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The Impact of Low-Income on Child Health: Evidence from a Birth Cohort Study

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Abstract

There is a growing literature that shows that higher family income is associated with better health for children. This paper contributes to this literature for the UK and uses a cohort study that has rich information on mother's early life events, her health, her behaviours that may affect child health and her child's health. The paper begins by examining, as have recent papers, the cross-sectional association between income and health. It then examines whether it is current or long term income that matters and concludes that the current association is due to an association between permanent income and child health. It then examines the correlates of this association, focusing on two sets of factors: parental behaviours that may affect child health and parental health, including maternal mental health. Controlling for these factors, there is almost no direct impact of income. A significant role is played by mother's own health and events in her early life. No clear role is played by child-health production behaviours of the mother.

JEL Number: I1

Key words: Child health, income, maternal health, transmission mechanisms

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1. Introduction

There is a huge literature on the relationship between socio-economic status and health (e.g. Marmot and Wilkinson 1999). There is now a growing literature that shows that higher family income is associated with better health for children (Case et al (2002) for the US, Currie and Stabile (2002) for Canada). Wealthier parents may have healthier children because they may have more income to buy health care or other goods that produce better health. Alternatively, income may be correlated with other factors which themselves affect child health. An obvious example is a genetic factor that results in both health and wealth advantage. However, there may be other non-genetic factors, such as events that occurred early in the life of the parent which affect her ability to produce child health from a given set of inputs. The policy implications of these routes are quite different. If the transmission is primarily through the purchasing power of income, policies to reduce the costs of palliative care for poor parents will increase their children's health. On the other hand, if the transmission mechanism is primarily via specific behaviours, or events that occur early in the life of the parents, or genetic inheritance, increases in current income may have little effect on the relationship.

In this paper, we focus on the link between parental behaviours, parental health, and income in the production of child health. We examine whether there is a link between current parental income and child health and then seek to unpack this correlation by examining the routes by which parental disadvantage is transmitted into child disadvantage. We focus on two types of factors that may affect child health and focus on the occurrence of these early in the child's life or even before the child's birth. The first factors are behaviours of the mother that may reduce the health of the child. These are early inputs into the child health production function[1]. The second are the mother's own health, including her mental health, prior to the child's birth. Poor maternal health may reduce the effectiveness of any other inputs devoted to the production of child health. Both sets of factors are likely to be associated with household income. If the association is such that wealthier mothers feed their children better diets or have better own health, then omission of these factors will suggest a larger direct role for income than is in fact the case.

[1] We focus on mothers because they are the primary carer for most children.

This approach complements two recent papers, one for the US (Case et al 2002) and one for Canada (Currie and Stabile 2003). Both of these have examined the relationship between income and child health and have concluded that there is an income-health gradient and this gradient, in both countries, steepens with age. We examine whether the same gradient exists in the UK and whether it also changes with age. Unlike the US, but like Canada, children in the UK have universal health insurance. Adults in the UK also have universal health insurance. This may alter the gradient from that observed in North America. Case et al (2002) examine the origins of this gradient and look at the impact of contemporaneous parental behaviours and measures of parental health on the association between child health and higher income. They find little effect of maternal labour supply, some indication that parental behaviour affects outcomes (the use of seat belts is associated with better health) but that controlling for these factors does not remove the effect of income on child health. We examine some of the same factors, including maternal labour supply and parental physical health, but in addition, examine the impact of mental health.

We examine the effect of these factors using data from the UK for a cohort of children born in the early 1990s. These data, hitherto little analysed by social scientists, provide rich information on mother's health, including various measures of her mental health (which have not been examined in previous papers investigating the effect of income on child health), her behaviours that may affect her child's health, and her child's health. We focus on children up to the age of 7.

We begin by examining the impact of low income on child health. We find the expected correlation between current income and the current health of the child: children from poorer households have poorer health. However, we find no evidence that this gradient steepens as children age. In fact, we find that the gradient diminishes over childhood and, in another dataset, over early adolescence. We then exploit the high frequency of the data set to examine dynamics. We find little evidence of a link between the timing of low income and child health: the impact of income is very similar whenever in a child's early life financial hardship occurred. It is repeated low income that appears to drive the association of child health and financial hardship (Korenman and Miller (1997) find a similar impact of repeated financial hardship on poor child health using US data).

We then explore the impact of maternal behaviours and health on the relationship between income and child health. We examine the impact of behaviours early in the child's life (diet, breast-feeding, early maternal employment, housing conditions) and maternal health, including mental health (the mother's birth conditions, anthropomorphic measures of her health pre-pregnancy, her assessment of her mental and physical health pre-birth, and her responses to adverse events that occurred early in her own childhood). We find that controlling for these factors, there is almost no direct effect of income on child health. With the exception of one measure of child health based on obesity, there is no association between permanent low income and child outcomes at age 7. Further, the evidence suggests that the transmission mechanism from income to child health is not through mother child health related behaviours. While these behaviours are correlated with income they do not have much direct impact on child health, after controlling for income. In contrast, we find that mother's health, including her mental health and her responses to events in her early life, are highly correlated both with income and with child health. Once we allow for these factors, the estimated impact of income falls almost everywhere to zero.

The paper is organised as follows. Section 2 outlines our approach and evidence on the association between parental income (or SES) and child health. Section 3 presents the data used in the analysis. Section 4 presents our results as to the impact of income and Section 5 presents our conclusions.

2. The relationship between child health and parental SES

2.1 Our approach

The relationship between child health and parental income can be thought of as having two components. The first is a child health production function, in which parental and other inputs are used to produce child health given an initial health stock (Grossman 2000). Income will affect the goods that are purchased and may also affect the productiveness of these inputs. Child health at time t can be written as:

$$h_{ct} = a_0 + a_1 X_{mt} + a_2 Y_{mt} + h_{co} + e_c + w_{ct} \quad (1)$$

where *m* indexes the parent and *c* the child, h_{ct} is the health of the child at time t, X_{mt} is a vector of parental inputs other than income at time t, Y_{mt} is parental income, h_{co} is initial (observed) child health, e_c is a unobserved, time invariant, child fixed effect and w_{ct} is random error.

Parental income Y_{mt} is a function of both observed and unobserved parental characteristics. These characteristics will include parental health:

$$Y_{mt} = b_0 + b_1 Z_{mt} + a_2 h_m + e_m + w_{mt} \quad (2)$$

where Z_{mt} contains both time varying and time invariant parental characteristics other than health, h_m is (observed) mother health, e_m is a unobserved, time invariant, mother effect and w_{mt} is random error.

From (1) and (2) an association between income and health may arise because income directly affects child health, because income affects the things parents buy and the time inputs they make, or because there is an association between adult health and child health which is picked up by income. It seems unlikely that more income per se will affect child health, but income may well affect health through the association between income and the goods and services parents buy and the time they spend with their children. These goods may not necessarily be medical care. In the UK medical care is free at the point of delivery so we would not expect to see a large association between income and the use of medical care. But income may be used to buy goods such as a better diet, heating, better quality housing, or vacations, all of which may contribute to the health of the child. But income and child health may also be associated not because income produces child health, but because parental health and child health that are linked through the fact that parental income is associated with parental health.

The problem of estimating the direct channel from health to income in equation (1) for adults is that health affects income and income affects health (Adams et al 2003; Add et al 2003; Smith 1999). This problem is largely absent for child health as children in the UK do not contribute to family income (though there may be some effect on parental labour supply of having an ill child)[2]. But there may be a bias because Y_{mt} and e_c are correlated (say through genetic endowments common to the mother and her child). In an adult context, one way to deal with

[2] In the data used in this paper, there is no relationship between parental rating of child health between birth and 30 months and maternal return to work before the child is aged 33 months.

this would be to use panel data and difference out the fixed effects. However, in the child context this strategy is less plausible. Individual characteristics, which might be thought of as fixed in adults, may only become so during childhood (for example, development of allergies). More generally, child development takes place at different rates across children. First differencing is therefore not likely to simply remove a fixed effect.

The strategy we therefore follow here is to use (1) to examine the association between parental income and child health controlling for a small set of 'standard' background controls, which attempt to capture aspects of the child's initial endowment of health (birth weight and birth order), the household demographic structure, and the education of the mother. Education and income are heavily correlated, and to estimate the effect of income without allowing for the impact of education will be to overestimate the effect of income. This specification follows the approach in existing literature on parental income and child health (e.g. Case et al 2002). With this specification we examine first the contemporaneous association of income and child health. We then use the high frequency of our data to see if when a child is in low income matters and whether persistence of low income matters.

We then exploit our rich data set to attempt to unpack the estimated effect of income by introducing measures of the mother's child health production behaviours (X_{mt}) and her health (h_m) into our estimation of equation (1). Examining these directly allows us to explain how income is operating and to differentiate between a behavioural channel (which could be influenced by policy) and a mother health related channel (which may be rather less open to policy manipulation) for the transmission of income to child health.

1.2 Previous research on the association between child health and parental income

Case et al (2002; also see Case and Paxson, 2002) use primarily cross sectional US data to examine whether the relationship between income and health found in adults exists for children. They show that this relationship is present for children and, further, that the gradient deepens with age. Currie and Stabile (2002) use panel data to investigate this and find the same deepening of difference across SES with age. However, they also show that this deepening is due to a greater incidence of health shocks among children in low SES households, rather than a slower recovery rate from a shock. Koreman and Miller (1997) investigate the timing of income and find that being long term in low income has a deleterious effect on child health as measured by stunting, wasting and obesity among a sample of children aged 5-7.

Case et al (2002) examine the effect of a set of both child health parental health related behaviours on the income-child health link. The measures they use are mainly contemporaneous. The child health related behaviours are whether the child has seen a doctor in the last year, whether they have a regular place for sick and health care, whether they have a regular bedtime and whether they wear a seat belt. The parental health behaviours are parental BMI, whether the parent smokes and whether the mother has visited a doctor in the last 12 months. These are all correlated with child health and reduce the association between income and child health, but not to a very large degree.

For the UK, there is strong evidence of an association between SES and health in adults (e.g. the Black report (Townsend and Davidson 1982) and its follow up (Independent Inquiry into Inequalities 1998), and that this difference persists into old age (Marmot and Nazroo 2001). Van Doorslaer et al (1997) show that this relationship holds for income as well as more general measures of SES. However, there is much less research which has looked at children. Currie and Hyson (1999) examine the impact of low birth weight on post childhood outcomes. They find that low birth weight has a persistent negative effect on a range of outcomes post childhood. However, they found that there was little evidence that the impact of low birth weight (which is associated with lower SES) had a differential effect for children from low SES families. Hobcraft (2003) looks at low SES and poor ability scores in childhood and finds these to be associated with poor mental health at ages 23 and 33.

West (1997) reviews a large earlier literature on the link between childhood illness and SES, most of which uses cross-sectional data. He finds that there is an association between SES and childhood ill-health in the UK, particularly as measured by mortality, but also as measured by the presence of one (or more) chronic conditions. He also finds this gradient in childhood illness by SES disappears in adolescence, so that youth, particularly early youth is characterised by relative equality of health. This is true for mortality, several chronic conditions, asthma and visual problems, non-fatal accidents and general mental health. Shaw et al (1999) primarily focus on the spatial distribution of inequalities but cite other work showing that there is evidence for considerable disparity in health across SES. They state that babies born into poor families are more likely to be born prematurely and be of low birth weight, that children in poor families are more likely to experience illness, including limiting long-standing illness, dental caries, childhood respiratory conditions, TB and HIV.

Finally, it should be noted that these SES differentials in the UK arise in a health care system where health care is free at the point of delivery. Evidence based on large scale national surveys suggest that access to health care, given medical need, is not strongly associated with income for adults (O'Donnell and Propper 1991, van Doorslaer et al 2000). Yet differentials in health remain.

3. The Data

3.1 The Avon Longitudinal Study of Parents and Children (ALSPAC)

We use a very rich UK data set on a cohort of children born in one region of the UK in the early 1990s. The Avon Longitudinal Study of Parents and Children (ALSPAC; Golding et al, 2001), is a local, population-based study investigating a wide range of socio-economic, environmental and other influences on the health and development of children. Pregnant women resident in the former Avon Health Authority were invited to participate if their estimated date of delivery was between the 1st of April 1991 and the 31st of December 1992. Approximately 85% of eligible mothers enrolled, resulting in a cohort of 14,893 pregnancies. Our estimation samples are somewhat smaller than this, representing late miscarriages, stillbirths and post-birth sample attrition and non-response to questionnaire items[3].

Respondents were interviewed at high frequency compared to any of the UK cohort studies.[4] They were given questionnaires pre-birth and then at regular intervals after the birth of their child. Here we use data from 18 questionnaires (10 mother-based and 8 child-based) covering the dates between 8 weeks gestation and the 85th month of the child.

3.2 Measures of child health

Mothers were asked at frequent intervals to provide a general assessment of their child's health as well as stating whether their child had recently experienced any of a list of between 16 and 21

[3] The cross-sectional representation of the ALSPAC sample has been investigated by comparison with the 1991 National Census data of mothers with infants under one year of age who were resident in the county of Avon. In general, the ALSPAC sample performed reasonably well, although mothers who were married or cohabiting, owned their own home, did not belong to any ethnic minority and lived in a car-owning household were slightly over-represented. As these are typically characteristics that are positively associated with income the initial ALSPAC sample is likely to contain a lower number of mothers with low-income than the population. See golding et al. (2001).

[4] For example, the UK National Child Development Study (NCDS) interviewed at birth and then again at 7. The UK Birth Cohoort Study (BCS70, first wave was in 1970) has a similar gap.

(depending on age) symptoms of poor health. We use this detailed information to construct three indicators of poor child health, available for when the child is aged 6, 18, 30, 42 and 81 months old. All are binary variables, with one denoting poor health.

The first two measures of child health are based on the number of symptoms of poor health mothers say their child has experienced over the past year[5]. The incidence of symptoms by age of child is shown in Table A1. The symptoms are wide ranging, both in the dimensions of health they capture as well as their prevalence. For instance, scarcely any children stop breathing (experienced by just 0.21 per cent of the 81 month sample), whereas it was rare for children not to have experienced a cold (typically over 90 per cent of children had a cold in the past year). At all ages, the number of symptoms of poor health is approximately normally distributed. Roughly one fifth of children experience the modal number of symptoms: 3 symptoms at 6 and 18 months and 5 symptoms at 30, 42 and 81 months[6].

We cut this distribution of symptoms into two and define ill health as being in the top 40% of the distribution and the top 20% at time *t* respectively. A straightforward count of number of symptoms has the benefit of simplicity and is likely on the whole to provide a fairly reliable proxy for quality of health. This assumes that all symptoms have an identical impact on quality of health and that, either all symptoms are independent, or, where symptoms may be interdependent in some circumstances (such as ear ache and ear discharge), the impact on health is twice as large as the presence of either symptom alone.

The third measure of poor child health is based on mothers' assessment of their child's health in the past year. A similar question is asked in most household surveys which include questions on health. Mothers were asked to classify their child health into one of "very healthy, no problems", "healthy, but a few minor problems", "sometimes quite ill" or "almost always unwell". Approximately 50 to 60 per cent of children were classified in the very healthy category. By contrast, less than five per cent of mothers rated their child as "sometimes quite ill" or "almost always unwell". Table A2 provides details. From these responses, we compute a

[5] At 6 months, the question refers to "first few months" rather than "past year".
[6] The distribution of number of symptoms of poor health at all ages is available from the authors.

binary indicator, labelled mother-reported poor child health, which is 1 if children are rated as anything but very healthy.[7]

As mentioned above, we have five observations for each of these three child health outcomes between 6 and 81 months. In addition, we also use two other child health indiccators for when the child is aged aproximately 7 years old. The first of these uses the same check list of symptoms as the first two outcomes; it is available for age 81 months only and indicates whether the child has asthma. This measure has the advantage of being for one condition only, and one which would have been diagnosed by a health care professional.

The final health outcome is the child's body mass index (BMI), constructed from clinic-based measures of the child's height and weight at 7 years of age. BMI scores are computed by dividing the child's weight in kilograms by their height in metres squared. We construct an indicator variable with value 1 if the child is in the top 10 percent of the survey sex-specific BMI distribution.

Except for the BMI scores, all the child health outcomes are based on mother reports. Dadds et al (1995) present evidence that maternal health does not influence mother's reports of child health. Case et al (2002) provide additional evidence on this issue, comparing physician reported and mother reported data, and conclude that the income gradients they find in their various sources of data are not due to mother reporting error. Nevertheless, to allow for the possibility that mothers misreport their child's health, we construct a maternal health misreporting variable which makes use of information provided by both the mother and her partner on the partner's health. Both the mother and her partner are asked when the child is aged at 8 and 21 months to indicate whether the partner has experienced any of a list of symptoms in the last year (or since the child was born when this information is provided at 8 months). The difference in the mother count of her partner's symptoms and the partner's own count provides an indication of the mother's propensity to misreport her partner's health: a positive value means that mother's view their partner's as having worse health than the partner's view themselves.[8] By incorporating this difference in symptoms variable into equations for child health, we

[7] The cross-correlation between the measures based on symptoms and that based on mother general assessment of child health are all significantly different from zero and range between 0.1 and 0.3.

[8] We take the mean of the difference in symptoms where information is available at 8 and 21 months, or the single observation if information is available at only one of these points in time. The mean is imputed for cases where no information is available at either point in time and the regressions contain a dummy variable indicating whether the information is missing.

implicitly assume that a mother's propensity to misreport her child's health is related to her propensity to misreport her partner's health: mother's are more likely to view their child in worse health than they actually are if they are more likely to view their partner's health in a less favourable light than it actually is.

3.3 Low-income indicators

We use two indicators of low income. The first is based on mothers' replies to a series of questions about financial hardship. The questions are asked shortly before birth (32 weeks gestation) and after birth when the child is aged 8, 21, 33, 61 and 85 months old. Thus information on financial hardship is available on six separate occasions, spanning a period of just over seven years.

Mothers are asked "How difficult at the moment do you find it to afford": food, heating, clothing, rent or mortgage and things for the baby/child. The available responses are "Very difficult", "fairly difficult", "slightly difficult", or "not difficult". In constructing our financial hardship scores, we assign a value of 3 for "very difficult", 2 for "fairly difficult", 1 for "slightly difficult" and 0 for "not difficult". These individual scores are aggregated to form an overall score with a maximum of 15 points[9].

We define a child as in low income if living in a household with a financial hardship score of five or more. The proportion of children with low-income based on this definition ranges from 25 to 30 percent in the first few years of childhood, falling to less than 17 percent by the time the children are 81 months old[10]. In part, this decline in the rate of low-income may arise from 'genuine' phenomena: poverty rates are at their highest amongst very young children and national rates of child poverty fell slightly over this period. In addition, the decline in low-income rates is also likely to reflect differential attrition, as there is increased risk of sample dropout amongst children in families with low-income (more details below).

[9] "Paid directly by social security" was introduced as an additional response to the heating and rent or mortgage questions in the 21 and 33-month questionnaires and this is coded as 3. All financial hardship questions in the 61 and 85-month questionnaires specified, "did not pay" as an alternative. There were few respondents who ticked this box, except for the rent or mortgage question. All "did not pay" responses were codes as 3 since these are likely to reflect payments made on the parent's behalf by social security.

[10] The full distribution of aggregate financial hardship scores is available from the authors.

ALSPAC also contains mother reported data on actual net family income. There are constraints on the use of these data as income amounts are recorded in five broad bands, given in table A3, and these data are available only when children are aged 33, 47 and 85 months old. We use this data first, as a check on the financial hardship based low-income measures, and second, directly in some analyses. Information is available on both financial hardship and family income when the children are aged 33 and 85 months. Table A4 reveals a close association between low actual income at 33 months and having a financial hardship score of five or more at 33 and 85 months. The precise timing, and matching, of the health and low-income is presented in Table A5.

3.4 Controls for child initial health, household composition and parental education

Controls for gender, birth weight, birth order and ethnicity allow us to control for initial child health (and to remove as much of the unobserved child fixed effect as possible). Controls for household composition, mother's age at birth and education allow us to isolate the impact of income, controlling for mother human capital. We also control for partner's education.

3.5 Mother's health

The data set contains measures of mother's physical and mental health, recorded early in the pregnancy, but which mostly measure health prior to pregnancy. Mothers answered a standard self-assessed general health question (shown in other work to predict mortality for adults) at 8 weeks into pregnancy.[11] At 18 weeks gestation the mothers are asked to answer 23 questions, on a five-point scale, which measure their free-floating anxiety, depression and somaticism[12]. This scale has been shown to be a measure of psycho-neurotic pathology in community settings. The mothers also provide answers to 31 questions on whether she experienced particular events before she was seventeen years old, and if so, whether the event affected her a lot, moderately, mildly or did not affect her at all or did not occur. These events include the death of a parent of sibling, the occurrence of physical or mental illness in the mother's family, being in trouble with the law, becoming pregnant. The maximum possible score is 124. We divide this score into quartiles[13]. The data set also contains anthropomorphic measures of mother's health (birth weight and BMI prior to pregnancy) and whether or not she was pre-term. We also include a

[11] The question asks the mother to rate her 'usual' health pre-pregnancy.
[12] This is the Crown Crisp Experiential Index. Details are available from the authors.
[13] These three measures of mother's health are associated but correlations between them are all below 0.17

measure of partner's health; this is the average number of symptoms they are recorded as having when the child is 8 and 21 months old.[14]

3.6 Mothers' child health related behaviours

We have data on three types of behaviour of the mother that may affect her child's health. First, we have information on the type of diet the mother fed to her child. We have information on breast-feeding behaviour from which we construct indicators of whether the child was breast fed, and if so, the duration of breast-feeding. We also have information on the solid food fed to the child at 38 months. Following North (2000) we classify solid food intake into 4 types of diet; healthy, junk, traditional and snack. Second, we have information on the total time input of the mother. Gregg and Washbrook (2003) have shown that mothers who return to work spend less time with their children than those who are not working so we measure whether, when and for what proportion of the week the mother returned to work before her child was three. Third, we have data on mother's consumption which may affect her child's health: specifically we have data on whether the mother was a smoker at 5 dates during the gestation and the first five years of the sample child's life[15]. Finally, we have information on the housing conditions of the home of the child at the same dates. We use this to construct an indicator of whether the home ever had serious damp, condensation or mould problems.

With any longitudinal sample, there is attrition, and generally this attrition is not random. Table A6 shows that those who drop out tend to be younger, poorer, less educated, are more likely to be single parents, to have children with lower birthweights, be in financial hardship and have mothers who are in less favourable general, as well as mental health. We control for these observable variables in the analysis; controlling for attrition on unobservables is obviously much harder, and we do not in this paper attempt to jointly model the attrition process and the health outcome process.

Summary statistics for the sample used in the analysis are in Table 1.

[14] This is the information on the partner provided by the partner that is also used to construct the maternal misreporting parameter (see Section 3.2).

[15] The data also contain information on alcohol and substance abuse. The numbers reporting ever experiencing drug addiction and/or alcoholism are too small to make use of these measures.

4. The effects of income

4.1 Low-income and poor child health: the contemporaneous association

The top panel of Table 2 presents the coefficient on financial hardship for the three measures of child health that we have at all dates: the probability of being in the top 40% of the symptom distribution, the probability of being in the top 20% of the symptom distribution, and mother reporting that the child health was poor. The first set of columns for each measure shows the bivariate correlation with financial hardship, the second set of columns controls for the background controls. The table shows that, with and without controls, being in financial hardship is associated with all three measures of child health at the 4 ages in the table. Across the two types of measure, low income is somewhat more strongly associated with the number of symptoms than with the mother's assessment of her child's general health, but the coefficient estimates do not differ statistically from one another across the columns. The association also falls as the symptom count measure becomes more severe, but again this pattern in the coefficients is not statistically significant.

The association between financial hardship and poor health is larger at 6 months than at all three other ages for the two symptoms based measures. The gradient falls as age rises for both symptom measures, after allowing for the controls. The pattern for the self assessed health measure is the opposite, though the gradient is not monotonic. However, none of the financial hardship coefficients are significantly different from each other.[16]

The controls are child birthweight, child birth order, gender, race, mother's age at birth, household composition, mother's and (where present) father's education, father's health (where present) and the maternal 'health-misreporting' parameter. These controls hardly change the estimated effect of contemporaneous income. Of the background controls, few are consistently significant. Girls are more likely to be ill than boys and first born more likely to be ill than later children. The misreporting parameter is significant, indicating that mothers who provide upward (i.e. worse) reports of their partner's health relative to the partners own assessment also

[16] To check for robustness to attrition, Table 2 was re-estimated using only the children for whom health outcomes and low-income measures are available at all four points. The results are very similar to those in Table 2.

are more likely to report their children's health as worse. Education of the mother appears to have little direct effect.[17]

The bottom panel of table 2 presents the same analysis using the five categories of income, treated as a continuous variable, instead of financial hardship. Contemporaneous income and child health measures are available at 30, 42 and 81 months. The table shows no statistically significant association with income at 30 or 42 months, but a statistically significant negative relationship at 81 months, with and without controls. Again, the impact of adding in the controls, in particular maternal education, is small[18].

We therefore do not find a strong association between low income and child health. Nor do we find strong evidence of any steepening of the association with age. These results contrast with those of Case et al (2002) for the US and Currie and Stabile (2002) for Canada. Both these papers find evidence of a significant deepening of the contemporaneous income effect as children age. Our data are for a younger cohort of children than either of these papers, and our income measure is rather cruder than either of these papers. To examine whether these differences account for the differences in findings we examine the association between household income and child health using another UK household survey, the General Household Survey (GHS). The GHS is an annual household survey of aproximately 8 thousand households comprising some 19 thousand people. The GHS asks respondents to assess their children's general health, in a similar way to the ALSPAC survey and the surveys used in Case et al (2002) and Currie and Stabile (2003)[19]. Table 3 presents the correlation between income and child health (with no controls) for both the ALSPAC and the GHS data. The definition of child health in this table is the child rated as in good health. The top two panels present ALSPAC data and cover the ages 6-81 months. The bottom panel uses GHS data and presents results for children aged 0-3 up to 13-17 years of age. The GHS sample sizes are considerably smaller than those in ALSPAC.

The top panel of Table 3, using the ALSPAC data, shows that there is a gap between the health of children in financial hardship and those who are not. Children living in households

[17] This finding accords with results for child development from Korenman et al (1995) using data for the US, but contrasts with Currie and Stabile (2002) and Case et al (2002) who find a significant impact of maternal education on child health.
[18] Using the income variable as categorical shows a similar lack of association (results available from the authors).
[19] The GHS asks respondents to rate their children's health as good, fairly good and not good.

experiencing contemporaneous financial hardship are slightly less likely to be rated in good health. The gap is about 5 points at 6 and 81 months, though smaller in between. The second panel uses the income data from ALSPAC and defines low income as less than £200 per week. On this measure the gap is non-existent at 30 months and very small at 42 months, and is the order of 5 points at 81 months. The two panels therefore show a relatively small effect of low income and also show considerable accord across the two different low income measures in the ALSPAC data.

The last panel shows the same analysis using the GHS. The results show the health of children classified as poor and those as not-poor, using the same definition as we have used for the ALSPAC data (£200 per week)[20]. Below this we present the health distribution across income quintiles. The GHS results show a gap between the health of children of the poor and the not-poor, but this gap does not increase as the children age. Instead the gap closes, so that between 13 and 17 the difference in the percentages of children rated as in good health between those in low income and those not is less than 4 points. The GHS levels of good health are higher than those in ALSPAC but the percentage differences between those in low income and those who are not are similar in the two data sets.

The categorical nature of the financial hardship and income measures in ALSPAC mean that we are not able to compare the estimates of the cross sectional association between income and child health with the recent US findings. Table 4 uses the GHS data to present a comparison between the association in the US data presented in Case et al (2002) and the GHS. This table reproduces the coefficients on log unequivalised household income from Table 2 of Case et al (2002) on the left hand side and the counterpart coefficients for children grouped into the same age bands from the GHS. The coefficients in the top row are without controls for mother's education. This shows that the coefficients from the two data sets are similar for children aged less than 8. After age 8, in contrast to the deepening of the association found in the US data, there is a weakening of the association with income in the UK data. The coefficient on income for the 9-12 year olds is around half the size of that for the 4-8 year olds and the coefficient for the 13-17 year olds is not statistically different from zero. The bottom rows control for education of the mother and (where present) the father. In the US data, controls for education reduce the coefficient on current income. In the UK the effect of controlling for parental

[20] The GHS data are pooled for the years 2000/1 and 2001/2. The ALSPAC £200 per week data for the children at 81 months are for 1998 or 1999.

education is very small. The income coefficient is largest between age 0 and 3, falls thereafter and is not significantly different from zero for ages 9 and above.

These results suggest that the income gradient at young ages (below 3) may not be very dissimilar to that found in the US. But they also suggest that the lack of gradient across age that we find in ALSPAC is not confined to ALSPAC data and nor is it a function of the age of the cohort. There appears to be no steepening of the gradient in the UK data, in contrast to the results for US and Canadian data. Nor does the lack of impact of maternal education as a control appear to be a feature of the ALSPAC data: we observe a similar pattern in the GHS. Again, this UK pattern is in contrast to the US findings and in keeping with previous evidence for the UK by West (1997).

The results also indicate that the income measures in ALSPAC are not the driver behind a relatively weak association between child health and household income. As the 5 category measure of income in ALSPAC is really only sensibly used as a categorical measure and the financial hardship measure maps closely onto a definition of low income using these categories, the rest of the paper presents results using only the financial hardship measure.[21] We refer to this interchangeably as financial hardship or low income.

4.2 The effect of low-income persistence

The high frequency of the ALSPAC data allow us to explore the relationship between income and child health in greater depth than it is possible using the other UK birth cohort surveys or using a cross-sectional data set like the GHS. First we examine whether being in low income more often matters more than being in low income only once or twice. Among children with non-missing low-income observations at all six points in time, just under than half (45 percent) never experience low-income. Around one-quarter (27 percent) experience low-income either once or twice, whilst just over six percent are continuously observed with low-income. Table 5 presents the regression coefficients of the number of times the household is in financial hardship on health outcomes at 81 months. There are five measures of health; three are the same as in Table 2, the additional two health indicators refer to whether the child has asthma at 81 months and whether the child was in the top 10 percent of the BMI distribution at age seven.
The results are estimated using the same set of background controls as in Table 2.

[21] As a robustness check, all subsequent analysis was repeated using a low-income cut-off of less than £200 per week rather than the low-income indicator based on financial hardship. The results were very similar.

The top panel of the table reports estimates for the number of low-income experiences in increments of one. In this specification, the income effects are not always well defined. However, there is some evidence that the impact of being in low income several times has more impact on child health at age 7 than being in low-income once. As the numbers of children experiencing high counts of low-income are relatively small we repeat the analysis distinguishing only between no experience, 1 to 2, and 3 to 6 experiences of low-income, reported in the lower panel of the table. These results suggest that it is being in low-income persistently that is associated with poor health. For all 5 measures, there is a significant association between being in low income 3-6 times and poorer health. Children in this low income group are around 4 percent more likely to be in the top 40 and top 20 percent of the symptom distribution and around 5 percent more likely to be reported as being in overall poor health. There is some indication that being in low income once or twice is also more harmful to health than never being in this state, but the coefficients are generally only significantly different from zero in two of the cases and in one of these is half the size of the estimated effect of being in low income 3-6 times.

4.3 The importance of when low-income occurs

To delve deeper into the impact of income we examine the impact of the timing of low-income on child health. We examine whether, for a given number of spells of low-income, the sequence of low-income observations matters. To answer this we focus on low income early in life and examine the importance of different low-income sequences between 32 weeks gestation and 33 months (a total of four low-income observations) on poor child health 4 years later (at 81 months). We identify the importance of timing by comparing differences between low-income occurring at the start and the end of the low-income observation window, for a total of one, two and three low-income experiences.

The results, in Table 6, echo those of Table 5 and indicate the importance of persistent low-income. The estimated impact of being in low-income at all four times during the first 33 months of the child's life is statistically well defined for four of the five measures of child health. Very few of the other sequences appear to have an impact on child health. These results suggest that it is low income, on a regular basis, that appears to account for differences in children's health. Being in low income once or twice, even if at the beginning of life, appears to

have little impact on a range of health measures at age 7, after controlling for initial health at birth.

5. The effect of maternal behaviours and health

The interpretation of being persistently in financial hardship as an 'income effect' is complicated by the fact that there may be other factors, correlated with both persistent low income and child health, that account for the observed relationship between income and poor child health. Low income may be associated with poorer inputs into a child's health or, more broadly, behaviours that lead to the production of worse child health. In the UK medical care is free but poorer individuals may feed their children worse diets, or live in environments which are more harmful to child health. In terms of the model outlined at the beginning of the paper, these can be seen as part of the X_{mt} vector of equation (1). Alternatively, there may be attributes of the mother that are correlated with both low income and poor child health which account for the observed correlation between income and child health. One candidate is poor health of the mother, which, at least in the long term, may affect both her ability to earn and the health of her child. In this case, the mechanism operates through the association of H_m and Y_{mt} in equation (2). If this is the case the association with current income may simply be picking up the association between poor mother health and child health[22].

In what follows we investigate the robustness of the persistent low income effect to two sets of factors, the first of which contains measures of mother child-health production behaviours, the second of which contains measures of the health of the mother. To avoid reverse causality, we focus on early determinants and examine the impact of behaviours early in the child's life (diet, breast-feeding, early maternal employment, housing conditions) and the health of the mother, measured *prior* to the child's birth. We use measures of her own birth conditions, anthropomorphic measures of her health pre-pregnancy (her BMI), her assessment of her mental and physical health pre-birth, and her recorded responses to adverse events that occurred early in her own childhood.

To drive the observed income effect, observed mother health and her child-health production behaviours must be associated with low-income. Table 7 presents these associations by

[22] Finally, there may also be a role for unobserved heterogeneity. We cannot explore this last route further.

estimating probit regressions for each of these behaviours and maternal health measures on the number of times the child's household is in financial hardship between 32 weeks gestation and 81 months. The evidence reveals a significant association with almost all measures of mother's health. More times in financial hardship is significantly associated with mothers assessing their general pre-pregnancy health as less good, with her mental health at 18 weeks gestation being poorer, with adverse experience of events during her childhood, with her higher BMI before the child's birth, though not with her own birth conditions. Moreover, whether the child had a junk or snakc diet at 38 months, the frequency the mother was observed smoking an whether the child was raised in poor housing conditions, are all also significantly associated with the number of times in financial hardship. On the other hand, returning to work before the child is three and the duration of breast-feeding are not associated with the cumulative experience of low-income.

Table 8 re-examines the association between current financial hardship and child health, presented in table 2, allowing for the measures of mother health and her behaviours as additional controls. It is clear that these variables account for a large part of the observed contemporaneous association between income and child health. In Table 8 current low income is statistically significantly associated with only one of the measures of child health and then only for health at the earliest age. In table 2, which allows only for standard household characteristics, parental education, father's health and the child's initial health, race and gender, the association with current financial hardship was always significant with a marginal effect in the order of around 0.05. We conclude that there is very little evidence of an effect of current income once we allow for mother health and behaviours.

Given this we examine the impact of being persistently in low income on child health outcomes at 81 months. Table 9 presents the estimated impact of regularly experiencing financial hardship, allowing for all other variables – the background controls plus mother's self-assessed health, anthropomorphic measures of her health, and her child-health behaviours – on our five measures of child health at age 81 months. The table presents the coefficients on financial hardship plus those on mother's behaviours and health and on the maternal health misreporting parameter. It is clear that, after allowing for mother's health and behaviours, there is almost no estimated impact of low income. The one exception is the positive association of high child BMI and being in financial hardship 3 or more times in the 7-year window.

It also appears that the effect of maternal health and behaviours has different effects on the different aspects of child health. Examining first measures of mother's health, the results show that mother's self-assessed general health, mother self-assessed poor mental health and the experience of adverse events in her childhood are all significantly associated with her reporting poorer health of her child. Further, the association is generally monotonic: the poorer these measures of her health, the poorer the child health, though the coefficients do not generally differ statistically across categories of severity of mother ill-health. The estimated effects of maternal health on child health are quite large. A mother who rates herself as in the poorest self-assessed health category has a child who is 12 percentage points more likely to be in the top 40% of the symptom distribution than one whose mother is always well. A mother whose mental health score (CCEI) is in the second highest quartile of the distribution has a child who is 7 percentage points more likely to be in the top 40% of the symptom distribution, while a mother with CCEI score in the top quartile of the distribution has a child who is 10 percentage points more likely to be in the top 40% of the symptom distribution.

On the other hand, these measures of poor maternal mental health are less associated with whether the mother reports her child has asthma and are not associated with whether the child has a high BMI relative to their peers. On the other hand, mother's physical health appears associated with these conditions. A mother being pre-term is associated with the number of symptoms of illness of the child, including asthma and her assessment of general child health, but not with the child having a high BMI. There is a statistically significant and monotonic association of a child having a high BMI and the mother's BMI pre-pregnancy. A mother in the top quartile of the maternal pre-pregnancy BMI distribution is nearly 15 percentage points more likely to have a child whose BMI at age 7 is in the top 10% of all children[23].

The table also shows a similar pattern for partner's health. Partner's self-assessed health is significantly associated with reports of a higher number of symptoms, including asthma, but not with high BMI. An increase of one in the number of symptoms reported by the partner of one will increase the chance that the study child in their household will be in the top 40% of the number of symptoms by around 3 percentage points. The impact on whether the child is reported as being in poor health is similar.

[23] Miller and Korenman (1994) find a small impact of mother's height and weight on child stunting (low weight for age) and wasting (low weight for height) in NLSY data.

There is generally much less association of child outcomes at 7 with mother child-health related behaviours early in the child's life. The duration of breast feeding has a significant association with the child being assessed as in very poor health, but generally has no association with the number of symptoms or of general health. Diet early in life appears to have some effect. Relative to a healthy diet, other kinds of diet are associated with more symptoms of illness (the effect of all other types of diet relative to a healthy diet being of similar order). On the other hand, neither diet nor breastfeeding appear to have any impact on the incidence of asthma or being in the top 10% of the BMI distribution. Maternal smoking does not appear to be associated with any of the measures of health based on number of symptoms or the child's general health, but is positively associated with the child having a high BMI.

Finally, the children of mothers who return to work before the children are 3 do not appear to be in worse health than other children: in fact, on some measures these children are in better health. There is no association between maternal employment early in the child's life with BMI[24].

In the final row, the table presents the coefficient on the maternal misreporting parameter. The probability that a mother over-reports her partner's health (when the child is under 3) is positively associated with her reporting that her child has more symptoms at age 7. The correlation with the reporting of asthma is smaller than the reporting of all symptoms or the general assessed health score. However, it is not associated with the child's BMI at 7. The lack of correlation with BMI, which is based on the mother reporting separately her child's height and weight (and not on her reporting directly whether they are obese relative to their peers), suggests that the mother mis-reporting variable may be seen as a mother's view of the severity of illness. This suggests that how a mother rates the severity of her child's illness is influence by the view she has of severity of illness more generally[25].

[24] For the US, Anderson et al (2003) find a positive association of maternal employment and children's BMI.
[25] The impact of the background controls (not shown) show differences across types of children: females are reported as being sicker than boys but are less likely to have asthma; low birth weight of the child is negatively associated with BMI at 7, but is not associated with the number of symptoms, asthma or general ill-health; children who are first born tend to be sicker and have a higher BMI than those born later in the family. Neither maternal nor paternal education have any association with child health at 7, echoing our earlier finding that controlling for maternal education has little effect on the estimated effect of income. Household structure during pregnancy is not associated with outcomes at age 7. Korenman et al (1997) find that differences in the abilities of poor and non-poor children were not due to differences in the education of the children's mothers, the structure of the children's families or the age of the mother. US studies on child obesity tend to find significant relationships with family structure, but results across studies are not consistent about the sign of the effects (Anderson et al 2003).

In sum, the results in Table 9 indicated that being in persistent low income has almost no direct effect on child health at age 7, after controlling for maternal health and health related behaviours. In the main, the reduction in the effect of income is due to controls for maternal (and paternal) health, rather than the effect of child-health related behaviours of the mother and the housing conditions of the household. The only exception is health measured as BMI, which is significantly and positively associated with being in persistent low income. More generally, the association between income, maternal health and child-health related behaviours of the mother and child health appear to differ between general measures of child health and the specific measure of BMI. The mother's assessment of her child's health (including her reporting of a doctor identified symptom, asthma) appear heavily related to her own health and that of her partner, particularly her reported mental health, measured before the child was born. Income has no direct effect once these factors are included. On the other hand, the child's tendency to obesity, as measured by BMI, is associated with (low) income, but is not affected by the mother's assessment of her own mental and physical health, though it is associated with the mother's own tendency to obesity and her smoking behaviours.

5. Conclusions

This paper has examined the association between parental income and child health up to age 7. Using detailed English cohort data we examine a number of measures of child health, based on data provided by the mother of the child at regular intervals during the first 7 years of the child's life. The data we use allows us to control for initial child health (so that we examine child health relative to health at birth), household characteristics, and a measure of the mother's tendency to over-report the severity of ill-health.

We find that there is a contemporaneous association between child health at several points during the first 7 years of life and measures of low income. However, we find no evidence that this association deepens with age: in fact, if anything the association is strongest at 6 months and falls thereafter. We confirm this lack of a steepening of the gradient across childhood using data from a national household survey. This shows that the gradient falls throughout childhood and adolescence. These results contrast sharply with recent results for the US (Case et al) and Canada (Currie and Stabile). But they confirm patterns reported for the UK in West (1997) who found that initial differences (mainly at birth) in child health by SES narrow in the UK during

childhood and adolescence. The reasons for this difference may lie in the nature of the medical system; health care in the UK is free at point of demand for all children, whereas in the US it is not. On the other hand, Currie and Stabile find a steepening of the gradient for Canada, which has universal health insurance for children. This suggests that the reasons may lie in other aspects of children's lives, for example in their experience of school and neighbourhood. Children's health will be affected by the schools they attend, if only because children are exposed to infection from other children in their school. Primary schools in the UK may be more homogenous in social mix than those of either the US or Canada. The impact of school and neighbourhood on children's health remains to be investigated.

Utilising the high frequency of the data to examine the contemporaneous association of low income and child health further, we find that the relationship between current low income and child health is due to an association between persistent low income and health. When the child is in low income early in their life appears to be unimportant for health outcomes at age 7: what appears to matter is being in low income often. This echoes the general non-linearity of the association between income and health discussed in Deaton (2003).

The paper then explores the links between low parental income and child health. We examine two types of link. The first is a set of child-health production behaviours, associated with both income and child outcomes. We focus on maternal smoking, maternal employment when the child is young, the diet fed to the child and the nature of the housing of the child. The second is maternal health. We focus on the pre-birth self-assessed health of the mother, including her mental health, and some anthropomorphic measures of her health, plus a measure of her partner's health early in the child's life. We find that, once we control for these factors, there is no direct effect of low income on four of the five child health outcomes at age 7. The effect of income, therefore, operates through these factors: there appears to be no independent effect of income with the exception of child health measured as obesity.

Of the two sets of factors, it is less the health related behaviours and more the health of the mother, particularly her mental health, that reduces the estimated effect of income to zero. Mothers who rated their mental or general health as poor, or who experienced or had strong responses to potentially difficult events during their childhood, have both lower income and children in poorer health. The exception to this general finding is for health measured as

obesity. A marker of potential obesity, child's BMI at 7, is associated with low income, one behaviour – smoking – and one measure of maternal health, mother's BMI pre-pregnancy.

In sum, we find a strong link between child health outcomes at 7 and early maternal mental health. This link has not been examined in the recent economics literature on child health. There are several potential explanations for this link. One explanation might be that, as the data are self-reported, mothers in poorer mental health may be more likely to report their child's health as poor. But we control for this in two ways. First, use measures of maternal mental health as reported during the child's gestations, some of which related to events which occurred before the mother was age 17. Second, we control for a measure of the extent to which a mother may perceive a given set of symptoms as worse than other people. We do find this reporting bias measure to be positively associated with reported child health. We also find the mental health link is less strong for health as measured by one condition which would have been doctor confirmed (asthma), and for a measure that is not mother assessed (BMI).

Under the assumption that the effect we find is corrected for reporting bias, our results suggest there are several links that need to be further explored. It may be that stress early in a mother's life impacts on her ability to produced child health. If maternal mental health is correlated over time, then these early markers may signal a more contemporaneous link as well. There may be genetic links. If this is the case then it is interesting that we find links between maternal mental health and child outcomes (as well as links, in the findings for BMI, between maternal physical health and child physical health outcomes). Even if the association between poor mental health and children's reported health exists because being in poor mental health means mothers' view their children as being in worse health, this is likely to be an important determinant of actual child health, since mother's perceptions will affect how they treat their child. Mothers who are in poor mental health may treat their children inappropriately; for example, seeking either too much or too little medical treatment.

Finally, by looking across different types of child health outcomes, we identify one area where the patterns of association are rather different. Child relative BMI, at age 7, appears to be positively correlated with low income, even after controlling for child birth weight, mother's BMI pre-pregnancy and the diet fed to the child before they went to primary school. The importance of early obesity to later health means that this intergenerational association needs further investigation. More generally, our results suggest that how parental disadvantage, be it

poor mental health or low family income, translates into different aspects of children's health needs to be further explored using detailed data on maternal and child behaviours and health.

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Table 1: Descriptive statistics of variables used in analysis

Variable[1]	Mean	Standard Deviation
Child Health outcomes		
Top 40% of number of symptoms of poor health		
6 months	0.358	(0.479)
18 months	0.399	(0.490)
30 months	0.413	(0.492)
42 months	0.375	(0.484)
81 months	0.448	(0.497)
Top 20% of number of symptoms of poor health		
6 months	0.208	(0.406)
18 months	0.212	(0.409)
30 months	0.243	(0.430)
42 months	0.220	(0.414)
81 months	0.186	(0.389)
Mother-reported poor child health		
6 months	0.404	(0.491)
18 months	0.546	(0.498)
30 months	0.512	(0.500)
42 months	0.553	(0.497)
81 months	0.387	(0.487)
Child characteristics		
Birth weight (kg)		
Less than 2.5	0.050	(0.219)
2.5 – 3	0.142	(0.349)
3.1-3.9	0.583	(0.493)
More than 3.9	0.174	(0.379)
Child's sex		
Female	0.484	(0.500)
Male	0.516	(0.500)
Child's ethnicity		
White	0.950	(0.219)
Non-white	0.050	(0.219)
Birth order		
First born	0.445	(0.497)
Second born	0.364	(0.481)
Third born (or higher)	0.142	(0.349)
Number of adults in household at 8 weeks gestation		
One	0.053	(0.225)
Two	0.835	(0.371)
Three (or more)	0.110	(0.312)
Mother's age at child's birth		
21 or less	0.101	(0.302)
22 to 25	0.207	(0.404)
26 to 35	0.622	(0.485)
36 (or more)	0.069	(0.254)
Mother's highest educational qualification		
CSE/none	0.202	(0.402)
Vocational	0.445	(0.497)
A-level +	0.353	(0.478)
Father's highest educational qualification		
CSE/none	0.261	(0.439)
Vocational	0.297	(0.457)
A-level +	0.442	(0.497)
Partner's Health		
Number of symptoms of poor health	2.726	(1.644)
Maternal misreporting parameter	0.044	(1.410)
Mother's reported health before pregnancy		

Sometimes, often or always unwell	0.080	(0.271)
Usually well	0.601	(0.490)
Always well	0.319	(0.466)
Mother's mental health at 18 weeks gestation		
CCEI score[2, 3]		
Lowest quartile	0.287	(0.452)
Second lowest quartile	0.214	(0.410)
Second highest quartile	0.256	(0.437)
Highest quartile	0.242	(0.429)
Disruptions in mother's life to age 17 years		
Life Events Score (LES)	0.303	(0.460)
Lowest quartile	0.238	(0.426)
Second lowest quartile	0.224	(0.417)
Second highest quartile	0.235	(0.424)
Highest quartile	0.200	(0.400)
Mother's child health related behaviours		
Mother smokes at		
32 weeks gestation	0.200	(0.400)
8 months	0.242	(0.428)
21 months	0.227	(0.419)
33 months	0.226	(0.418)
47 months	0.222	(0.416)
Mother breast fed		
never	0.264	(0.441)
less than 3 months	0.230	(0.421)
3-5 months	0.166	(0.372)
6+ months	0.340	(0.474)
Dietary type at 33 months		
Junk	0.315	(0.465)
Healthy	0.251	(0.434)
Traditional	0.217	(0.412)
Snack	0.217	(0.412)
Mother starts work within first 33 months		
Does not	0.362	(0.481)
Full time, child aged 0-6 months	0.093	(0.291)
Part time, child aged 0-6 months	0.224	(0.417)
Child aged 7-9 months	0.091	(0.288)
Child aged 10-17 months	0.127	(0.333)
Child aged 18-33 months	0.103	(0.304)
Mother's birth weight		
Mother was born pre-term	0.738	(0.261)
Lowest decile	0.518	(0.222)
Birth weight missing	0.492	(0.499)
Pre-pregnancy BMI (quartiles)		
Lowest	0.257	(0.437)
Second lowest	0.244	(0.429)
Second highest	0.249	(0.432)
Highest	0.248	(0.432)
Housing Conditions		
Ever had serious damp, condensation or mould problems	0.017	(0.131)
Missing	0.304	(0.460)

[1] All variables are dummy variables

[2] CCEI score: Crown Crisp Experiential Index

[3] It was not possible to group the sample into exact quartiles owing to the non-continuous distribution of the underlying score.

Table 2: The impact of low income on current poor child health by age of child (marginal effects)

	Financial hardship					
	Top 40% of symptoms of poor health		Top 20% of symptoms of poor health		Mother-reported poor child health	
Age of child (months)[1]	**Controls**		**Controls**		**Controls**	
	No	**Yes**	**No**	**Yes**	**No**	**Yes**
6	0.084***	0.067***	0.072***	0.055***	0.051***	0.039***
	(0.010)	(0.012)	(0.009)	(0.010)	(0.011)	(0.012)
# of observations	10684	8947	10684	8947	10637	8910
18	0.048***	0.043***	0.048***	0.036***	0.037***	0.028**
	(0.011)	(0.012)	(0.009)	(0.010)	(0.011)	(0.013)
# of observations	9714	8684	9714	8684	9626	8607
30	0.056***	0.060***	0.050***	0.043***	0.052***	0.054***
	(0.012)	(0.013)	(0.010)	(0.012)	(0.012)	(0.013)
# of observations	9186	8045	9186	8045	9143	8010
81	0.053***	0.045***	0.054***	0.049***	0.066***	0.054***
	(0.015)	(0.017)	(0.012)	(0.014)	(0.016)	(0.018)
# of observations	7596	6738	7596	6738	6992	6233

	Low income					
	Top 40% of symptoms of poor health		Top 20% of symptoms of poor health		Mother-reported poor child health	
Age of child (months)[2]	**Controls**		**Controls**		**Controls**	
	No	**Yes**	**No**	**Yes**	**No**	**Yes**
30	-0.002	-0.006	-0.007*	-0.005	-0.006	-0.013**
	(0.004)	(0.006)	(0.004)	(0.005)	(0.004)	(0.006)
# of observations	8379	7368	8379	7368	8340	7336
42	-0.001	-0.011*	-0.007**	-0.010**	-0.008*	-0.017***
	(0.004)	(0.006)	(0.004)	(0.005)	(0.004)	(0.006)
# of observations	8141	7133	8141	7133	8069	7073
81	-0.017***	-0.020***	-0.015***	-0.016***	-0.017***	-0.011*
	(0.005)	(0.006)	(0.004)	(0.005)	(0.005)	(0.006)
# of observations	6977	6198	6977	6198	6428	5730

[1] Age refers to health outcome. The corresponding financial hardship variables refer to 8, 21, 33 and 85 months respectively.

[2] Age refers to health outcome. The corresponding low income variables refer to 33, 47 and 85 months respectively.

* significant at 10%; ** significant at 5%; *** significant at 1%

Standard errors in parentheses.

Controls are child fixed characteristics (birth weight, sex, whether white and birth order), number of adults in household at 8 weeks gestation, mother's highest educational qualification at 32 weeks gestation, mother's age at child's birth, partner's highest educational qualification, partner's health (dummy indicating if missing), maternal misreporting parameter (dummy indicating if missing).

Table 3: % of children in good health by income.

			ALSPAC	
Age[1]	**6mo**	**18mo**	**30mo**	**81mo**
Observations	10637	9626	9143	6992
In financial hardship	56.0	42.5	45.0	55.8
Not in financial hardship	61.1	46.2	50.2	62.4
Age[2]	**30mo**	**42mo**	**81mo**	
Observations	8340	8069	6428	
Low income	49.3	42.3	56.7	
Not low income	48.6	44.4	62.1	
			GHS	
Age	**0-3**	**4-8**	**9-12**	**13-17**
Observations	1947	2007	2594	2173
Poor	71.7	75.9	81.2	79.3
Not poor	81.3	83.2	84.7	83.0
Income quintile				
Lowest	72.0	74.6	81.7	79.4
2	72.5	76.5	80.3	78.7
3	81.5	82.3	81.4	82.7
4	80.1	85.2	85.9	83.4
Top	86.1	87.6	90.0	85.5

[1] Age refers to health outcome; financial hardship indicators are at 8, 21, 33 and 85 months respectively.
[2] Age refers to health outcome; low income indicators are at 33, 47 and 85 months respectively.
Notes: In Alspac "good health" = "very healthy, no problems" or "healthy, but a few minor problems"; other options are: "sometimes quite ill", "almost always unwell".
In the GHS, "good health" = "good health"; other options are: "fairly good health", "not good health". In GHS poor = lowest quintile group of unequivalised, gross household income. GHS is pooled from the 2000/01 and 2001/02 cross-sections.

Table 4: The relationship between income and health of child at different ages

	Case et al (2002)				GHS			
Ages	**0-3**	**4-8**	**9-12**	**13-17**	**0-3**	**4-8**	**9-12**	
Observations	51,448	54,067	64,746	59,069	1011	1056	1365	
Without mother's education								
Log average income	-0.183	-0.244	-0.286	-0.323	-0.209	-0.185	-0.083	-
	(0.008)	(0.008)	(0.008)	(0.008)	(0.042)	(0.051)	(0.047)	(
With parental education								
Log average income	-.0114	-0.156	-0.187	-0.218	-0.119	-0.156	-0.046	-
	(0.008)	(0.008)	(0.008)	(0.009)	(0.045)	(0.053)	(0.049)	(

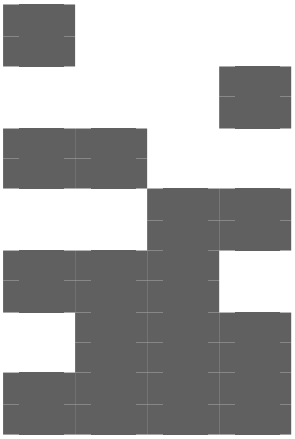
Notes: GHS is pooled from the 2000/01 and 2001/02 cross-sections.
The numbers in parentheses are robust standard errors, where correlation is allowed between unobservables for observations from the same household.

Table 5: The impact of number of times in financial hardship on poor child health at 81 months (marginal effects)

Number of times in financial hardship	Top 40% of symptoms of poor health	Top 20% of symptoms of poor health	Mother-reported poor child health	Asthma	Top 10% of BMI
1	0.023	0.026*	0.017	0.007	0.012
	(0.020)	(0.016)	(0.020)	(0.013)	(0.013)
2	0.073***	0.025	0.002	-0.004	0.013
	(0.024)	(0.020)	(0.024)	(0.015)	(0.016)
3	0.048*	0.025	0.062**	0.026	0.025
	(0.028)	(0.022)	(0.028)	(0.019)	(0.019)
4	0.024	0.025	0.073**	-0.011	0.015
	(0.030)	(0.025)	(0.031)	(0.018)	(0.020)
5	0.006	0.040	-0.008	0.025	0.042*
	(0.033)	(0.027)	(0.034)	(0.022)	(0.025)
6	0.126***	0.116***	0.073*	0.078***	0.035
	(0.037)	(0.034)	(0.039)	(0.029)	(0.027)
1 to 2	0.041**	0.025*	0.011	0.003	0.012
	(0.017)	(0.013)	(0.017)	(0.011)	(0.010)
3 to 6	0.044**	0.042***	0.051***	0.024**	0.027**
	(0.018)	(0.015)	(0.019)	(0.012)	(0.012)
Observations	5542	5542	5157	5542	4627

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors in parentheses.
Controls are the same as those detailed in the notes to table 2.

Table 6: Selected low-income sequences on poor child health at 81 months (marginal effects)

Experience of low-income at points shaded below	Top 40% of symptoms of poor health	Top 20% of symptoms of poor health	Mother-reported poor child health	Asthma	Top 10% of BMI
-1[1] 8 21 33					
	0.023	0.004	-0.057	-0.022	-0.010
	(0.037)	(0.029)	(0.036)	(0.021)	(0.022)
	0.011	-0.013	0.004	0.023	0.003
	(0.032)	(0.024)	(0.033)	(0.022)	(0.021)
	0.073	0.041	0.058	-0.002	0.012
	(0.045)	(0.037)	(0.046)	(0.028)	(0.030)
	0.008	-0.037	0.004	-0.010	0.015
	(0.040)	(0.028)	(0.041)	(0.024)	(0.027)
	0.066	0.028	0.116**	0.027	0.032
	(0.045)	(0.037)	(0.047)	(0.031)	(0.032)
	0.055	0.019	0.067*	0.023	0.043
	(0.035)	(0.028)	(0.036)	(0.024)	(0.026)
	0.055**	0.069***	0.049**	0.046***	0.018
	(0.024)	(0.021)	(0.025)	(0.017)	(0.016)
Other	0.025	0.024*	0.007	-0.011	0.010
	(0.018)	(0.015)	(0.019)	(0.011)	(0.012)
Observations	6325	6325	5857	6325	5126

* significant at 10%; ** significant at 5%; *** significant at 1%

Standard errors in parentheses.

Controls are the same as those detailed in the notes to table 2.

[1] Refers to 32 weeks gestation.

Table 7: The association between number of times in financial hardship and maternal health and maternal behaviours

Regressions are ordered probits or probits unless otherwise stated.

	Mother's Self-Assessed Health Until Present Pregnancy[5]	***Mother's CCEI***[1] ***At 18 Weeks Gestation***[6]	***Mother's Childhood Life Events Score***[6]	***Mother's Weight At Own Birth***[7]			***Mother's Pre-Pregnancy BMI***[6]
				pre-term	*lowest decile*	*missing*	
# of times in financial hardship	-0.056***	0.141***	0.077***	0.009	0.010	0.022*	0.027***
	(0.011)	(0.010)	(0.010)	(0.018)	(0.021)	(0.012)	(0.010)
	Duration Breast Fed[8]	***Child's Dietary Type at 38 months***[9]					
		Junk	*Healthy*	*Traditional*	*Snack*	*Missing*	
# of times in financial hardship	-0.002	0.044***	0.017	-0.023	-0.037***	-0.006	
	(0.010)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	
	Time Mother Starts Work After Child Birth[2, 10]	***Number Of Times Mother Observed Smoking Between 32 Weeks Gestation And 47 Months***[3]		***Poor Housing***[13]			
		Ordered Probit[11]	*Probit Regression*[12]	*poor housing*[4]	*missing*		
# of times in financial hardship	0.016	0.107***	0.061***	0.196***	-0.032**		
	(0.010)	(0.012)	(0.019)	(0.028)	(0.015)		

[1] CCEI score: Crown Crisp Experiential Index at 18 weeks gestation

[2] Cut-off = 33 months

[3] Missing cases are excluded from the ordered probit.

[4] Missing cases are excluded from estimation sample.

[5] Dependent variable: 1 = sometimes/often/always unwell, 2= usually well, 3= always well

[6] Dependent variable (in quartiles): 1 = lowest … 4 = highest

[7] Dependent variable = 1 for each birth weight (pre-term, lowest decile of birth weight, birth weight missing)

[8] Dependent variable (in months): 0 = 0, 1 = < 3, 2 = 3-5, 3 = 6+

[9] Dependent variable = 1 for each dietary type (Junk Diet, Healthy Diet, Traditional Diet, Snack Diet, Dietary Type Missing)

[10] Dependent variable (in months): 0 = never, 1 = < 6, 2 = 7-9, 3 = 10-17, 4 = 18+

[11] Dependent variable: 0 = 0 … 5 = 5

[12] Dependent variable: 1 = missing

[13] Dependent variable =1 for each housing type (poor housing, poor housing variable missing)

Note that a dummy variable = 1 for missing cases is used in regressions for tables 6-8.

* significant at 10%; ** significant at 5%; *** significant at 1%

Standard errors in parentheses.

Note that the maximum number of times in financial hardship = 6

Table 8: The impact of current financial hardship on current poor child health by age of child allowing for maternal health and maternal behaviours (marginal effects)

Age of child (months)[1]	Top 40% of symptoms of poor health	Top 20% of symptoms of poor health	Mother-reported poor child health	Asthma	Top 10% of BMI
6	0.020	0.022*	0.005		
	(0.015)	(0.012)	(0.015)		
18	0.004	0.008	-0.012		
	(0.016)	(0.013)	(0.016)		
30	0.021	0.009	0.010		
	(0.016)	(0.013)	(0.016)		
81	0.023	0.026	-0.006	0.015	0.003
	(0.021)	(0.016)	(0.021)	(0.013)	(0.012)

[1] Age refers to health outcome. The corresponding financial hardship variables refer to 8, 21, 33, and 85 months respectively.

* significant at 10%; ** significant at 5%; *** significant at 1%

Standard errors in parentheses.

Controls are as those detailed in the notes to table 2 plus mother-own assessed health before pregnancy, mothers' CCEI score at 18 weeks gestation, mothers' weighted life event score during own childhood, duration child breast-fed, child dietary type at 38 months, age of child when mother started work, number of times mother observed smoking, whether mother was pre-term, mothers' own birth weight, mother's pre-pregnancy BMI and whether child lived in poor housing conditions.

Table 9: The importance of financial hardship compared to other observable characteristics on poor child health at age 81 months (marginal effects)

	Top 40% of number of symptoms of poor health	Top 20% of number of symptoms of poor health	Mother-reported poor child health	Asthma	Top 10% of BMI
Number of Times in Financial Hardship					
1 to 2	0.026	0.021	-0.003	-0.001	0.013
	(0.019)	(0.015)	(0.019)	(0.012)	(0.011)
3 to 6	0.028	0.026	-0.010	0.017	0.031**
	(0.022)	(0.017)	(0.022)	(0.014)	(0.013)
Maternal and paternal health					
Maternal Misreporting					
Extent of maternal misreporting	0.042***	0.033***	0.033***	0.009**	-0.002
	(0.007)	(0.005)	(0.007)	(0.004)	(0.004)
Maternal misreporting variable = missing	0.038	0.025	0.053*	0.024	-0.025*
	(0.030)	(0.024)	(0.031)	(0.020)	(0.013)
Mother's Self-Assessed Health Until Present Pregnancy					
Sometimes/often/always unwell	0.117***	0.111***	0.253***	0.023	-0.048***
	(0.036)	(0.033)	(0.037)	(0.024)	(0.011)
Usually well	0.063***	0.016	0.107***	0.020*	-0.017*
	(0.017)	(0.013)	(0.016)	(0.010)	(0.009)
CCEI[1] Score					
Second lowest quartile	0.017	0.015	-0.007	0.009	-0.006
	(0.021)	(0.017)	(0.021)	(0.013)	(0.011)
Second highest quartile	0.068***	0.063***	0.018	0.005	-0.019*
	(0.021)	(0.017)	(0.021)	(0.013)	(0.010)
Highest quartile	0.101***	0.049**	0.058**	0.018	-0.003
	(0.024)	(0.020)	(0.024)	(0.015)	(0.012)
Mother's Childhood Life Events Score					
Second lowest quartile	0.047**	0.032*	0.047**	0.012	0.005
	(0.021)	(0.017)	(0.021)	(0.013)	(0.011)
Second highest quartile	0.072***	0.073***	0.064***	-0.004	-0.003
	(0.021)	(0.018)	(0.022)	(0.013)	(0.011)
Highest quartile	0.078***	0.079***	0.045**	0.032**	-0.007
	(0.022)	(0.019)	(0.023)	(0.015)	(0.012)
Mother's Birth Weight					
Pre-term	0.067*	0.028	0.068*	0.061**	0.030
	(0.034)	(0.027)	(0.035)	(0.025)	(0.022)
Lowest decile at birth	-0.096***	-0.033	-0.026	-0.016	0.003
	(0.035)	(0.025)	(0.036)	(0.020)	(0.020)
Birth weight missing	-0.011	0.004	0.009	0.001	0.001
	(0.016)	(0.012)	(0.017)	(0.010)	(0.009)
Pre-Pregnancy BMI (Quartiles)					
Second lowest	0.015	-0.017	0.031	-0.002	0.023
	(0.021)	(0.016)	(0.022)	(0.013)	(0.016)
Second highest	-0.028	-0.006	0.020	0.002	0.069***
	(0.021)	(0.016)	(0.022)	(0.013)	(0.017)
Highest quartile	0.007	-0.007	0.006	0.003	0.147***
	(0.023)	(0.017)	(0.023)	(0.014)	(0.022)
Partner's Health					
# of symptoms for partner	0.037***	0.022***	0.035***	0.011***	-0.002
	(0.006)	(0.005)	(0.006)	(0.004)	(0.003)
# of symptoms for partner = missing	-0.041	-0.024	-0.041	-0.014	0.021
	(0.027)	(0.020)	(0.027)	(0.017)	(0.016)
Maternal child health behaviours					

Duration Breast Fed (Months)					
Less than 3	0.014	0.006	0.042*	-0.003	0.004
	(0.024)	(0.019)	(0.025)	(0.014)	(0.013)
3-5	-0.005	-0.001	0.061**	-0.013	0.010
	(0.026)	(0.020)	(0.027)	(0.015)	(0.015)
6 or more	0.030	0.019	0.031	-0.013	0.003
	(0.023)	(0.018)	(0.024)	(0.014)	(0.013)
Dietary Type					
Junk	0.076***	0.039*	0.009	0.010	0.012
	(0.025)	(0.020)	(0.025)	(0.016)	(0.014)
Traditional	0.064***	0.033	0.026	0.010	0.011
	(0.025)	(0.020)	(0.025)	(0.016)	(0.014)
Snack	0.064***	0.028	0.016	-0.016	-0.016
	(0.023)	(0.019)	(0.023)	(0.014)	(0.012)
Missing value at 33 months	0.043*	0.045**	0.039	0.008	0.006
	(0.026)	(0.021)	(0.026)	(0.016)	(0.014)
Time Mother Starts Work After Birth					
Full-time work, child aged 0-6 months	-0.052*	-0.042**	-0.048*	-0.006	-0.009
	(0.028)	(0.019)	(0.028)	(0.017)	(0.014)
Part-time work, child aged 0-6 months	-0.034*	-0.004	-0.017	0.005	-0.014
	(0.021)	(0.016)	(0.021)	(0.013)	(0.010)
Child aged 7-9 months	-0.014	-0.001	0.041	0.009	-0.014
	(0.028)	(0.021)	(0.028)	(0.018)	(0.013)
Child aged 10-17 months	-0.024	-0.038**	0.005	0.013	-0.016
	(0.025)	(0.017)	(0.026)	(0.016)	(0.012)
Child aged 18-33 months	-0.046*	0.007	-0.036	-0.014	-0.005
	(0.027)	(0.021)	(0.027)	(0.016)	(0.014)
Number Of Times Observed Smoking					
One to four times	-0.022	-0.024	-0.003	0.013	0.047***
	(0.024)	(0.017)	(0.024)	(0.015)	(0.017)
Five times	-0.064**	-0.004	0.019	0.006	0.048**
	(0.028)	(0.021)	(0.029)	(0.018)	(0.021)
Missing value for at least one observation	-0.081**	-0.002	-0.005	0.037	0.030
	(0.036)	(0.028)	(0.038)	(0.026)	(0.025)
Poor Housing Conditions					
Ever had serious damp, condensation or mould	-0.046	0.042	0.035	0.057	-0.051***
	(0.061)	(0.048)	(0.062)	(0.044)	(0.015)
Missing	-0.003	0.005	-0.020	-0.001	-0.003
	(0.023)	(0.018)	(0.023)	(0.014)	(0.012)
Observations	4469	4469	4172	4469	3737

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

[1] CCEI score: Crown Crisp Experiential Index
Controls are those used in Table 2.

Appendix

Table A1: Prevalence of symptoms of poor child health by age of child

Symptom	Age of child (months)				
	6	18	30	42	81
	Col%	Col %	Col %	Col %	Col %
diarrhoea	28.68	60.74	55.09	44.05	35.38
blood in stools	3.96	3.04	3.3	2.14	0.85
vomiting	31.26	55.51	59.88	54.22	44.74
cough	64.81	83.78	85.2	87.61	77.23
high temperature	39.30	68.08	66.95	63.15	53.06
cold	87.64	95.12	93.08	94.29	87.18
ear ache	10.06	33.26	31.17	30.96	27.96
ear discharge	2.83	6.83	6.34	5.17	5.39
convulsions	0.07	2.33	2.35	1.2	0.51
colic	39.35	8.24	-	-	-
stomach ache	-	-	26.61	34.62	59.51
rash	38.20	45.2	35.97	23.08	18.74
wheezing	21.56	23.55	19.34	15.85	12.22
breathlessness	6.19	7.52	8.32	7.64	6.47
stopped breathing	2.23	1.84	1.55	0.87	0.21
urinary infection	-	-	-	-	3.37
headache	-	-	6.47	15.29	40.19
constipation	-	7.3	7.93	9.88	10.32
asthma	-	-	-	-	12.49
eczema	-	-	-	-	16.03
hay fever	-	-	-	-	6.29
other symptom	0.95	7.3	7.93	9.88	6.41
Observations	11160	11116	10318	10053	8504-

Table A2: Mother-reported child health by age of child (column percent)

Mother-reported child health for past year		Age of child (months)				
		6[1]	18	30	42	81
Mother's response	very healthy	59.56	45.38	48.81	44.66	61.34
	minor problems	37.37	49.65	47.16	51.47	36.82
	sometimes quite ill	2.22	4.27	3.62	3.5	1.71
	mostly unwell	0.85	0.71	0.42	0.37	0.13
	all	11,408	11,014	10,261	9,953	7,778
Derived variable	poor health[2]	40.44	54.62	51.19	55.34	38.66

[1] refers to "first few months" rather than "past year"
[2] mother's responses: minor problems, sometimes quite ill, mostly unwell
[3] mother's responses: sometimes quite ill, mostly unwell

Table A3: Net family income by age of child (column percent)

Family Income (£ per week)	Age of Child (months)		
	33	47	85
<£100 per week	8.4	7.3	3.8
£100 to £199 per week	17.4	15.2	10.9
£200 to £299 per week	28.5	26.3	18.2
£300 to £399 per week	21.3	22.6	22.6
>£400 per week	24.4	28.6	44.5
All	100	100	100
< £200 per week	25.8	22.5	14.7
Observations	8,380	8,141	6,977

Table A4: Comparison of low-income groups based on financial hardship score and family income (percent)

Family income at 33 months (£ per week)	%	In financial hardship at 33 months		In financial hardship at 85 months	
		No	Yes	No	Yes
<£100 per week	Row	21.5	78.5	24.2	75.8
<£100 per week	Column	2.5	23.4	1.1	15.9
£100 to £199 per week	Row	47.3	52.8	45.6	54.4
£100 to £199 per week	Column	11.4	32.6	6.0	32.8
£200 to £299 per week	Row	73.4	26.6	75.3	24.7
£200 to £299 per week	Column	29.1	27.0	16.7	24.9
£300 to £399 per week	Row	84.9	15.1	89.2	10.8
£300 to £399 per week	Column	25.2	11.4	24.5	13.5
>£400 per week	Row	93.6	6.4	94.8	5.2
>£400 per week	Column	31.7	5.6	51.6	12.9
All	Row	71.9	28.1	82.0	18.0
All	Column	100.0	100.0	100.0	100.0
Observations		6008	2351	5643	1239

Table A5: The timing of poor health and low-income indicators

	Age of Child (months)											
	-1[1]	6	8	18	21	30	33	42	47	61	81	85
Health indicators												
Symptoms of poor child health		■		■		■		■			■	
Mother-reported child health		■		■		■		■			■	
Low-income indicators												
Financial hardship score	■		■	■	■		■			■		■
Reported family income							■		■			■

[1] Refers to 32 weeks gestation.

Table A8 summarises the child's age at which the health outcomes and low-income measures are available. When analysing contemporaneous associations, we match only low-income and health measures provided they are separated by no more than four months. Thus, the 6, 18, 30 and 81-month health outcomes are matched with the 8, 21, 33 and 85 month incomes respectively.

Table A6: The extent of differential attrition in ALSPAC.

Variable	Unrestricted Sample		Estimation Sample[1]	
	Mean	Standard Deviation	Mean	Standard Deviation
Child characteristics				
Birth weight (kg)				
Less than 2.5	0.050	(0.219)	0.033	(0.179)
2.5 – 3	0.142	(0.349)	0.130	(0.336)
3.1-3.9	0.583	(0.493)	0.601	(0.489)
More than 3.9	0.174	(0.379)	0.188	(0.391)
Child's sex				
Female	0.484	(0.500)	0.481	(0.500)
Child's ethnicity				
Non-white	0.050	(0.219)	0.031	(0.174)
Birth order				
First born	0.445	(0.497)	0.455	(0.498)
Second born	0.364	(0.481)	0.385	(0.487)
Third born (or higher)	0.142	(0.349)	0.160	(0.367)
Number of adults in household at 8 weeks gestation				
One	0.053	(0.225)	0.027	(0.163)
Two	0.835	(0.371)	0.917	(0.275)
Three (or more)	0.110	(0.312)	0.055	(0.229)
In financial hardship at 32 weeks gestation	0.258	(0.438)	0.190	(0.392)
Mother's age at child's birth				
21 or less	0.101	(0.302)	0.026	(0.158)
22 to 25	0.207	(0.404)	0.138	(0.345)
26 to 35	0.622	(0.485)	0.749	(0.434)
36 (or more)	0.069	(0.254)	0.087	(0.282)
Mother's highest educational qualification				
CSE/none	0.202	(0.402)	0.104	(0.306)
Vocational	0.445	(0.497)	0.435	(0.496)
A-level +	0.353	(0.478)	0.461	(0.499)
Mother's reported health before pregnancy				
Sometimes, often or always unwell	0.080	(0.271)	0.053	(0.225)
Usually well	0.601	(0.490)	0.596	(0.490)
Always well	0.319	(0.466)	0.350	(0.477)
Mother's mental health at 18 weeks gestation				
CCEI score[2, 3]				
Lowest quartile	0.287	(0.452)	0.331	(0.470)
Second lowest quartile	0.214	(0.410)	0.235	(0.424)
Second highest quartile	0.256	(0.437)	0.250	(0.433)
Highest quartile	0.242	(0.429)	0.184	(0.388)

The number of observations for the estimation sample is 4469.

[1] The estimation sample is the same as that for columns 1, 2, and 4 in Table 9. Cases are required to have child health available at 81 months in addition to non-missing values for all explanatory variables in Table 9.