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# THE EFFECT OF CHILDHOOD ECONOMIC DEPRIVATION ON PHYSICAL AND PSYCHOLOGICAL HEALTH STATUS

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**Abstract:** This paper investigates the effects of childhood deprivation on health at the later stages of the working age. The results indicate that there is an effect of childhood socioeconomic conditions on later adulthood overall health profile and second on the likelihood of suffering from a number of medical conditions. The risk of frail health is higher among adult respondents of the age between 50 to 65 who grew up in unfavourable socioeconomic circumstances, after controlling for their genetic risk traits, and their current educational and wealth status.

**JEL Classification Code:** I00, I12

**Keywords:** childhood deprivation, health, health conditions

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## **I. Introduction**

Childhood economic deprivation is a fundamental issue of human rights, and of great political and social importance. It concerns the well-being of approximately one billion children, who are growing up below poverty lines, mainly, in the world's poorest, but also in the wealthiest, countries (UNICEF 2005a,b). Furthermore, childhood economic and social deprivation has important repercussions for future overall health status which in turn shapes social and health policies. The link between socioeconomic deprivation and health status has been identified by many researchers (e.g. Wilkinson, 2006, Skalli *et al* 2006). However, not much attention has been paid to the intergenerational effect of poverty on physical and psychological health status. It is clear that such an effect would have consequences for a number of important social issues like labour market participation and retirement decisions. Moreover, the intergenerational health effects of poverty are basic factors for the future demand for health care. These issues clearly have important policy implications for national social security and health systems in an era of aging populations. Thus the study of the effects of childhood economic deprivation can contribute to strategic planning and to the better development of health and social policies for the wellbeing of the overall population.

This paper investigates the effects of childhood deprivation on the health of individuals at the later stages of their working life. The empirical analysis of the paper is carried out using some newly collected data from six European countries. The dataset contains information on the physical and mental health status of older labour force participants, their past working experiences, incidence of diseases, individuals' sense of well-being, and their socioeconomic and occupational background. It also includes information concerning childhood environment that could potentially capture early-life deprivation effects on current health status.

The paper starts with a brief literature review which provides an overview of available evidence related to relationship between socioeconomic status, childhood

socioeconomic status and their effect on overall health. The next section presents a discussion of the data, of the empirical analysis and of the empirical results. The fourth section summarises the main findings of the study and the final section concludes.

## **II. Literature Review**

### **A. Socioeconomic Status and Health**

Research on the influence of social and economic factors on health "...concerns the interaction, ... between a health production function and a health demand function and has been a highly distinctive research area within health economics" (Culyer and Newhouse, 2003). The term "social factors" or "social determinants" is a generic term and it may include a number of parameters including for example, income, wealth, class, education, occupation and employment. There are several studies which report a strong link between social factors and physical and psychological health (for a general review see Marmot and Wilkinson, 2006). One of these studies, the Black report, provides evidence on marked inequalities in health among the social classes in Britain. The report found that in early 1970's the death rate for adult men in unskilled workers was nearly twice that of professional workers (Townsend and Davidson 1992). More recent studies indicate the persistence of this link. For instance, people living in the most deprived districts of Glasgow have a life expectancy 12 years shorter than those living in the most affluent districts (NHS: Health Scotland 2004). Similarly, Navarro (1990) shows that wealth and income inequalities are linked to great disparities in health both in terms of mortality and morbidity even if the effects of race are netted out. In general, British statistics have shown that health follows a social gradient: the higher the social position, the better the health (Marmot and Wilkinson, 2006). The same trend is shown to be prevalent for many European countries ( Skalli *et al*, 2006).

Etienne *et al* (2007) study the association between income inequality and individual health and report that "the income inequality is systematically, negatively and significantly correlated with individual health, regardless of their position in the income

distribution. Kington and Smith (1997) use the Health and Retirement Survey (HRS) to uncover the existence of a strong positive relationship between levels of household income or wealth and health status. HRS respondents in excellent health have 2.5 times as much household income and five times as much household wealth as respondents in poor health. Social gradients were also found to be associated with mental health problems such as schizophrenia, depression and antisocial behaviour in other studies conducted by Dohrenwend *et al* (1992).

Socioeconomic gradients like early life deprivation, poverty, income, and education influence disease indirectly (Siegrist and Marmot, 2004). The effect of socioeconomic status (SES) on specific health problems like heart disease is observed in many studies. For instance, London based civil servants of lower SES status are found to be more exposed to coronary heart disease risk (Marmot *et al*, 1991 and Steptoe *et al*, 2004). In a study of young black men, Kapuku *et al* (2002) reports that SES is associated with diastolic blood pressure. Marmot *et al* (1997, 2006) show that decreasing SES status implies greater physical and mental ill health and mortality. Finally, SES also appears to have a direct casual effect on mental health and degenerative conditions: Lorant *et al* (2003) report that low SES is generally associated with high psychiatric morbidity, disability, and poor access to health care.

Importantly, there are indications of a vicious circle. For instance, Adda *et al* (2003) find growing evidence that low socio-economic status causes poor health and poor health causes low socioeconomic status. The above clearly indicate that the inequalities in health and death are of concern to all countries and it is one of the big challenges in the conduct of government social policy (Townsend and Davidson 1992).

## **B .Socioeconomic Status and Childhood Health**

The relationship between socioeconomic status and physical and mental health also holds for the childhood period. There is evidence that socioeconomic deprivation during childhood is related to overall mortality rates and to mortality due to cardiovascular

disease, lung and stomach cancer (Galobardes et al, 2004). Similarly, Power *et al* (2007) report that social class in childhood is associated with high blood pressure, HDL Cholesterol, triglycerides, fibrinogen, hearing threshold, depressive symptoms and with a general trend in deteriorating health. Laaksonen *et al* (2007) also show that low childhood SES and current economic status are strongly associated with common mental disorders among men and women in both Helsinki and London.

Bosma *et al* (1999) find similar results regarding the direct association between low socioeconomic conditions in childhood and adverse health outcomes in adulthood. Lynch *et al* (1997) uncover an association of social class in childhood and its effect on psychological attributes at adulthood. Their study revealed that poor health behaviour and psychosocial problems cluster in low socio economic groups. In particular, their results show that many adulthood behaviour and psychosocial dispositions detrimental to health are consistently related to poor childhood conditions, low levels of education and blue collar employment. In addition, poor adult health and psychosocial characteristics are more prevalent among men whose parents were poor.

Many studies also find that childhood socioeconomic conditions are inversely associated with overall cardiovascular disease mortality. In their study of the natural history of atherosclerosis Holman *et al* (1958) and Berenson *et al* (1987) find that even though coronary heart disease manifests itself in adulthood, atherosclerosis, an important underlying process leading to the disease, begins at much earlier age. Moreover, McCarron *et al* (2003) show the presence of risk factors during childhood or adolescence is associated with an increased risk of developing coronary heart disease. Importantly, Beebe-Dimmer *et al* (2004) provide empirical evidence that low childhood socioeconomic position is associated with an increased mortality due to cardiovascular disease. In similar vein, Brunner *et al* (1999) show that the SES driven accumulation of health capital and cardiovascular risk begins in childhood and continues, according to socioeconomic position, during adulthood.

Ramsay *et al* (2007) examine the extent to which childhood socioeconomic circumstances are related to the risk of coronary heart disease (CHD) in older British men by retrospective assessment of childhood socioeconomic circumstances (father's occupation and childhood household amenities). The combined exposure to adverse childhood and adult social circumstances turns out to be associated with the most unfavourable life style behaviour and CHD risk. Evans (2003) reports that the physical aspects (crowding, noise, housing quality) and psychosocial (child/ separation, turmoil, violence) of the home environment and personal characteristics (poverty, single parenthood, maternal high school dropout status) elevate the cumulative risk associated with heightened cardiovascular and neuroendocrine parameters, increased deposition of body fat and a higher summary index of total allostatic load.

Lawlor *et al* (2004) study on the association between childhood socioeconomic position and adult function in older adulthood, shows that childhood poverty is associated with poorer lung function for women aged 60 to 79 years.

Bosma *et al* (1999) report that low social class in childhood relates to poor general health in adulthood and people who grew up in lower socioeconomic conditions exhibit more negative personality profiles and adverse coping styles in adulthood compared to individuals who grew up in more affluent households. Finally, Kestila *et al* (2006) report that parental education and problems in childhood are related to psychological distress. They find that childhood living conditions and adversities are strongly associated with psychological distress in early adulthood even after controlling for the respondent's own education. This is confirmed by Makinen *et al* (2006) who find an association of childhood circumstances with physical and mental functioning in adulthood and an inverse association between parental education and adult mental functioning.

### **III. The Data**

The empirical analysis in this paper is carried out using some newly collected data as part of a European Commission funded project (SOCIOLD) conducted in six European

countries (UK, France, Finland, Denmark, the Netherlands and Greece). The focus of the project is the investigation of the effects of socioeconomic and occupational status on the health of the older workforce<sup>1</sup>. The data collection targeted individuals aged between 50 and 65. The surveys were conducted in the summer-autumn of 2004 through Internet although face-to-face interviews took place in Greece where Internet penetration at the time was limited especially with regard to the sample population). The questionnaires aimed to collect information on issues such as physical and mental health status, past working experiences, incidence of diseases, sense of well-being, and socioeconomic and occupational background of older participants of the labour force. In this study childhood circumstances at the age of 14 are asked retrospectively<sup>2</sup>.

Some studies report that methodological problems can arise when individual report self-assessment of health (Ward *et al*, 2002). It is argued that people from low socioeconomic groups might have lower health expectations and this can bias any inference based on this information (Grundy and Holt, 2000). In view of this, in addition to a self assessed health, three alternative measurements of physical and mental health are utilised in this study. They are relatively objective as they do not rely on self assessment of the health status but they refer to specific medical or mobility conditions. Thus, first a *mobility score* variable is constructed using the individuals' evaluation on how difficulty it is to perform various everyday physical tasks, second, a *physical score* variable is derived by utilising the individuals' response on whether they have suffered a medical condition are used as measures of physical health status. Finally, based on a series of questions on psychological well-being, a score index variable is derived to reflect individuals' *mental health* status. A more detailed description of how these health indicators are constructed can be found in the Appendix I. A detailed description of the variables used in the paper, with summary statistics, is provided in **Table 1** in Appendix I. The sample size is 5080 observations, comprising of 1,016 respondents from the UK, 1,001 from Greece, 1,003 from France, 1,000 from the Netherlands, 1,015 from Denmark, and 474 from Finland.

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<sup>1</sup> Further information on the project can be found at <http://www.abdn.ac.uk/sociold/index.hti>.

<sup>2</sup> Studies report that retrospective data on childhood circumstances are likely to be generally reliable (Dube *et al*, 2004).



#### **IV. The effect of childhood deprivation on health at the later stages of working life.**

##### **The evidence.**

In view of view of the literature reviewed above, this study examines the effect of childhood deprivation on psychological and physical health at the later stages of working life. The individual's health status at the age between 50 and 65 is always the variable to be explained. The medical literature suggests that overall health is also determined by the individual's genetic traits (Inoue and Lupski, 2003; Jackson 2004). Hence, in all regressions, in order to control for the individual's genetic traits, a variable capturing the medical condition history of the individual's parents is included. It has to be noted that heteroskedasticity corrected estimates are reported throughout the paper.

The first three columns of **Table 1** present the OLS estimates of the effect of childhood deprivation on the three health status indices. The results show that higher values in the childhood deprivation index are associated with increasing frailty of health at middle ages for the mobility, physical health and psychological health indices<sup>3</sup> The results are consistent with the literature (Lynch *et al*, 1997; Bosma *et al*, 1999; Galobardes *et al*, 2004; Laaksonen *et al*, 2007). Thus, for each additional unit of the childhood deprivation index, the odds of an individual exhibiting frail health increase by 1.32 and 1.40 for the mobility and the physical health index respectively<sup>4</sup>. Similarly, for each additional unit of the childhood deprivation index, the odds of an individual exhibiting better psychological health decrease by a factor of 0.61. The fourth column of Table 1 reports the ordered logit estimates. In line with the earlier findings, it is shown that the effects of childhood deprivation are detrimental to self assessed health status at the stage of middle age (the odds of exhibiting better health decrease by a factor of 0.80).

In the spirit of the earlier cited literature, the individual's genetic traits turn out to be an important determinant of the individual's health indicating that if the individual's parents

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<sup>3</sup> It will facilitate the interpretation of the findings to note that for the index of physical health and the mobility index higher values imply frailer health, for the psychological health index higher values imply better psychological health and for the self-assessed health higher values imply better health.

<sup>4</sup> This is the exponent of the estimated coefficient.

have suffered from serious medical conditions, the individual exhibits frailer health than the remainder. Finally, in line with the literature older individuals appear to have frailer health (Kind *et al.* 1998).

However, the literature indicates that health at the middle age is affected by important variables such as education and wealth (Lynch *et al.*, 1997; Bosma *et al.* 1999; Brunner *et al.*, 1999; Marmot and Wilkinson, 2006). It is therefore important to examine whether the above results are robust to the inclusion of these factors in the regressions (Marikainen *et al.*, 2003). Two complementary variables approximating the individual's wealth are included. First, the paper uses three dummy variables indicating the level of the individual's household wealth at the time of the survey and three dummy variables indicating the households house value. Second, there are five dummy variables indicating the highest qualification obtained by the individual respondent.

**Table 2** reports the results of the augmented regressions. The results reported in **Table 1** are robust to the inclusion of the above variables. Higher values in the childhood deprivation index are associated with increasing frailty of health at middle age for the mobility, physical health and psychological health indices. The inclusion of the control variables does not substantially affect the effect of childhood deprivation on current health. Thus, for each additional unit of the childhood deprivation index, the odds of an individual exhibiting frail health increase by 1.21 and 1.32 for the mobility and the physical health index respectively. In addition, for each additional unit of the childhood deprivation index, the odds of an individual exhibiting better psychological health decrease by a factor of 0.66. The ordered logit estimates also show that the effects of childhood deprivation are detrimental to self assessed health status at middle age (the odds of exhibiting better health decrease by a factor of 0.86).

The effect of the control variables is reported throughout for consistency, but it is not discussed in detail although some comments may be in order. In particular, current wealth is significantly, independently and positively associated with current health. Marikainen *et al.* (2003) who studied the effect of income and wealth on GHQ depression

and health in white collar women, suggested that the associations between income, particularly personal income, and morbidity can be largely accounted for by pre-existing health and other measures of social position and that the strong independent association between household wealth and morbidity are likely to be related to a set of early and current material and psychological benefits. This is in line with other studies (Kington and Smith 1997)). Hence, one should expect that estimates may be affected by the endogeneity in the wealth–health relationship and this is an issue of importance. Furthermore, the results show that higher education is associated with better physical health but it is associated with frailer health in the case of mobility, psychological and self assessed health status. This surprising result may be an outcome of the endogeneity in the current health education relationship or of the expected multicollinearity between current wealth and education or both. Indeed, Hallqvist *et al*, (2004); Hertzman *et al* (2001), Laaksonen *et al* (2005) suggest that own education may mediate the effects of childhood circumstances in adult functioning. Overall, the data used in this study are not well suited to investigate the above issues. Yet, in this study, the above are not of major concern since wealth and education are used only as a control variables and given that the focus of the study is the childhood deprivation-adult health relationship.

To investigate further the effect of childhood deprivation on health, a number of logit regressions are estimated where the dependent variable captures specific medical conditions. The results are reported in Tables 3a and 3b. The dependent variables are a number of binary variables that take the value one if the individual has ever suffered from a particular medical condition and zero otherwise. The medical conditions are high blood pressure, diabetes, benign growth, malignant growth, endocrine hormone problem, genitourinary, gastrointestinal, musculoskeletal, respiratory, cerebrovascular or cardiovascular/heart diseases<sup>5</sup>. In line with the literature, the results demonstrate the paramount importance of childhood deprivation on the likelihood of someone suffering from some medical condition at the later stages of their working lives (see also Brunner et al, 1999). The deprivation index is consistently statistically significant for every single medical condition used in this study. Thus, for each unit increase of the childhood

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<sup>5</sup> These conditions are also used to construct the index of physical health used in this study.

deprivation index at the age of 14 the odds of suffering increase by 1.49 for blood pressure, 1.30 for heart disease, 1.38 for diabetes, 1.48 for benign growth and 1.25 for malignant growth, 1.37 for genitourinary condition, 1.50 for Gastrointestinal condition, 1.71 for musculoskeletal condition, 1.41 for endocrine condition, 1.50 for respiratory and 1.57 for Cerebrovascular diseases.

## **V. Conclusions.**

In the spirit of the Nobel laureate Amartya Sen (1998) who argues that the quality of life depends on various physical and social conditions, such as the epidemiological environment in which a person lives, this study shows a social gradient in health status which is associated with childhood deprivation. The novel aspects of this study are the European wide survey (six countries) and the construction of indices which concentrate exclusively on childhood-adult socioeconomic effects of health. The results indicate that there is an effect of childhood socioeconomic conditions on later adulthood health profile as measured first by a mobility index, a physical health index and a self assessed health indicator and second by the likelihood of suffering from a number of medical conditions. The risk of frail health is higher among adult respondents of the age between 50 to 65 who grew up in unfavourable socioeconomic circumstances, after controlling for their genetic risk traits, their current educational and wealth status.

The main policy implication of this study is the intergenerational effect of poverty. Importantly, it appears that childhood deprivation has long lasting detrimental effects on the health of individuals that are visible at the later ages of working life. The importance of this effect can not be underestimated as it has repercussions on the individual's propensity for labour market participation at the later stages of their working life, since health is a major determinant of the retirement decision. Hence, the relationship between childhood deprivation and adult health is taking an increasingly important policy role in an era of aging populations since conditions of child poverty puts higher demand on the health care systems in the future. Understanding the relationship between health and childhood deprivation can indicate avenues of improving the health status of the

population by influencing the SES of the young rather than focusing on and possibly limiting health care services as a way of controlling increasing health care costs in the future. This clearly shows that the inequalities in health and death are of concern to all countries and that it is one of the biggest possible challenges in the conduct of government social policies (Townsend and Davidson 1992).

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<b>Table 1. The effect of childhood deprivation on health indicators</b>				
	<b>mobility status</b>	<b>physical health</b>	<b>psychological status</b>	<b>Self-assessed health</b>
Variable	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
age	0.0632***	0.0333***	-0.00254	-0.0255***
	0.00995	0.00285	0.0113	0.00441
male	-0.752***	-0.0524	0.516***	-0.0254
	0.112	0.0334	0.125	0.0488
Genetic loading	0.703***	0.381***	-0.815***	-0.334***
	0.134	0.0359	0.163	0.0667
Deprivation _14	0.277***	0.342***	-0.493***	-0.212***
	0.0517	0.0142	0.0568	0.0214
Constant	7.575***	-2.248***	30.10***	-5.094***
	0.598	0.169	0.697	0.276
Constant2				-3.726***
				0.27
Constant3				-2.521***
				0.269
Constant4				-0.767***
				0.267
R-squared	0.025	0.113	0.024	
Observations	5392	5508	5080	5508

Robust standard errors: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<b>Table 2. The effect of childhood deprivation on health indicators</b>				
	<b>mobility status</b>	<b>physical health</b>	<b>psychological status</b>	<b>Self-assessed health</b>
Variable	Coefficient standard error	Coefficient standard error	Coefficient standard error	Coefficient standard error
age	0.0537***	0.0299***	0.00802	-0.0208***
	0.0099	0.00282	0.0113	0.0045
male	-0.630***	-0.0436	0.413***	-0.0980**
	0.111	0.0328	0.124	0.0495
Genetic loading	0.816***	0.401***	-0.932***	-0.406***
	0.132	0.0359	0.161	0.0665
deprivation_14	0.189***	0.275***	-0.408***	-0.153***
	0.0527	0.0142	0.0591	0.0226
wealth:\$1000- \$55000	-0.055	-0.417***	0.0207	0.145**
	0.159	0.0415	0.184	0.0666
wealth: more than \$55000	-0.508***	-0.385***	0.129	0.238***
	0.165	0.0454	0.196	0.0715
house value: \$10000-\$200000	-0.477***	-0.138***	0.678***	0.395***
	0.16	0.0425	0.184	0.0658
House value: more than \$200000	-0.695***	-0.100**	1.024***	0.677***
	0.164	0.0479	0.189	0.073
No education	3.145***	-0.0343	-1.189***	-0.804***
	0.659	0.146	0.164	0.18
Up to lower secondary	0.825***	-0.0605	-1.158*	-0.480***
	0.143	0.0408	0.599	0.0623
Upper secondary	0.181	-0.141***	-0.0618	-0.118
	0.154	0.044	0.187	0.0722
Post –secondary, non-tertiary	0.517***	0.365***	-0.764***	-0.506***
	0.175	0.0553	0.179	0.0788

Constant	8.192***	-1.678***	29.45***	-4.776***
	0.611	0.169	0.719	0.286
Constant2	5392	5508	5080	-3.361***
	0.054	0.163	0.054	0.28
Constant3				-2.094***
				0.278
Constant4				-0.277
				0.277
R-squared	0.054	0.163	0.054	
Observations	5392	5508	5080	5508

Robust standard errors:\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 3a: Logit estimation; The effect of childhood deprivation on health; Specific Illnesses						
variable	Blood pressure	Heart	Diabetes	Benign growth	Malignant growth	Genitourinary
age	0.0737***	0.0772***	0.0702***	0.0129	0.0616** *	0.0429***
	0.0071	0.00888	0.0122	0.0111	0.0144	0.00937
male	0.0718	0.466***	0.164	-0.244*	-0.345**	0.167
	0.077	0.106	0.135	0.127	0.17	0.107
Genetic loading	0.952***	0.822***	0.811***	0.492***	0.818***	0.414***
	0.121	0.162	0.211	0.189	0.275	0.15
deprivation_14	0.396***	0.260***	0.323***	0.388***	0.223***	0.318***
	0.035	0.046	0.0582	0.0586	0.0714	0.0483
wealth:\$1000- \$55000	-0.543***	-0.458***	-0.748***	-0.926***	-0.489*	-0.807***
	0.119	0.162	0.242	0.22	0.268	0.173
wealth: more than \$55000	-0.482***	-0.129	-0.719***	-0.727***	-0.317	-0.710***
	0.124	0.159	0.249	0.207	0.265	0.176
house value: \$10000-\$200000	-0.295***	-0.0732	-0.327	-0.148	-0.323	0.19
	0.113	0.137	0.202	0.191	0.23	0.142
House value: more than \$200000	0.0674	-0.604***	-0.625***	0.287	-0.126	0.0616
	0.116	0.165	0.227	0.183	0.248	0.162
No education	0.326	-0.0608	0.366	-1.068	0.511	-0.0357
	0.264	0.400	0.405	0.72	0.486	0.387
Up to lower secondary	-0.0294	-0.279**	-0.238	-0.137	-0.471**	-0.191
	0.101	0.133	0.179	0.158	0.228	0.128
Upper secondary	0.0064	-0.303*	-0.135	-0.212	-0.135	-0.378**
	0.123	0.170	0.223	0.210	0.267	0.182
Post –secondary, non-tertiary	0.469***	0.014	0.237	0.391**	0.358	-0.0974
	0.108	0.145	0.179	0.16	0.218	0.147
Constant	-7.688***	-8.258***	-8.398***	-4.923***	-7.998***	-6.064***
	0.455	0.58	0.786	0.725	0.949	0.604
Observations		5508	5508	5508	5508	5508

Robust standard errors: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 3b: Logit estimation; The effect of childhood deprivation on health; Specific Illnesses					
Variable	Gastrointestinal	Mucloskeletal	Endocrine	Respiratory	Cerebro vascular
age	0.0220***	0.0415***	-0.044***	0.0184**	0.0832***
	0.00807	0.00681	0.0127	0.00801	0.0205
male	-0.0577	-0.158**	-1.041***	-0.234***	-0.0513
	0.0914	0.0786	0.154	0.087	0.255
Genetic loading	0.606***	0.486***	0.823***	0.506***	0.149
	0.139	0.11	0.23	0.126	0.337
deprivation_14	0.408***	0.535***	0.343***	0.404***	0.448***
	0.0412	0.0367	0.0591	0.0416	0.116
wealth:\$1000- \$55000	-0.687***	-0.820***	-0.511***	-0.701***	-0.134
	0.152	0.129	0.198	0.14	0.358
wealth: more than \$55000	-0.481***	-0.850***	-0.843***	-0.699***	0.427
	0.152	0.143	0.228	0.145	0.339
house value: \$10000-\$200000	-0.218*	-0.234**	-0.0185	-0.245*	-0.327
	0.132	0.115	0.194	0.126	0.283
House value: more than \$200000	-0.194	-0.154	0.349*	0.131	-0.592
	0.141	0.124	0.194	0.13	0.370
No education	-1.162**	-0.646*	0.790**	0.121	-
	0.517	0.39	0.338	0.321	-
Up to lower secondary	-0.348***	0.313***	-0.489***	-0.194*	-0.251
	0.118	0.0972	0.187	0.111	0.316
Upper secondary	-0.604***	-0.211	-0.093	-0.301**	-0.419
	0.163	0.136	0.206	0.145	0.439
Post –secondary, non-tertiary	0.438***	0.757***	0.0134	0.290**	0.00526
	0.119	0.107	0.188	0.118	0.350
Constant	-4.793***	-5.828***	-1.780**	-4.320***	-10.41***
	0.500	0.433	0.819	0.506	1.399
Observations	5508	5508	5508	5508	5418

Robust standard errors \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table Appendix 1. Means and standard deviations of the variables		
Variable	Mean	Std. Dev.
Mobility index	12.108	4.173
Physical health	0.888	1.316
Psychological health	28.127	4.504
Self assessed health	3.470	1.119
Blood preasure	0.168	0.374
diabetes	0.046	0.209
benign growth	0.052	0.223
malignant growth	0.028	0.164
genitourinary	0.072	0.258
gastrointestinal	0.104	0.305
musculoskeletal	0.168	0.373
endocrine hormone problem	0.044	0.205
respiratory	0.119	0.324
cerebrovascular	0.012	0.108
cardiovascular/heart	0.077	0.267
Age	55.842	5.490
Male (=1)	0.488	0.500
Genetic loading: 1 if individual belongs in dangerous group (i.e. if any of their first-degree relatives ever suffered from cardiovascular, malignant growth, diabetes, or blood pressure), 0 otherwise	0.808	0.394
deprivation_14: Deprivation Index when 14 years old	2.901	1.121
wealth:\$1000- \$55000	0.212	0.409
wealth: more than \$55000	0.203	0.403
house value: \$10000-\$200000	0.268	0.443
House value: more than \$200000	0.209	0.407
No education	0.016	0.127
Up to lower secondary	0.287	0.452
Upper secondary	0.159	0.366
Post –secondary, non-tertiary	0.169	0.375
Omitted variables		
house value: less than \$10000	0.522	0.500
wealth: less than \$1000	0.584	0.493
tertiary	0.356	0.479

## **Appendix 1 Health status and deprivation at the age of 14 indicators.**

### **Physical health status index:**

#### ***Self-assessed health:***

Health over last 12 months:  
( very bad=1, to very good=5)

Hence higher values imply better health.

#### ***Index of physical health.***

Information on specific medical conditions derived from the question:

Have you ever suffered from?

high blood pressure

diabetes

benign growth

malignant growth

genitourinary

gastrointestinal

musculoskeletal

endocrine hormone problem

respiratory

cerebrovascular

cardiovascular/heart disease

(No=0, Yes=1)

The index is derived from summing up the above responses, hence higher values of the index imply frailer health.

### **Index of mobility status:**

The index is derived from the responses to the following questions:

how difficult to bathe or dress yourself

how difficult to walk a block

how difficult to walk several blocks

how difficult to walk more than a mile

how difficult to bend, kneel or stoop

how difficult to climb one flight of stairs

how difficult to lift or carry groceries

how difficult to do moderate activities

how difficult to do vigorous activities

how difficult to climb several flights of stairs

(not at all difficult =1 to very difficult =4)

The mobility index is derived from summing up the above responses. Higher values imply frailer health

### **Psychological health Status indicators:**

The index is derived from the responses to the following questions:

Have you feeling recently as if you:

have slowed down  
are tense/wound up  
are having worrying thoughts  
are getting sudden feelings of panic  
are cheerful  
enjoy book/tv/radio  
have trouble sleeping  
easily get bored/irritated  
having difficulty concentrating  
are lonely

(much more than usual =1 to not at all = 4)

The psychological health index is derived from summing up the above responses. Higher values imply better psychological health

### **Deprivation Index when 14 years old**

The index is derived from the responses to the following questions:

When you were at the age of 14, did your family house have the following?

more than two persons per room,  
no toilet inside or outside the house,  
share a bed, when 14 years old  
no hot running water,  
no adequate house heating facilities,  
damp walls, floors etc,  
crime or vandalism in the area,  
your family was not well off (subjective assessment)

(yes =1, no=0))

The deprivation index at the age of 14 is derived from summing up the above responses. Higher values imply more severe deprivation.