

# Childhood Health and Skills Development in Intergenerational Mobility\*

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## Abstract

Evidence of stalled and declining social mobility in industrialized economies is often attributed to the continuing importance of family background in settings where education increasingly matters for economic attainment. While family background provides reliable predictors of children's economic attainment in adulthood, the pathways underlying these relationships remain unclear. This paper assesses the relative contributions of poor early health, socioemotional skills and cognitive skills during childhood to intergenerational income mobility. A method for decomposing the relative contributions of these pathways is applied to birth cohorts from 1958 and 1970 in the United Kingdom. Birthweight and adolescent health contribute a stable but modest share to intergenerational mobility. While mathematics and reading in adolescence contribute the largest shares, they also display a declining importance over the two cohorts. In contrast, measures of introvertedness and distractedness show large and increasing importance for intergenerational income mobility.

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## 1 Introduction

Despite steady gains in occupational and educational mobility in the United States and England spanning the majority of the 20th century (Grusky and DiPrete 1990; Hauser and Featherman 1977; Hout 1988) children's income in adulthood remains stubbornly tied to their parents income. The emerging evidence for cohorts born between 1952 and 1975 in the United States suggests that income mobility has remained largely constant from 1980 through the early 2000s (Mazumder 2005; Lee and Solon 2011). While the evidence of trends in the United Kingdom are less clear (e.g. Ermisch and Francesconi 2004; Ermisch and Nicoletti 2005; Blandon 2007), there is widespread consensus that the increases in income mobility anticipated over the end of the 20th century have failed to materialize.

Identifying the lasting effects of childhood circumstance which might account for the persistent relationship between parents' income and their children's income in adulthood has proven difficult. The data requirements are substantial. There are few data collections including multiple cohorts with frequent observations of measures over childhood and adulthood. Among the available cohort studies, the availability of sufficient measures and their comparability across datasets has proven a major challenge to testing the growth in theories concerning neighborhoods, families, parenting, schools, marriage and the work place. Where data are available, many efforts emphasize the importance of family background itself. Parents education, occupational status and income have well known large and possibly distinct effects on their children's adulthood income. However, it remains unclear how these factors might operate over the life course.

This paper examines the relative contribution of childhood health and skills development to the intergenerational correlation in income. Wide evidence of the effects of family socioeconomic status on individual health and the growing evidence that early childhood health may have lasting consequences for schooling together suggest a potentially impor-

tant role for health in income mobility. The close links between parents' education and childrens' education and the increasing importance of education for economic success suggest that the pathways to educational attainment may dominate income mobility. While this may be the case, there are many additional factors that may play important roles as intermediate steps along the pathways to educational attainment. Parenting practices and parents' investments in their children's learning encompass numerous behaviors which have been widely hypothesized to shape children's educational trajectories. Whether these investments are measured, their influences on children's skills in adapting to the demands of school settings and the increasing rigor of academics as they grow older constitute a large domain of possible influences on educational achievement.

I examine the importance of a set of socioemotional skills which reflect children's abilities to adapt to the classroom learning environment. These skills include a set of measures which partly reflect the learned adaptation to classroom environments, such as distractedness and restlessness. Additional measures which are more closely tied to personality and mental health, such as introvertedness and feelings of mastery over one's life, may be less subject to acquisition via learning, but have been similarly shown to correlate with success in school. This broad set of measures are referred to as *skills* because they not only may be partly learned but also inherited from parents along both biological and social pathways. The growing evidence of the importance of these measures for both schooling and labor market outcomes (see Table 1) provides further impetus for classifying them as a set of skills with economic consequences that may last a lifetime.

I adapt a method for decomposing intergenerational income elasticities in order to assess the relative importance of childhood health, cognitive skills and socioemotional skills along the pathways from parents' income to their children's adult income. Early health effects which may influence learning skills present an additional set of pathways by which health may constrain early academic trajectories. Likewise, poor socioemotional skills which hinder learning and cooperation in the classroom may impart cumulative ef-

fects for learning which begin at a young age. The persistence of direct health and socioemotional effects over adolescence and into adult labor market experiences pose an expanding set of constraints with potentially lasting consequences through adulthood. In this case, whether increasing labor market returns to schooling dominate changes in intergenerational income mobility, shifting influences of these intermediate processes may constitute the primary pathways for intergenerational mobility.

Two birth cohorts born in the United Kingdom in 1958 and 1970 provide ideal data for examining these pathways. Multiple measures of family background, child health and schooling are available from birth into middle adulthood. The large number of measures, their frequency of observation and their comparability across both cohorts present a unique opportunity to examine these pathways and the timing of their effects.

## 2 Decomposing Mobility

The contribution of childhood circumstances to intergenerational mobility may be evaluated by specifying the pathways linking family income to children’s adult income and decomposing their relative contributions to measures of mobility. This method adapts the procedure described by Blanden et al. (2007) to account for the large number of health measures available in the British birth cohorts. A common measure of mobility results from regressing offspring adult income on parents’ income:

$$\ln Y_i^{child} = \alpha + \beta \ln Y_i^{parent} + \varepsilon_i \quad (1)$$

Standardizing this measure to remove influence of changing income distributions results in an estimate of the correlation between parents’ and children’s income.

$$\beta \left( \frac{\sigma_{\ln Y^{Parents}}}{\sigma_{\ln Y^{Child}}} \right) = r_{\ln Y^{Parents}, \ln Y^{Child}} \quad (2)$$

The first step to decomposing the contribution of a childhood measure requires specifying the relationship between the given measure and adulthood income. Equation (3) is one such model.

$$\ln Y_i^{child} = \kappa_1 + \rho Health_i + \mu_{1i} \quad (3)$$

Although the influence of parents' income on both health and children's adulthood income poses an important omitted variable which will be captured in the error term, adding an additional specification for the intermediate outcome (health) describes the magnitude of the parent income effect which occurs through child health.

$$Health_i = \omega_1 + \lambda \ln Y_i^{Parents} + \epsilon_{1i} \quad (4)$$

Substituting (4) for the measure of health in (3) returns the reduced form equation and then permits decomposing the measure of mobility from equation (1) ( $\beta$ ). An adjustment is added to capture the effects of parent income which are not occurring via health:

$$\beta = \rho\lambda + \frac{Cov(\mu_{1i}, \ln Y_i^{Parents})}{Var(\ln Y_i^{Parents})} \quad (5)$$

This framework is readily adaptable to consider many possible pathways which may contribute to the relationship between parents' and children's income. For example, childhood cognitive measures, such as an achievement test, may be added to examine the relative contributions of childhood health and childhood achievement.

$$\ln Y_i^{child} = \kappa_2 + \delta Health_i + \pi Test\ Score_i + \mu_{2i} \quad (6)$$

Equation (6) allows recovering the conditional contributions of health and test scores. Given an additional model for the test score in equation (7), the estimates define the de-

composition described by (8):

$$Test\ Score_i = \omega_2 + \gamma \ln Y_i^{Parents} + \epsilon_{2i} \quad (7)$$

$$\beta = \delta\lambda + \pi\gamma + \frac{Cov(\mu_{2i}, \ln Y_i^{Parents})}{Var(\ln Y_i^{Parents})} \quad (8)$$

In this case, the contributions of health and the test score are conditional effects and are expressed by  $\delta\lambda$  and  $\pi\gamma$ .

This framework may be further extended to also consider the relative importance of different stages of the life course. Health at birth and over adolescence may be introduced sequentially to the model to assess the relative importance of the timing of poor health. Model (3) is adapted to include both cognitive and socioemotional skills in order to assess the importance of these pathways for our measure of mobility.

### 3 Data

The National Child Development Study (NCDS) is a prospective longitudinal study of nearly all (98.8 percent) children born in the week of March 3-9, 1958 in Great Britain (England, Scotland, and Wales). Medical, social, demographic and economic data have been collected on cohort members from birth through age 46, including follow-up interviews their parents, teachers, doctors, or their partners at ages 7, 11, 16, 23, 33, 41 and 46.<sup>2</sup> The sample of interest for the education models is all 9,359 cohort members present at birth and during the age 23 and 33 waves when educational attainment was collected. The sample of interest for the earnings models are 4,229 boys present at birth with valid observations of earnings data at age 33. The sample is further limited to men who were participating either part- or full-time in the labor market. Limiting the sample to men minimizes the measurement error in adult self-reported SES that arises from changes in women's labor force participation during the 1980s and 1990s. This sample restriction is

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<sup>2</sup>For a detailed description of the study see Ferri (1993) and Blane (1999).

consistent with standard earnings equations and allows ready comparisons with related research of labor market outcomes.

The British Cohort Study (BCS) is a prospective longitudinal study of children born during the week of April 5-11 in 1970 in England, Scotland, and Wales. This study adopted many of the features of the NCDS, including interviews with cohort members' parents, teachers, doctors, or their partners at ages 5, 10, 16, 26, 30 and 34. The full sample of males present at the first wave (8,905) is limited to participants in the age 34 wave (4,253) as well as the age 5 wave (3,707) and 10 wave (3,535). Among those with valid birth measures (2,941), the sample is further restricted to the male cohort members who were employed at age 34 (2,296) in order to eliminate the upward bias resulting from including unemployed cohort members with zero income in earnings models. Although the large reduction in sample size from dropping cohort members without earnings raises the possibility of a highly select sample, the largest reduction in sample size results from dropping cases with item non-response for the main measures of achievement and socioemotional outcomes at ages 5 and 10. Limiting the sample which includes individuals both with and without earnings to those with complete responses for these measures reduces the sample by more than half to 1,311. The remaining individuals with earnings results in an analytic sample of 1,030.

Tables 3 and 4 report the descriptive statistics for the full and analytic samples. The tables include the main measures adopted for controlling for family background. Among these measures, family income represents the measure of intergenerational income persistence. The adopted measure is the mean family income reported over the waves at age 10 and age 16. Mean income is less vulnerable to the variance in reported income due to temporary changes in earnings than reported income during any single wave. For cases where the income report is missing in one of the two waves, the available reported income is adopted. Since the survey instruments for both waves solicited categories of earnings rather than specific amounts, a set of earnings models were estimated to generate a pre-

dicted continuous earnings measure. These models included indicators of ownership for a large number of assets reported in the surveys at ages 5, 10 and 16. By including lagged indicators of asset ownership for items like automobiles, washer-driers and dishwashers (relatively luxury items during the early 1970s), these models were further able to account for changes in household wealth.<sup>3</sup>

## 4 Results

### 4.1 Childhood Correlates with Adult Attainment

Measures of birth weight, chronic conditions during early childhood and additional measures of general health throughout adolescence are significantly correlated with educational attainment in both cohorts. Table 5 reports estimates of the effects of a common set of health measures across both cohorts from an ordered logit of the four categories of educational attainment described in Tables 3 and 4. A separate model is estimated for each health measure and includes controls for a set of comparable measures of family background. The majority of the measures display large and statistically significant effects. Comparing the magnitudes of the effects across the two cohorts suggests a decline in the importance of childhood health for educational attainment across the two British cohorts.

Tables 6 and 7 report estimates of larger sets of health measures available in each study from OLS regressions of adult earnings. Table 8 reports the corresponding estimates for socioemotional skills. Comparing the estimates across the two cohorts shows increases in the effects of both birth weight as well as the socioemotional measures. The change in the magnitude and significance of the effects is suggestive of the emergence of a new set of skills reaping returns in the labor market.

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<sup>3</sup>Model results are available by request.



## 4.2 Earnings at Age 34

Table 9 presents the results for OLS estimations of earnings at age 34 with nested sets of the measures of childhood circumstance.<sup>4</sup> The first two models show the robustness of the positive effect of birth weight to including measures of socioemotional skills in both cohorts and to including both socioemotional and cognitive skills in the 1970 cohort. Even after controlling for educational attainment in model (4) for the 1970 cohort, the weakly significant effect of birth weight suggests a gain of 3.8% in earnings at age 34 with every kilogram of birth weight.

The final model (4) for each cohort includes the numerous pathways by which birth weight and adolescent health may affect adult socioeconomic status. Each of the remaining significant pathways presents the opportunity for an accumulation of adversity flowing from low birth weight status. The effect of degree attainment presents the largest possible effects. The sustained significance of the BAS non-verbal score at age 10 suggests that the adverse effects of low birth weight for non-verbal scores may not only add to the effects from worse verbal scores in hindering educational attainment, but further persist by lowering earnings growth in adulthood. The large and negative effects of introversion for wages in adulthood evident in model (4) for both cohorts reflects another set of lasting direct effects from childhood socioemotional skills in addition to the effects of distractedness.

## 4.3 Relative Shares of Health, Socioemotional Skills and Cognitive Skills

Estimates of intergenerational income mobility are presented in Table 2. While the estimate for the 1958 cohort of .072 is lower than estimates reported elsewhere, the estimate of .264 for the 1970 cohort is closer to reports using similarly defined cohorts. Table 10 presents the contributions of four measures of health and socioemotional skills during childhood to the estimates of intergenerational mobility. Each additional pathway is added sequentially to the baseline model (1) to illustrate the magnitude of the birth-

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<sup>4</sup>All models include the full set of controls for family background.

weight's contribution which is due to the added pathway. The sizable changes in the birth-weight shares between models (2) and (3) in both cohorts illustrates the dominance of achievement in the pathways linking early health to intergenerational mobility.

The increase in the contribution of socioemotional skills between the 1958 and 1970 cohorts illustrates the rise in importance of this set of skills. While the aggregate contribution of early health is constraint across both cohorts, the increase in the share of socioemotional skills appears to occur at the cost of the importance of achievement skills. Figure 1 illustrates the changing relative importance of achievement and socioemotional skills.

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Table 1: Labor Market Returns to Socioemotional Skills

Motivated.	Disciplined. Longer work hours. Enhanced skills. (Goleman, 1998)
Ethical	Less shirking. Better team player. (Minkler 2008; Schick and Stekel 2010)
Optimistic	Better managing stress. Less depression. (Dupont et al. 2006)
Extroverted	Better communication. Better team player. (Betz, 2008; Blue, 2007; Goleman, 1998; Schick and Stekel 2010)
Emotionally stable	7-11% earnings return. (Gelissen and de Graaf, 2006; Mueller and Plug, 2006; Heineck, 2007)
Conscientious	Attentive to solving problems. Takes on goals of employer. (Gelissen and de Graaf, 2006; Mueller and Plug, 2006; Heineck, 2007)
Courteous	Productivity. Wage gains. (Schick and Stekel, 2010)

Table 2: Mobility 1974-1991 and 1986-2004

	$\beta$	$r$
1958 Cohort	0.072*** (0.016)	0.084*** (0.019)
1970 Cohort	0.264*** (0.019)	0.248*** (0.018)

NCDS N=2,350. BCS N=2,895. Standard errors in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Table 3: British Cohort 1958 - Descriptive Statistics

	Analytic Sample (N=2,738)				Full Sample				N
	Men		Women		Men		Women		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Log wage age 33	1.84	0.37	1.55	0.37	1.81	0.38	1.55	0.39	8,186
Employed full time age 33	0.93	0.25	0.40	0.49	0.90	0.30	0.36	0.48	10,731
SES unskilled age 33	0.06	0.23	0.02	0.16	0.08	0.27	0.03	0.17	9,600
Semi skilled	0.27	0.45	0.18	0.39	0.30	0.46	0.20	0.40	9,600
Skilled manual	0.21	0.41	0.05	0.22	0.25	0.44	0.07	0.25	9,600
Non manual skilled	0.20	0.40	0.52	0.50	0.18	0.39	0.53	0.50	9,600
Managerial	0.13	0.33	0.13	0.34	0.13	0.34	0.15	0.36	9,600
Self reported health poor age 33	0.01	0.10	0.01	0.11	0.02	0.13	0.02	0.14	10,713
Fair	0.10	0.29	0.12	0.32	0.12	0.32	0.12	0.33	10,713
Good	0.49	0.50	0.52	0.50	0.51	0.50	0.53	0.50	10,713
No O-levels passed	0.23	0.42	0.30	0.46	0.28	0.45	0.32	0.47	9,359
Less than 5 O-levels passed	0.12	0.32	0.25	0.43	0.13	0.33	0.26	0.44	9,359
More than 5 O-levels passed	0.16	0.37	0.13	0.33	0.16	0.37	0.13	0.33	9,359
Any A-levels passed	0.37	0.48	0.23	0.42	0.32	0.47	0.20	0.40	9,359
Teach nurse tech certificate	0.13	0.34	0.09	0.29	0.11	0.32	0.10	0.29	9,359
Very low birth weight	0.00	0.04	0.00	0.05	0.00	0.04	0.00	0.04	10,549
Moderately low birth weight	0.04	0.19	0.05	0.23	0.04	0.21	0.06	0.25	10,549
High birth weight	0.13	0.33	0.07	0.26	0.12	0.32	0.07	0.26	10,549
Very pre term (27-32 weeks)	0.00	0.07	0.00	0.07	0.00	0.07	0.01	0.07	9,825
Moderate (33-36 weeks)	0.03	0.17	0.04	0.19	0.04	0.20	0.04	0.20	9,825
Early term (37-38 weeks)	0.17	0.37	0.16	0.37	0.17	0.38	0.16	0.36	9,825
Jaundice at birth	0.00	0.04	0.00	0.03	0.00	0.04	0.00	0.03	10,894
Med events since birth $\geq 1$	0.28	0.45	0.22	0.41	0.26	0.44	0.20	0.40	10,181
Health cond one age 7	0.22	0.42	0.19	0.39	0.21	0.41	0.20	0.40	9,731
Two or more	0.05	0.21	0.06	0.23	0.05	0.21	0.05	0.23	9,731
One limiting condition age 7	0.04	0.21	0.03	0.17	0.04	0.20	0.03	0.17	9,456
Two or more	0.02	0.15	0.01	0.11	0.03	0.16	0.02	0.13	9,456
Ear-eye-speech age 7 $\geq 1$	0.07	0.26	0.04	0.21	0.06	0.24	0.05	0.22	9,270
Hospital overnight stay age 11	0.21	0.41	0.18	0.39	0.12	0.53	0.08	0.50	10,200
Med events since age 7 $\geq 1$	0.38	0.49	0.30	0.46	0.37	0.48	0.29	0.46	9,352
Health cond one age 11	0.26	0.44	0.26	0.44	0.25	0.43	0.26	0.44	9,277
School absence health <1 month	0.96	0.20	0.95	0.23	0.95	0.22	0.94	0.24	9,268
>1 month	0.04	0.20	0.05	0.23	0.05	0.22	0.06	0.24	9,268
One current condition age 11	0.14	0.35	0.11	0.32	0.13	0.34	0.12	0.32	8,787
Two or more	0.02	0.12	0.02	0.15	0.02	0.14	0.02	0.13	8,787
Ear-eye-speech age 11 $\geq 1$	0.08	0.27	0.05	0.23	0.09	0.28	0.06	0.24	7,882
Birth order	2.03	1.24	2.05	1.19	2.10	1.29	2.13	1.29	9,763
Log family income age 16	5.21	0.56	5.21	0.53	5.18	0.55	5.17	0.56	7,309
SES unskilled at birth	0.06	0.24	0.07	0.26	0.08	0.27	0.08	0.28	10,849
Semi skilled	0.11	0.32	0.10	0.31	0.12	0.32	0.13	0.33	10,849
Skilled manual	0.51	0.50	0.54	0.50	0.49	0.50	0.49	0.50	10,849
Non manual skilled	0.11	0.32	0.10	0.30	0.10	0.30	0.11	0.31	10,849
Managerial	0.13	0.34	0.13	0.34	0.14	0.34	0.13	0.34	10,849
Mother's years education	9.95	1.48	9.99	1.54	9.97	1.57	10.00	1.60	7,987
Father's years education	9.98	2.02	9.94	1.86	10.02	2.04	10.01	1.99	7,800
Father at home age 16	0.96	0.21	0.95	0.22	0.93	0.26	0.91	0.28	8,146
Household size age 10	1.91	1.42	1.97	1.46	1.98	1.54	1.99	1.51	9,349

Table 4: British Cohort 1970 - Descriptive Statistics

	Analytic Sample (N=2,140)				Full Sample				
	Men		Women		Men		Women		N
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Log wage age 34	2.29	0.49	2.16	0.48	2.27	0.48	2.13	0.47	6,350
Employed full time age 34	0.99	0.12	0.59	0.49	0.91	0.29	0.43	0.50	8,906
SES unskilled age 34	0.02	0.15	0.01	0.12	0.03	0.16	0.02	0.13	7,352
semi skilled	0.08	0.28	0.10	0.30	0.09	0.29	0.14	0.34	7,352
skilled manual	0.27	0.45	0.06	0.25	0.31	0.46	0.06	0.24	7,352
non manual skilled	0.12	0.32	0.34	0.47	0.11	0.31	0.32	0.47	7,352
managerial	0.41	0.49	0.42	0.49	0.39	0.49	0.41	0.49	7,352
Labor attachment age 34	0.93	0.13	0.90	0.16	0.91	0.17	0.82	0.24	8,680
Self reported health poor age 30	0.01	0.08	0.01	0.09	0.02	0.13	0.02	0.14	8,307
fair	0.09	0.29	0.10	0.29	0.12	0.33	0.12	0.33	8,307
good	0.53	0.50	0.52	0.50	0.54	0.50	0.53	0.50	8,307
Self reported health poor age 34	0.03	0.17	0.05	0.22	0.05	0.22	0.07	0.26	8,902
fair	0.12	0.33	0.15	0.35	0.14	0.35	0.15	0.36	8,902
good	0.50	0.50	0.44	0.50	0.48	0.50	0.45	0.50	8,902
No O-levels passed	0.31	0.46	0.26	0.44	0.37	0.48	0.33	0.47	8,693
Less than 5 O-levels passed	0.20	0.40	0.19	0.39	0.18	0.38	0.19	0.39	8,693
More than 5 O-levels passed	0.11	0.31	0.14	0.34	0.11	0.31	0.13	0.33	8,693
Any A-levels passed	0.12	0.32	0.17	0.37	0.12	0.33	0.15	0.36	8,693
Teach nurse tech certificate	0.26	0.44	0.24	0.43	0.22	0.42	0.20	0.40	8,693
Very low birth weight	0.00	0.04	0.00	0.05	0.00	0.05	0.00	0.06	8,927
Moderately low birth weight	0.04	0.21	0.05	0.22	0.05	0.22	0.06	0.23	8,927
High birth weight	0.13	0.34	0.07	0.26	0.11	0.32	0.06	0.24	8,927
Very pre term (27-32 weeks)	0.01	0.09	0.01	0.08	0.01	0.11	0.01	0.09	7,368
Moderate (33-36 weeks)	0.08	0.27	0.05	0.23	0.08	0.27	0.06	0.24	7,368
Early term (37-38 weeks)	0.31	0.46	0.32	0.47	0.32	0.47	0.30	0.46	7,368
Jaundice at birth	0.23	0.42	0.17	0.38	0.23	0.42	0.17	0.38	8,812
One or more illnesses at birth	0.06	0.24	0.04	0.20	0.07	0.25	0.04	0.21	8,929
Hospital overnight stay age 5	0.26	0.44	0.19	0.39	0.28	0.45	0.20	0.40	7,753
Med events since birth $\geq 1$	0.11	0.32	0.06	0.25	0.12	0.33	0.07	0.25	7,604
Health cond one age 5	0.26	0.44	0.24	0.43	0.26	0.44	0.23	0.42	7,748
Two or more	0.05	0.22	0.06	0.23	0.07	0.25	0.06	0.24	7,748
Hospital overnight stay age 10	0.23	0.42	0.19	0.39	0.26	0.44	0.19	0.39	7,845
Med events since age 5 $\geq 1$	0.15	0.36	0.13	0.34	0.17	0.37	0.13	0.33	8,010
Health cond $\geq 1$ age 10	0.11	0.32	0.12	0.32	0.12	0.33	0.13	0.33	7,949
School absence health <1 month	0.30	0.46	0.35	0.48	0.32	0.47	0.34	0.48	7,928
>1 month	0.03	0.17	0.05	0.21	0.04	0.19	0.05	0.21	7,928
One current condition age 10	0.19	0.39	0.19	0.39	0.20	0.40	0.19	0.39	8,010
One or more	0.09	0.28	0.06	0.24	0.08	0.28	0.07	0.25	8,010
One limiting condition age 10	0.07	0.26	0.05	0.22	0.09	0.28	0.06	0.24	7,481
One or more	0.00	0.07	0.00	0.03	0.01	0.10	0.01	0.08	7,481
Poor health age 16	0.03	0.17	0.05	0.23	0.04	0.19	0.06	0.25	5,398
Race other	0.01	0.09	0.01	0.10	0.02	0.15	0.02	0.15	7,705
Birth order	1.91	0.99	1.85	0.96	1.87	1.00	1.86	1.02	8,396
Family income (mean)	185.84	76.19	184.90	74.82	174.79	76.30	173.39	75.58	8,414
SES unskilled at birth	0.03	0.17	0.03	0.17	0.05	0.23	0.05	0.22	8,750
semi skilled	0.12	0.32	0.13	0.33	0.15	0.35	0.16	0.36	8,750
skilled manual	0.49	0.50	0.46	0.50	0.45	0.50	0.46	0.50	8,750
non manual skilled	0.16	0.37	0.17	0.37	0.15	0.36	0.15	0.35	8,750
managerial	0.13	0.34	0.15	0.35	0.13	0.34	0.13	0.34	8,750
Mother's years education	10.95	1.89	10.82	1.62	10.79	1.87	10.72	1.83	8,916
Father's years education	11.14	2.43	11.12	2.22	11.05	2.46	11.00	2.31	8,820
Father present at home age 10	0.95	0.21	0.94	0.24	0.93	0.25	0.92	0.27	7,949
Household size age 10	1.48	0.94	1.43	0.92	1.51	0.99	1.49	1.04	7,899

Full sample is all cohort members who participated in the surveys at birth and age 34 (N=8,929).

Table 5: Bivariate Correlations: Child Health and Educational Attainment

Health Measure	Estimates	N
NCDS 1958		
<i>Educational Attainment by Age 33 (4 categories)</i>		
Birth weight (kg)	0.457*** (0.065)	6,273
Gestation (weeks)	-0.018 (0.016)	
Health conditions(6) =1 age 7	-0.155** (0.062)	6,251
Conditions(6) $\geq 2$	-0.150 (0.110)	
Limiting conditions count age 7 =1	-0.040 (0.060)	6,098
Conditions $\geq 2$	-0.243*** (0.085)	
Hearing problem age 7	-0.303*** (0.118)	6,107
Speech problem age 7	-1.563*** (0.356)	6,083
Health conditions count age 11 =1	-0.114* (0.058)	5,983
Conditions $\geq 2$	-0.200** (0.092)	
Speech problem age 11	-0.390*** (0.133)	5,674
School absence health 1 wk-1 month age 11	-0.220*** (0.055)	5,986
Absence health $> 1$ month	-0.285** (0.113)	
BCS 1970		
<i>Educational Attainment by Age 34 (4 categories)</i>		
Birth weight (kg)	0.198*** (0.076)	4,682
Gestation (weeks)	-0.047** (0.019)	
Hospital overnight stay since birth age 5	-0.132** (0.066)	5,587
School absence health 1 wk-1 month age 10	-0.129** (0.057)	5,574
Absence health $> 1$ month	-0.374*** (0.143)	
Count chronic conditions last year age 10	-0.132** (0.067)	5,361
Conds last year $\geq 2$	-0.060 (0.100)	
Hearing problem age 10	-0.837*** (0.309)	5,587
Speech problem age 10	-0.406*** (0.140)	5,362
Limiting conditions count cumulative disabling $\geq 1$ age 10	-0.535*** (0.115)	5,257
Limiting conds count present cumulative disabling =1 age 10	-0.010 (0.082)	5,257
Conditions $\geq 2$ age 10	-0.307*** (0.095)	

Standard errors in parentheses. The NCDS and BCS estimates are from ordered logit models of a four category measure of educational attainment. All the models included controls for family income during childhood, single parent household, parents' education, household size, sex, and SES at birth. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 6: Bivariate Correlations: Child Health and Earnings Age 34 in British Cohort 1958

	Men			Women			All		
Birth weight (kg)	0.030*	(0.018)	2,760	0.027	(0.017)	2,472	0.029**	(0.013)	5,232
Gestation (weeks)	0.013***	(0.004)		-0.003	(0.004)		0.005*	(0.003)	
High birth weight	0.011	(0.027)		0.001	(0.031)		0.008	(0.020)	
Med events birth-age 7 $\geq 1$	0.008	(0.015)	2,849	-0.007	(0.017)	2,566	0.002	(0.011)	5,415
Health cond(6) =1 age 7	-0.011	(0.017)	2,753	-0.056***	(0.017)	2,465	-0.031***	(0.012)	5,218
Cond(6) $\geq 2$	-0.063*	(0.033)		-0.018	(0.028)		-0.037*	(0.022)	
Health Cond(10) $\geq 1$ age 7	-0.013	(0.016)	2,753	-0.053***	(0.015)	2,465	-0.032***	(0.011)	5,218
Cond(10) $\geq 1$ age 7	-0.011	(0.019)		-0.025	(0.019)		-0.019	(0.014)	
Chronic conditions age 7 $\geq 1$	-0.016	(0.029)	2,754	-0.087***	(0.031)	2,466	-0.048**	(0.021)	5,220
CNS and CVS problems age 7 $\geq 1$	0.028	(0.023)	2,702	-0.028	(0.027)	2,401	0.008	(0.017)	5,103
Limiting conditions count present=1	0.003	(0.017)	2,696	-0.014	(0.017)	2,401	-0.005	(0.012)	5,097
Conditions $\geq 2$	-0.026	(0.023)		-0.056**	(0.024)		-0.040**	(0.016)	
Limiting conds count present cumulative disabling =1	0.013	(0.017)	2,696	-0.006	(0.018)	2,401	0.004	(0.012)	5,097
Conditions $\geq 2$	-0.035*	(0.020)		-0.061***	(0.022)		-0.047***	(0.015)	
Limiting conditions index age 7 (0,1+)	-0.084***	(0.029)	2,696	-0.113***	(0.035)	2,401	-0.094***	(0.022)	5,097
Squint problem age 7	-0.003	(0.026)	2,754	-0.016	(0.026)	2,464	-0.009	(0.019)	5,218
Vision problem age 7 (parent report)	0.060**	(0.027)	2,754	-0.004	(0.024)	2,460	0.026	(0.018)	5,214
Vision problem age 7	-0.029	(0.209)	2,693	-0.169	(0.169)	2,401	-0.112	(0.133)	5,094
Hearing problem age 7	-0.050	(0.032)	2,691	-0.110***	(0.034)	2,401	-0.076***	(0.023)	5,092
Speech problem age 7	-0.220***	(0.061)	2,690	-0.130	(0.151)	2,394	-0.204***	(0.055)	5,084
Ear-eye-speech age 7 $\geq 1$	-0.072**	(0.030)	2,653	-0.115***	(0.033)	2,361	-0.089***	(0.022)	5,014
<i>Health Age 11</i>									
Med events age 7-age 11 $\geq 1$	0.007	(0.015)	2,669	0.004	(0.015)	2,363	0.007	(0.011)	5,032
Med events since age 7 $\geq 1$ (m)	0.023	(0.021)	2,669	-0.007	(0.027)	2,363	0.016	(0.016)	5,032
Events $\geq 2$ (m)	-0.002	(0.017)		0.007	(0.017)		0.003	(0.012)	
Hospital overnight stay age 11	-0.004	(0.017)	3,031	0.005	(0.017)	2,734	0.000	(0.012)	5,765
Health cond one age 11	-0.010	(0.017)	2,652	-0.003	(0.016)	2,340	-0.007	(0.012)	4,992
Two or more	-0.023	(0.027)		-0.041*	(0.025)		-0.033*	(0.018)	
Current condition age 11 $\geq 1$	-0.032	(0.021)	2,534	-0.034	(0.021)	2,226	-0.034**	(0.015)	4,760
Vision problem age 11	0.013	(0.052)	2,439	-0.006	(0.055)	2,135	0.005	(0.038)	4,574
Hearing problem age 11	-0.175**	(0.085)	2,394	-0.003	(0.070)	2,073	-0.077	(0.054)	4,467
Speech problem age 11	-0.037	(0.032)	2,513	-0.076*	(0.046)	2,209	-0.048*	(0.026)	4,722
Ear-eye-speech age 11 $\geq 1$	-0.020	(0.029)	2,297	-0.025	(0.034)	1,989	-0.022	(0.022)	4,286
School absence health 1 wk-1 month	-0.018	(0.016)	2,655	-0.039***	(0.015)	2,348	-0.029***	(0.011)	5,003
absence health >1 month	-0.104***	(0.033)		-0.054*	(0.030)		-0.078***	(0.022)	

Standard errors in parentheses. Odds ratios unless otherwise specified. Models include controls for SES at birth, family income age 10 and 16, parents' education and household size. The pooled sample includes an additional control for sex. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.



Table 7: Bivariate Correlations: Child Health and Earnings Age 34 in British Cohort 1970

	Men		Women		All				
Birth weight (kg)	0.030	(0.033)	2,299	-0.003	(0.040)	2,293	0.012	(0.026)	4,592
Gestation (weeks)	0.002	(0.008)		0.000	(0.010)		0.001	(0.006)	
High birth weight (>4.25kg)	0.030	(0.047)		-0.022	(0.072)		0.017	(0.041)	
Health Cond12 1	0.008	(0.029)	2,454	0.006	(0.035)	2,482	0.007	(0.023)	4,936
Health Cond12 2	0.063*	(0.034)		-0.022	(0.044)		0.021	(0.028)	
Health Cond12 ≥3	0.022	(0.040)		-0.015	(0.056)		0.001	(0.034)	
Speech difficulty	-0.045	(0.038)	2,429	0.006	(0.059)	2,460	-0.027	(0.034)	4,889
Squint problem now	-0.108	(0.070)	2,436	0.035	(0.079)	2,458	-0.031	(0.053)	4,894
Squint problem now/past	-0.025	(0.045)	2,454	0.026	(0.057)	2,482	-0.002	(0.036)	4,936
Fainting problem	-0.027	(0.054)	2,447	-0.039	(0.063)	2,478	-0.034	(0.042)	4,925
Wheezing problem	0.024	(0.029)	2,436	-0.027	(0.040)	2,466	0.002	(0.024)	4,902
Vision problem	0.063	(0.066)	2,353	0.066	(0.082)	2,395	0.060	(0.053)	4,748
Hearing problem	0.111***	(0.043)	2,362	-0.004	(0.057)	2,414	0.053	(0.035)	4,776
Pneumonia	0.022	(0.095)	2,358	0.042	(0.142)	2,403	0.024	(0.083)	4,761
Bronchitis	0.008	(0.032)	2,373	-0.023	(0.045)	2,414	-0.005	(0.027)	4,787
Ear infections	0.068*	(0.038)	2,347	0.052	(0.050)	2,411	0.055*	(0.031)	4,758
Eczema problem	0.072**	(0.036)	2,356	-0.043	(0.046)	2,411	0.015	(0.029)	4,767
Hospital overnight stay	-0.022	(0.026)	2,722	-0.001	(0.037)	2,759	-0.015	(0.022)	5,481
Med events since birth ≥1	0.009	(0.038)	2,408	0.032	(0.059)	2,440	0.012	(0.033)	4,848
<i>Health Age 10</i>									
Health cond ≥1 (m)	0.024	(0.035)	2,721	-0.024	(0.043)	2,758	-0.001	(0.028)	5,479
Hearing problem (m)	0.039	(0.079)	2,720	-0.077	(0.097)	2,749	-0.020	(0.063)	5,469
Bronchitis (m)	-0.001	(0.069)	2,696	-0.061	(0.083)	2,731	-0.038	(0.054)	5,427
Eczema problem (m)	0.062	(0.050)	2,635	0.046	(0.061)	2,675	0.055	(0.039)	5,310
Pneumonia last 12 months (m)	-0.125	(0.340)	2,602	0.370	(0.429)	2,632	0.119	(0.274)	5,234
Meningitis encephalitis since age 5 (m)	0.332**	(0.165)	2,715	-0.102	(0.334)	2,744	0.206	(0.159)	5,459
Hospital overnight stay	0.053**	(0.026)	2,722	0.026	(0.037)	2,759	0.039*	(0.022)	5,481
Med events since age 5 ≥1 (m)	0.018	(0.031)	2,722	0.045	(0.042)	2,759	0.029	(0.026)	5,481
School absence health 1 wk-1 month	-0.003	(0.025)	2,714	-0.060**	(0.030)	2,754	-0.033*	(0.020)	5,468
absence health >1 month	-0.051	(0.062)		-0.051	(0.070)		-0.053	(0.047)	
Chronic Anytime 1	0.014	(0.028)	2,609	0.013	(0.034)	2,648	0.014	(0.022)	5,257
Conds 2	0.036	(0.033)		-0.001	(0.042)		0.017	(0.027)	
Conds 3	0.005	(0.047)		-0.057	(0.060)		-0.028	(0.038)	
Conds ≥4	0.062	(0.057)		-0.062	(0.074)		0.003	(0.047)	
Count chronic conditions last year (12 possible)=1	0.022	(0.029)	2,609	-0.024	(0.035)	2,648	-0.002	(0.023)	5,257
Conds last year ≥2	0.016	(0.044)		-0.060	(0.053)		-0.023	(0.035)	
Count chronic conditions persisting (12 possible) ≥1	0.080*	(0.047)	2,609	0.057	(0.055)	2,648	0.070**	(0.037)	5,257
Vision problem	0.089	(0.092)	2,602	0.197*	(0.113)	2,645	0.146**	(0.073)	5,247
Hearing problem	0.009	(0.104)	2,722	-0.177	(0.156)	2,759	-0.065	(0.091)	5,481
Speech problem	-0.161***	(0.048)	2,613	-0.139	(0.085)	2,645	-0.155***	(0.045)	5,258
Current abnormalities (14 possible)=1	0.020	(0.029)	2,722	0.071**	(0.036)	2,759	0.044*	(0.023)	5,481
Abnormalities ≥2	0.068	(0.043)		-0.055	(0.059)		0.014	(0.036)	
Current social or behavioral problem	-0.178**	(0.090)	2,606	-0.186	(0.128)	2,641	-0.186**	(0.076)	5,247
Current abnormalities (16 possible)=1	0.023	(0.028)	2,722	0.069*	(0.036)	2,759	0.044*	(0.023)	5,481
Abnormalities ≥2	0.042	(0.042)		-0.050	(0.058)		0.001	(0.035)	
Limiting conditions count cumulative disabling ≥1	-0.070	(0.044)	2,553	-0.100	(0.062)	2,602	-0.084**	(0.037)	5,155
Limiting conditions count present=1	0.002	(0.034)	2,553	-0.005	(0.042)	2,602	-0.002	(0.027)	5,155
Conditions ≥2	-0.007	(0.065)		-0.017	(0.079)		-0.007	(0.051)	
Limiting conds count present cumulative disabling =1	-0.009	(0.035)	2,553	-0.016	(0.044)	2,602	-0.014	(0.028)	5,155
Conditions ≥2	-0.065*	(0.038)		-0.056	(0.051)		-0.060*	(0.031)	

Standard errors in parentheses. Odds ratios unless otherwise specified. Models include controls for SES at birth, family income age 10 and 16, parents' education and household size. The pooled sample includes an additional control for sex. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Table 8: Bivariate Correlations: Health, Socioemotional Skills and Earnings at Age 34

1974-1991		1986-2004	
<i>Health at birth</i>		<i>Health at birth</i>	
Birth Weight (kg)	0.042** (0.019)	Birth Weight (kg)	0.104*** (0.020)
Gestation Weeks	0.075 (0.063)	Gestation Weeks	0.126 (0.084)
<i>Socioemotional</i>		<i>Socioemotional</i>	
Hyperactive age 11	-0.024 (0.105)	Hyperactive age 10	-0.215*** (0.046)
Restless age 11 <sup>a</sup>	1.036 (0.102)	Distracted age 10	-0.367*** (0.048)
Introverted age 11	-0.059 (0.039)	Introverted age 10	-0.212*** (0.048)
Inconsequential age 11	0.016 (0.076)	Locus of Control age 10	0.286*** (0.044)
		Self Esteem age 10	0.243*** (0.043)

Standard errors in parentheses. OLS estimates unless otherwise specified. All models include a control for parents age and age squared. p<0.10, \* p<0.05, \*\* p<0.01. <sup>a</sup> Log odds from logit estimation.

Table 9: Adult Earnings in Comparative Perspective

Earnings at Age 33 (1958 Cohort)				
	(1)	(2)	(3)	(4)
Birth Weight (kg)	0.040** (0.019)	0.038** (0.019)	0.009 (0.018)	0.007 (0.018)
Gestation Weeks	0.014** (0.006)	0.013** (0.006)	0.013** (0.006)	0.013** (0.006)
Hyperactive age 11		-0.010 (0.011)	0.004 (0.010)	0.004 (0.010)
Restless age 11		-0.026 (0.020)	-0.012 (0.020)	-0.011 (0.019)
Inconsequential age 11		-0.020*** (0.006)	-0.003 (0.006)	-0.002 (0.006)
Introverted age 11		-0.065*** (0.010)	-0.039*** (0.010)	-0.040*** (0.009)
Reading test age 11			0.046*** (0.013)	0.033** (0.013)
Math test age 11			0.096*** (0.013)	0.076*** (0.014)
<i>School Continuation</i>				<i>incl.</i>
R-squared	0.012	0.047	0.109	0.123

Standard errors in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Earnings at Age 34 (1970 Cohort)				
	(1)	(2)	(3)	(4)
Birth Weight (kg)	0.077*** (0.020)	0.057*** (0.019)	0.042** (0.019)	0.038** (0.019)
Gestation Weeks	-0.002 (0.006)	-0.001 (0.006)	-0.000 (0.006)	0.002 (0.005)
Hyperactive age 10		0.024** (0.012)	0.017 (0.011)	0.023** (0.011)
Distracted age 10		-0.097*** (0.013)	-0.050*** (0.014)	-0.041*** (0.014)
Introverted age 10		-0.021* (0.011)	-0.019* (0.011)	-0.028*** (0.011)
Locus of Control age 10		0.064*** (0.011)	0.040*** (0.011)	0.034*** (0.011)
Reading Test age 10			0.032** (0.016)	0.016 (0.016)
Math Test age 10			0.042*** (0.016)	0.021 (0.015)
British Ability age 10			0.030** (0.014)	0.023* (0.014)
<i>School Continuation</i>				<i>incl.</i>
R-squared	0.012	0.075	0.094	0.134

Table 10: Relative Contributions to Mobility

1958 ( $\beta = 0.072$ )				
	(1)	(2)	(3)	(4)
Early health	0.038	0.035	0.016	0.014
Socioemotional Skills		0.042	0.033	0.036
Achievement Skills			0.396	0.253
School Advancement				0.303
Total Explained	0.038	0.077	0.445	0.607
Total Unexplained	0.962	0.923	0.555	0.393

  

1970 ( $\beta = 0.241$ )				
	(1)	(2)	(3)	(4)
Early health	0.026	0.020	0.013	0.013
Socioemotional Skills		0.235	0.131	0.102
Achievement Skills			0.257	0.153
School Advancement				0.295
Total Explained	0.026	0.255	0.400	0.564
Total Unexplained	0.974	0.745	0.600	0.436

Figure 1: Relative Contributions to Mobility

