at how transfers to parents affect spending on “adult goods” and use alcohol, tobacco, and adult clothing as examples of these.

In order to assess whether CB affects spending decisions we need exogenous variation in benefit payments, which we have in the UK because of reforms to the benefits system over time and because of inflation. Our analysis covers the 21 years from 1980 (when CB had finally entirely replaced the earlier system of Family Allowances) to 2000 (after which tax credits for parents were introduced which would complicate our analysis because these credits were means tested and were subject to a potential take-up problem). Across this period there have been wide variations in real CB within years induced by differences in inflation across years, and large changes in the real value of CB between years driven by reforms. For example, a large reform occurred in 1991 whereby CB entitlement of the first child rose by a considerable amount, and a further increase for the first child occurred in 1999.

Our empirical work uses parametric Engel curve estimation, and then statistically tests whether the estimated marginal propensity to spend (MPS) out of CB is different from the MPS out of other income for the various commodity groups. We use Family Expenditure Survey (FES) data on household spending patterns, which contain detailed expenditure information, constructed from two consecutive weekly diary records supplemented with information about regular payments.

Our basic results find rejections of the restriction that the marginal propensities to spend out of CB and other income are the same, and these rejections arise for *adult* assignable goods (such as alcohol and women's clothing), and not for child assignable goods. Variants on the basic estimation designed to test the robustness of these initial results all support them. Despite the weight of evidence in our work that suggests that variations in CB are reflected in adult-assignable and not in spending on child-assignable goods it would be inappropriate to conclude that the lack of equivalence between CB and other income implies that parents put less weight on the welfare of their children than on their own so that, at the margin, they favour expenditure on adult goods. Rather, an alternative explanation would be that parents may place so much weight on the welfare of their children that they fully insure them against income variations so that, at least unanticipated, variation in incomes does not affect spending on the children.

To investigate this issue we assume that households form static expectations of real CB. That is, we assume that households expect real CB to fall within years according to the actual inflation rate, and that between years it is assumed that the government will uprate nominal CB to be the same real level as in the previous uprating date. The difference between actual CB and anticipated CB (as just defined) captures the change in CB that has occurred because of the nominal uprating that last occurred – which we assume is unanticipated. We then enter anticipated and unanticipated CB separately in our Engel curve estimation. The anticipated CB effects are generally badly determined and therefore are not significantly different from the MPS out of other expenditure. However, the unanticipated CB effects are consistent with our earlier results and with the interpretation that parents do insure their children against shocks so that unanticipated CB is spent disproportionately on adult goods.

## **5. “Parental Income and Children’s Smoking Behaviour: Evidence from the British Household Panel Survey”**

**by Laura Blow, Andrew Leicester and Frank Windmeijer**

When investigating health behaviour, researchers often find a strong positive association between income and healthy behaviour. This could however be due to individual characteristics that determine both income and health investment and is not necessarily due to the role of money per se. In this study we look at this relationship over the generations by studying the association between parental income and children’s prevalence to smoke in Britain using data from the British Household Panel Survey and British Youth Survey.

Since 1994, the British Household Panel Survey (BHPS) has contained a section aimed at children aged 11 to 16 in each sample household. This relatively unexploited source of information contains direct questions about the child’s smoking habits, and forms the basis of our research. The panel element of the data is especially useful in trying to identify the effects of income on smoking since it allows us to employ fixed effects techniques to strip out constant factors of a particular family which might be correlated with income but exert an independent influence on smoking behaviour (which would tend to bias any impact of income in a simple OLS regression). In particular, we examine differences in the smoking behaviour of siblings when they reach the same age and how these compare to income differences in the household at the time the siblings reach a particular age.

In the paper we first analyse to what extent there is a correlation between parental income and children’s smoking participation. We find that:

- Children from households with income within the first two quintiles (the households with the lowest incomes) are more likely to smoke than children from household in the top three quintiles.
- This income effect is diminished however when the maternal education level is added to the model. There is a clear gradient in the effect of mother’s education on their children’s smoking status with children of mothers with lower education having a higher probability to smoke.
- When the presence in the household of an adult smoker is added to the model, the income effects get further reduced for the first two quintiles. The gradient associated with mother’s education remains, but is also somewhat diminished in magnitude. The effect of parental smoking is large: the average probability of a child smoking is 0.16, whilst the presence of an adult smoker in the household increases the probability of a child smoking to 0.29.

It is clear from this analysis that there is an inverse association between parental socio-economic status and children’s smoking prevalence, but that the income gradient is dominated by the education gradient, and that the effect of income is further diminished by controlling for parental smoking status. As adult smoking is inversely related to household income and education in this BHPS sample it is clear



that a large part of the relationship between children's smoking behaviour and parental socio-economic status is transmitted via the smoking status of the adults

To study the potential income effect in greater detail and to establish whether there is a possible causal relationship between parental income and smoking behaviour of the child, the paper next uses differences in smoking status between siblings within a household to determine an income effect. For example, the oldest sibling may be a smoker at age 15 in 1994 and her three-year younger sibling may not be a smoker at age 15 in 1997. We investigate whether this difference in smoking status is in any way related to the change in household income between the years 1994 and 1997, controlling for other factors that may have changed over time. By focusing on sibling differences within the household, we implicitly control for household characteristics that do not change over time, like mother's education.

The results of this analysis indicate that:

- Increases in within household income do not lead to a decreased probability of the younger sibling to smoke.

These results together suggest that children's lifestyles and health investments are correlated with parental income and that differences seem due to differences in permanent income. Transitory income changes do not necessarily lead to different behaviour.

## **6. “Parental income and child outcomes: what can we learn from material deprivation?”**

**by Alissa Goodman and Michal Myck**

Since the government put reducing child poverty at the centre of its domestic policy agenda in 1999 it has introduced large increases in benefits and tax credits for families with children. Although such increases, almost by definition, help the government to meet its proximate policy aims, namely to reduce income-based measures of child poverty (by a quarter relative to a 1998-99 baseline by 2004-05, and by one half by 2010-11) it remains an open question whether, and how much these financial transfers will have affected other, possibly more meaningful, measures of well-being, besides income.

One measure of well-being, recently introduced as part of the DWP’s new official measure of child poverty is material deprivation. This research investigates the relationship between family income and material deprivation among a panel of lone parents constructed from 5 waves of the Family and Children Survey (FACS). In addition we consider how material deprivation and family income are related to another aspect of well-being, again within lone-parent families, namely, parent and child health. This latter analysis is particularly interesting since we believe that deprivation scores are likely to provide a better indication of the longer-run resources available to a family than most measures of current income.

In this paper we construct an index of hardship, based on the number of items a family lacks, weighted according to the general prevalence of ownership of that item across the population as a whole. We then examine how changes in income affect material deprivation, and how material deprivation and income, in turn, affect parent and child health.

One strength of our analysis lies in our use of panel data. Since family income may be correlated with many unobserved factors, which are also associated with higher (or lower) deprivation, any estimates of the relationship between income and deprivation which do not take this into account are likely to be biased. We exploit the fact that we can use multiple observations on the same families, by using data from five waves of the Families’ and Children’s Survey (1999-2003), in order to control for time-invariant family fixed effects which might affect both family income and material deprivation.. Our focus is on lone-parent families as FACS represents this type of family well and because their information on income is more reliable than for couples. However, lone parents are also of particular policy interest, since they make up a disproportionate number of the child and family poverty count, relative to their incidence in the population.

Our findings suggest that material deprivation, as summarised in our measure, is negatively correlated with income, so that as lone parents’ income rises, their material deprivation falls. In addition, deprivation is lower for the working population over and above the contribution of income which results from employment, and for homeowners relative to those who live in rented accommodation.

We then use material deprivation as a proxy for long-term financial status and use it to analyse how long-term/permanent income affects other dimensions of quality of life. Analysis of the consequences of deprivation shows a very strong relationship between health status and deprivation. Our material deprivation measure contributes substantially to the explanation of variation in health status of both parents and children. The explanatory power of our estimations improves significantly when the measure is included in health status regressions alongside current disposable income.

## **7. “Early education and children’s outcomes: How long do the impacts last? A study of a cohort of children born in 1958.”**

**by Alissa Goodman and Barbara Sianesi**

Two clear strands have emerged in the UK government’s recent policies aimed at improving the well being of children. Firstly, we have seen large increases in parental incomes through increases in transfers to the least well off, both in work and out of work. Secondly, an emerging policy focus has been on the importance of early childcare and pre-school in improving the well-being of children, either through the enabling effect that childcare has on allowing parents to work, or through other more direct effects of early education on children.

The aim of this project is to shed light on the question of how effective early pre-school and schooling is for improving the well-being of children, and whether any impacts are likely to be long-lasting. In doing so, we add to a well-established literature both from the UK and around the world (especially the US), addressing itself to this question.

Most studies, which look at early education amongst contemporary cohorts of children are unable to be informative as to the longer-term effects. For example the EPPE study has only, so far, followed children as far as age 7. Our study is based on the National Child Development Study (NCDS), a single cohort of people born in 1958, observed up to the age of 42.

In this work we consider the returns to two different early education ‘treatments’: first we consider the impact of a child obtaining any early education prior to the age of 5, whether this takes place in a school setting (through early entry to primary school), or in a pre-school setting such as state-maintained or private nursery, or playgroup. This answers the question of whether any formal human capital intervention before the age of 5 is beneficial for child outcomes. Second, we restrict our treatment of interest to attendance at pre-school only, answering the question of whether attendance at nursery or other establishments before entering primary school has short or long-term effects. (This latter is closest in spirit to contemporary evaluations such as the EPPE study).

The outcomes we consider are a range of outcomes relating to (i) cognitive development, as measured by a series of tests taken by the children at ages 7, 11, and 16; (ii) socialisation, derived from both parental and teacher assessments of social skills also at 7, 11, and 16 and (iii) educational attainment and labour market outcomes up to the age of 42.

Our findings suggest that investments in human capital before the age of 5 appear to have had long-lasting and positive effects on the children from the 1958 cohort (see top panel of Table 1). We find that early education leads to improvements in cognitive tests, including both maths and reading at age 7; these effects diminish in size but remain significant throughout the schooling years, up to age 16. The effects on socialisation appear to be more mixed: we find some evidence of improvement in

teacher reports, but a deterioration in parental reports of social skills at age 7, especially for first born children; however such effects on social skills (both positive and negative) do not tend to last, and are no longer detectable by age 11. We also find evidence that there are (small) gains from early education in adulthood, both on educational attainment and labour market performance, through a higher probability of obtaining qualifications, and in turn marginally higher employment probabilities and wages at age 33.

Table 1: Summary of effects of early education on outcomes ages 7 to 33

	Age 7	Age 11	Age 16
<b>Effects of any pre-compulsory education compared to none:</b>			
Average test scores	9.0ppt***	6.7ppt***	4.8ppt***
Social mal-adjustment (teacher)	-5.3ppt***	-1.8ppt	n/a
Obtains any qualifications		2.9ppt***	
Wages at 33		2.7%*	
<b>Effects of any pre-school education compared to no pre-school</b>			
Average test scores	5.3ppt***	3.6ppt**	0.5ppt
Social mal-adjustment (teacher)	2.4ppt	4.0ppt	n/a
Obtains any qualifications		0.7ppt	
Wages at 33		3.6ppt	

Notes: test scores and maladjustment ratings measured in standard deviations from the mean.

\*\*\* denotes statistical significance at the 1% level, \*\* at the 5% level and \* at the 10% level.

How big are these estimated effects? Our report shows that the gains to early cognition (age 7) are of a comparable size to those associated with growing up in a family where the father is of high social class, and almost completely counteract the negative effects on test scores of growing up in a difficult family environment. However, whilst these latter family background effects either stay the same or grow bigger throughout childhood and adulthood, the effects of early education diminish, and so are small relative to the impact of these family background factors by the time the individual enters adulthood. The additions to wages due to extra schooling before the age of 5 of around 3 per cent (see Table 6.3 in the paper) are small compared to the estimated gains from an extra year of schooling later on in a person's school career, which have been estimated at around 6 per cent (see Blundell et al, 2005) or higher.

Our research has also shown that there is a positive impact of attending nursery before a young person attends primary school on early test scores. However once we control for background characteristics we find that these effects do not tend to be long-lasting, with very weak evidence of continued effects through to age 16. We also fail to find effects, either positive or negative, on social skills. However we do find evidence of effects on wages at age 33 (estimated at around 4 per cent) which are of a similar magnitude to the wage effects we found associated with pre-compulsory schooling more generally.

Although our results pertain to the pre-school experiences of children born in 1958, our findings are very much in line with those found by other researchers for the 1970 birth cohort, and broadly in line with those for the more recent EPPE study. As we stress in our report, we cannot determine how representative of current provision the pre-school experience of the NCDS children was. However, if anything, the presumption is that any intervening changes in the practice, curriculum and organisation of pre-school institutions would have worked towards increasing the quality of the educational experience provided; thus the long-term benefits uncovered for the 1958 cohort are plausibly going to be even larger for current pre-school children.

In future work we plan to advance on three areas in terms of methodological approach, outcomes and treatments. In particular we aim to use information about childcare availability at the local level during the early years of the 1958 cohort's life as an exogenous determinant of early child care, in order to further test the robustness of our results. We also aim to consider whether there are effects on parenting outcomes – namely whether attendance in early education has any effects on how the children go on to bring up their own children when they become adults, and their children's social and cognitive development.

**8. “The Effects of School Resources on Participation in Post-Compulsory Education: Some Cost-Benefit Analysis”,  
by Paul Bingley, Vibeke Myrup Jensen and Ian Walker**

One important issue in assessing what policies will work for improving children’s lives is to identify how much of the variation in child outcomes is due to parental background, how much to neighbourhood effects, and how much to school quality variation. We have used information from the entire population of Danish siblings to understand how changes in school quality over time affect children’s educational attainments.

A crucial advantage in the Danish data is that variations in class size across intake cohorts is driven by an administrative rule that says that when the intake exceeds 25 the class has to be split. Thus, one sibling may enter school in a cohort just below the critical value and the other may be in a cohort just above the critical size and the result is that they, for random reasons, experience quite different class sizes.

It is the combination of the administrative rule and the availability of the Danish data containing siblings that makes this work uniquely informative about the impact of class size. We estimate the effect of class size on the duration of education, and we estimate (using twins data and later incomes taken from tax return registers) the effect of education on later incomes.

- **The effect of reducing the average class size for compulsory schooling by 1 (i.e about 5%) is to increase the amount of postcompulsory schooling by about about 1%.**
- **The rate of return to education based on the twins is estimated to be around 5%** (only half what we would normally expect to see in the UK - but consistent with much of the existing Scandanavian literature).

So we can compute the discounted economic benefits of small classes and compare this with estimated costs of maintaining smaller classes and of extending education durations.

- We find that the benefits fail to cover the additional costs except at unrealistically low discount rates. The **internal rate of return is just 1%**.

However, the analysis only considers the effects on the duration of education. Such a policy ought to increase the effects of a given period of education on future wages and we are now working on finding the effects of class size on test score outcomes to address this problem.

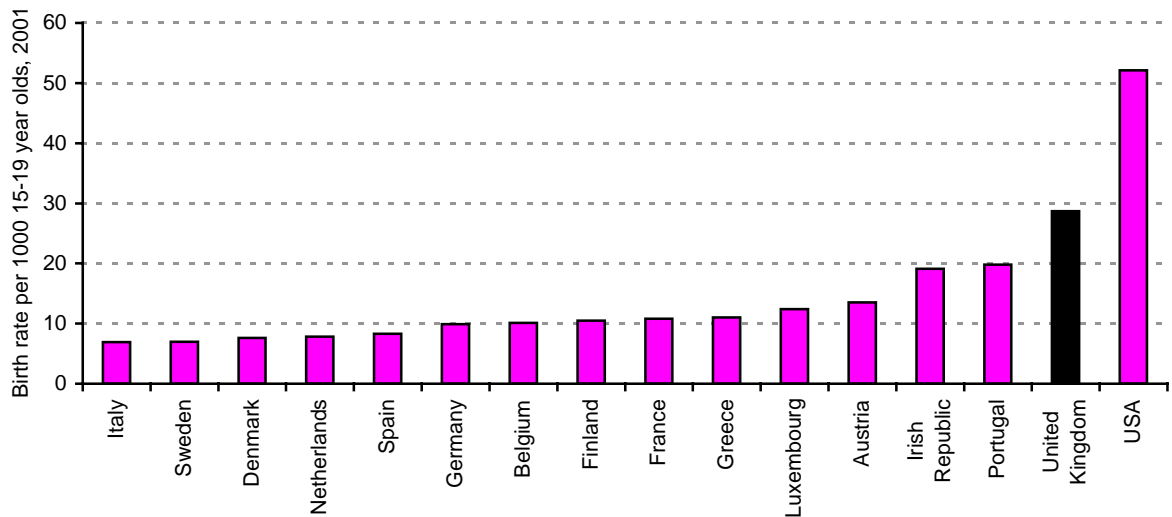
This work has been presented at the: Aberdeen Economics Department seminar; IZA in Bonn; and at Warwick labour economics workshops.

## 9. “Understanding the Effects of Early Motherhood in Britain: the long-term socio-economic effects on mothers.”

by Alissa Goodman, Greg Kaplan and Ian Walker

Britain’s worsening record on teenage pregnancies relative to other countries motivates a continued interest in estimating the long-term socioeconomic consequences of teenage motherhood. UK teenage birth rates are the highest in Western Europe, and though teenage births are well below those in the USA, Britain is the only country in Western Europe that has not experienced a significant decline in teenage fertility rates in the last thirty years. Britain comes comfortably top in the teenage birth league-table provided by a recent UNICEF report (see Figure 1) across a number of western European countries and is only beaten by the USA.

Figure 1: The Teenage Birth League



Source: UNICEF (2001) A League Table of Teenage Births in Rich Nations, Innocenti Report Card Issue No. 3

Our research is concerned with estimating the effects of early motherhood for a cohort of British women born in 1970. Although the associations between early motherhood and negative later-life economic outcomes are already well documented, it is very much open to question how much these associations can be given a causal interpretation. There is a very lively current debate within the US economics literature about this, with an increasing number of US researchers suggesting that early motherhood may simply be an indicator of prior disadvantage, rather than a significant root cause of future disadvantage. Of course this question has very important policy implications for the nature, timing and targeting of appropriate interventions to assist young mothers. In particular, if prior disadvantage is the primary cause of many teenage mothers’ poor outcomes later in life, then policies aimed simply at preventing teenage conceptions or births will not be effective.



Our research provides new evidence from Britain on this issue, by applying an idea developed in the US to British data. We use data from the 1970 British Cohort Study (BCS70), a longitudinal study of an entire cohort born in Britain during one week in March 1970. The basic idea behind our approach is that in order to form accurate estimates of the effects of teenage motherhood, it is of crucial importance to choose an appropriate *comparison group* of young women, who would be the same in *every* respect to the teenage mothers in our sample, except for the fact that they did not have children as teenagers. It would be impossible to observe all the relevant attributes of teenage mothers in the sort of data we have to construct this comparison group directly. However, following an idea developed by Hotz, McElroy and Sanders (2003), we can think of those women who became pregnant as teenagers, but did not actually give birth because they had a miscarriage as a natural comparison group of this kind. This is because it can be argued that it is only by chance, and not by choice, that these women did not become teenage mothers.

The results from our analysis cover four broad areas: family income, receipt of means-tested benefits, employment and wages of the cohort member's partnership, and the number of children in the household by age 30. Our results provide an interesting picture of the effects of teenage motherhood on socio-economic status of the mother by age 30. We compare results for the effects of teenage motherhood on a range of different outcomes, using two different methodologies, the first controlling for a range of observable characteristics using Ordinary Least Squares (OLS) regression, the second, preferred specification, using miscarriage as an instrumental variable (IV). The more conventional OLS estimates show substantial drops in income and wages as a direct result of teenage motherhood, and a greater probability of being out of work and on means-tested benefits.

However our IV estimates, where our results are instead effectively based on the comparison group described above, suggests considerably smaller 'genuine' effects of teenage motherhood, few of which are statistically significant. In particular, these results suggest that there is no effect of teenage motherhood on weekly wages, or family income, unadjusted for family size. Our results also point to the fact that teenage mothers tend to have more children in total than non-teenage mothers (by the age of 30), which is one cause of any lower living standards they may experience.

Our research also considers in some detail the robustness of these findings, deriving bounds on the above IV effects allowing for possible mis-reporting or non-randomness of miscarriages. It also discusses the extent to which the differences between teenage and non-teenage mothers might be driven simply by issues of timing.

We conclude by pointing out that this research adds to the growing body of literature that suggests that the effects of teenage motherhood, in itself, may not be as detrimental to teenage mothers as has previously been thought. Instead, the root causes of future problems may lie further back in the childhood lives of the women concerned. If correct, this research suggests that effective policies would focus on alleviating the longer-term disadvantage experienced by teenage mothers in their own childhoods, rather than simply on interventions in the teenage years to persuade young women to delay child birth.

## 10. “Ethnic differences in birth outcomes”

by Lorraine Dearden, Alice Mesnard and Jonathan Shaw

There is a growing literature on the sources of ethnic inequalities in a variety of outcomes including health, education, earnings and retirement in the UK. Most of this work, however, focuses on adult outcomes. In this paper we use the new Millennium Cohort Study (MCS) to look at the differences in outcomes of children at birth across four ethnic groups: White, Black, Asian and Other.

There is also an increasing body of research that shows that increased birth weight and length of gestation is positively associated with cognitive and health outcomes later in life, independent of other socio-economic factors. This begs the question – are there factors that explain differences in duration of gestation and birthweight and do these vary by ethnicity?

We study length of gestation in days and birth weight and try to understand how much of the variation in these outcomes by ethnicity is due to:

- differences in maternal behaviour before and during pregnancy: more than a quarter of mothers of White children smoked and more than a third drank alcohol during pregnancy. By contrast, almost no mothers of Asian children smoked or drank during pregnancy.
- differences in socio-economic background: White parents are on average better educated and have higher income than parents of other ethnicities. Asian parents are the least well off and least well educated in the data.
- differences in family composition and fertility decisions: family size varies across ethnic groups and tends to be larger for Asian children
- other observed factors such as parental age, weight and height: the average age of mothers varies across ethnic groups from 27.4 for the mothers of Asian children to 30.4 for Black mothers. Mothers of Asian children are smaller on average than mothers from other ethnic origins, while fathers of White children are taller on average than fathers from other ethnic origins. Mothers of Black children have the highest average weight and mothers of Asian children the lowest.

Looking first at gestation: White children have on average a longer length of gestation than other ethnic groups, and whilst controlling for background characteristics reduces variation between ethnic groups in length of gestation, nevertheless unexplained differences remain between ethnic groups. Some of these characteristics which appear to be important for gestation include mother's, but not father's height, and the education of both parents. Family income however does *not* appear to be important, controlling for other factors. Neither does smoking behaviour before and during pregnancy, suggesting that the well documented detrimental effect of smoking on birthweight operates independently of gestation. In contrast, drinking during pregnancy increases gestation by almost a day on average, while attending an ante-

natal class increased gestation by more than a day for full-term babies. Not surprisingly, twins and triplets had a significantly shorter length of gestation.

Looking next at birth weight: as with gestation, there are considerable differences between ethnic groups: White babies are heavier on average and Asian babies lighter on average than other ethnic groups, while there is much greater dispersion in birthweight for Black children. Controlling for background characteristics reduces but doesn't eliminate these differences. Some important other characteristics determining birth weight (after controlling for gestation) include parental education, height, weight and smoking.

Further work will consider how these differences in child outcomes apparent at birth evolve throughout the life course.

## 11. Conclusions

Our research began by posing the question, “(i) how much does income matter, and (ii) what else matters for child outcomes?” Our reading of the existing literature suggested that once appropriate methods were used to control for all other observed and unobserved characteristics of low and high income parents, we would answer “not very much” to question (i). (See section 2, methodology review.)

To some extent, our findings have echoed this. For example, the gradient between child-smoking and parental income seems to be largely explained by other factors such as parents’ education and parental smoking behaviour. We found no evidence that when family income goes up, a young person is less likely to smoke. (See section 5 on youth smoking). We also found evidence that when child benefit has temporarily gone down, parents have not spent less money on their children, though we have found evidence that they spend less on adult-assignable goods such as adult clothing and alcohol (see section 4 on child benefit).

On the other hand, we have found some evidence that parental income does matter for a child’s education choices. Here the distinction is important between long-run income, and current income at a point in time. We have found evidence that both are important for whether or not a child decides to leave school at 16; whilst long-run income is the most important, short-term income changes also matter, backing up other research findings that young people may be credit-constrained, and that short-term income transfer policies like the EMA are therefore likely to be effective in increasing young people’s propensity to stay at school. Further work, based on Danish data, is investigating the robustness of these findings (See section 3 on staying-on decisions).

We have also found that increases in parental income amongst lone parents have led to significant falls in material deprivation, suggesting that increasing incomes have at least led to improved living standards for children; moreover material deprivation, as a proxy for long-run income, is an important predictor of both child and adult health. (section 6 on material deprivation).

In answering our question (ii), “what else matters?”, we have focused largely on education. We looked at intergenerational links in education choices, and showed that increasing parental education might not have as strong knock-on effects on children’s education decisions as we had previously thought (section 3). However early education (before the age of 5) appears to have had long-lasting effects on children’s cognition and school achievements, and even on future employment and wages. However, in the case of early education these benefits come much later than the costs of the policy, while for later interventions (like encouraging later leaving) the benefits occur closer to when the costs are incurred. So far, full cost-benefit analyses have not been conducted. Our experience from estimating the effect of class size reductions in Denmark, which improves children’s length of schooling and hence wages, suggest that discounting is very important in such long term policies since the policy clearly fails a cost benefit appraisal even at low discount rates.

Finally, we looked at some other issues related to child well-being, including the determinants of low birthweight, and the long-run effects of teenage motherhood. Our

research on the former suggested that parental background (including ethnicity) matters even for these outcomes very early on in life. Our research on teenage mothers found that early life disadvantage may well be more important for explaining why teenage mothers tend to face socio-economic difficulties later in life, rather than the teenage motherhood itself.

What conclusions can we draw for policy? We still have a long way to go before we have a full answer to the question of where to spend the marginal pound, in terms of comparing both the costs and the benefits of different sorts of interventions. Though increases in benefits and tax credits may well have led to increases in living standards amongst families with children, our research suggests that it is unrealistic to expect that money alone will always be sufficient to raise child outcomes. However, research into finding out “when” money matters may well illuminate useful opportunities for intervention - and our findings on school-leaving is one such example.

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