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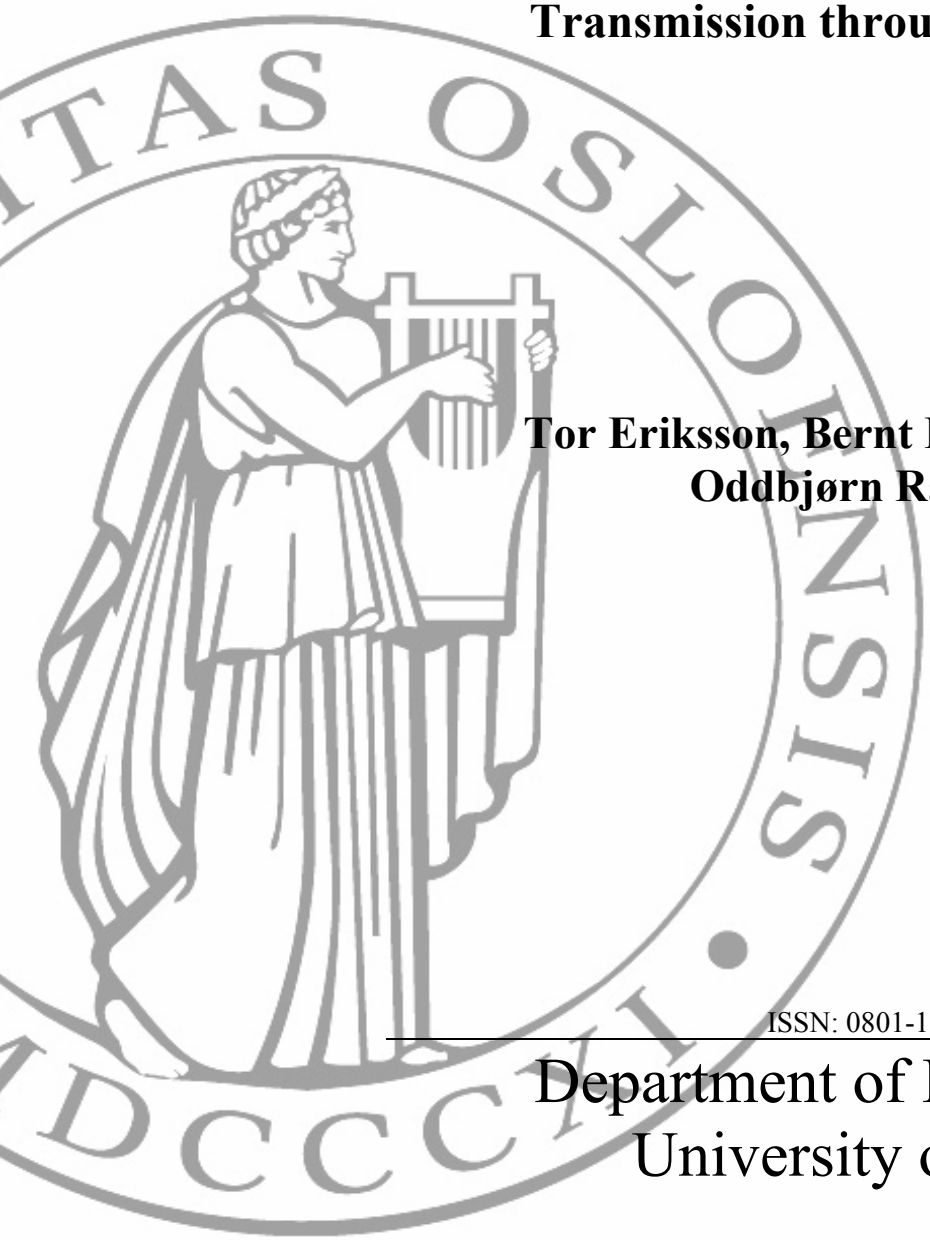
Earnings persistence across generations: Transmission through health?



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Earnings persistence across generations: Transmission through health?

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Abstract: Using a unique data set that links adult labour market outcomes and health status of a cohort of Danes and their parents, we study the interrelationships between transmission of health and economic status across generations. We first establish new evidence on intergenerational earnings resemblance in Denmark, obtaining estimates of father-child earnings elasticities of .29 for sons and .27 for daughters. Next, we show that children from low-income families are more likely to experience health problems in adulthood, and that poor health outcomes, such as back illness, heart disease, and psychological illness, affect labour earnings negatively. The data further reveal strong correlations of health outcomes across generations. When we condition on health status, estimates of the intergenerational earnings elasticity drop by a substantial amount—28 percent for sons and 25 percent for daughters. These findings point to parental investments in health and resemblance of health across generations as factors behind the pattern of low intergenerational earnings mobility observed in many countries.

JEL Classification: J28

Keywords: Intergenerational mobility, health and earnings

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1. Introduction

Most economic models treat an individual's earnings as the sum of returns to the factors of production she brings to the market. In the case of labour, it is her accumulated skills as summarised by schooling and labour market experience that typically is at the centre of analysis. A growing body of research – see Bowles, Gintis, and Osborne (2001) for a survey – has shown that other individual traits, such as race, height, obesity, beauty (Hamermesh and Biddle, 1994), personality (Kuhn and Weinberger, 2005), and health (Currie and Madrian, 1999) also are important determinants of earnings differentials. Health capital forms a component of an individual's stock of human capital affecting labour market outcomes (Mushkin, 1962; Grossman, 1972; Currie and Madrian, 1999). The transmission of economic status from one generation to the next varies across countries and over time (Corak, 2004; Ferrie, 2005), and the literature has so far focused almost exclusively on cognitive skills and investments in education in understanding the processes behind intergenerational persistence of economic outcomes. Non-cognitive traits – for many of which there are strong similarities between parents and offspring – have largely been neglected. The objective of this paper is to examine the role of one set of non-cognitive traits – the individual's health – in generating earnings resemblance between parents and offspring.

Indeed, we know relatively little about the mechanisms that give rise to the resemblance of earnings between parents and children (Solon, 1999). A human capital investment approach predicts that intergenerational earnings persistence relates to the strength of the 'mechanical' (for example, genetic) transmission of income-generating traits, the efficacy of investments in children's human capital, the returns to human capital, and the progressivity of public investments in children's human capital (Solon, 2004). Akin to investments in schooling, parents invest in children's living conditions through their spending of time and money, and the foundation for adult health is made at a young age. Economic theory suggests that poor parents invest less in children's health capital (Becker and Tomes, 1979; 1986).

Our focus on health as an essential component of human capital, and thereby a contributing factor to earnings resemblance across generations, is motivated by a number of stylized facts. Children from families in the lower end of the income distribution have

considerably poorer health during formative years than children from wealthy or high-income families; see Case, Lubotsky, and Paxson (2002) for evidence from the United States, Currie and Stabile (2004) for Canada, and Case, Fertig, and Paxson (2005) for the United Kingdom. In fact, childhood circumstance, social status, and economic conditions of the family have been shown to have health effects that extend beyond adolescence; see Lundberg (1993) and Elstad (2005) for Scandinavian evidence. There are a number of possible mechanisms behind these associations. One line of research points to nutrition *in utero* and birth weight as having direct effects on chronic conditions such as hearth disease and diabetes (Barker, 1995; Ravelli et al., 1998). Other researchers have linked the childhood environment and rearing style to adult lifestyle choices and behaviour, such as smoking and physical exercise, that have health implications (Mheen et al., 1998). Further, many psychological attributes and personality traits affecting adult health are shaped during childhood (Schwartz et al., 1995; Bosma et al., 2005).

The associations between childhood environmental factors, adult health, and earnings need not, however, only reflect the direct influences of early events. Family background may determine adult experiences of which some have health implications (Marmot et al., 2001), thus affecting labour productivity and earnings indirectly. Similarly, childhood health shocks may have long lasting implications for an individual's earning capacity through their effects on educational attainment and skill accumulation (Kuh and Wadsworth, 1993). Recent studies have shown that low birth weight is associated with lower educational attainment and reduced earnings later in life, and improved identification strategies by means of within-family estimators and studies of twins clearly suggest that such effects are causal (Behrman and Rosenzweig, 2004; Black et al., 2005).

Reviewing the empirical evidence, Case et al. (2005) conclude that "more attention (should) be paid to health as a potential mechanism through which intergenerational transmission of economic status takes place" (p. 368). Our aim is to determine just how important health is for explaining the intergenerational correlation of earnings. We use a unique data set, the Danish youth cohort study, which follows a cohort of seventh graders in 152 Danish schools in 1968 through 2001. The study participants have been interviewed at several points in time, and during the early waves of the study parents were interviewed as well. Like in other influential cohort studies, information about the family environment is

collected in real time, and is not contingent on respondents' recollection of the past. In the last interview, in 2001, cohort members were asked several questions not only about their own health situation, but also about corresponding information concerning their parents. This allows us to:

(i) establish the link between parental economic status and children's health status as adults,
(ii) estimate the effects of poor health on labour market outcomes of the cohort members, and finally,
(iii) examine the role of health in the intergenerational transmission of earnings.

The remainder of the paper is organised into five sections. The next section briefly summarises the relevant literature and discusses various channels through which health can affect (the lack of) intergenerational earnings mobility. The basic data used are presented in section 3. Section 4 gives the results concerning the effects of health on earnings, the effects of parental earnings on health, and the analysis of the importance of health for the intergenerational income mobility process. The fifth section offers discussion of alternative interpretations of the empirical evidence, and the sixth section concludes.

2. Health, labour market outcomes, and intergenerational mobility

An individual's adult health status is influenced by a large number of factors, ranging from genetically determined endowments and experiences through childhood and adolescence, to adult lifestyle. An economic perspective would be that parents invest in their children's health by spending time and money along many different dimensions. The choice of food and nutrition; their awareness of, and precautionary actions against, sicknesses and injuries; the quality of health care; and the location and standard of housing and neighbourhood are all examples of parental decisions that may have long-term consequences for the health status of their children. The costs associated with these investments can be substantial. Analogous to parental investments in children's education, economic theory predicts that wealth and income will affect the actions taken by parents to secure the health of their children (Becker

and Tomes, 1979; 1986). Moreover, when parents cannot borrow against their children's adult earnings, poor parents will tend to under-invest in children's health.

The literature has documented that children in poor families have significantly higher incidences of, and more serious, health problems than children from well-to-do families; see, e.g., Case et al. (2002; 2005). Such correlations do not necessarily reflect causal relationships if there is a positive association between health and income and if the propensity for health problems is (in part) transmitted by nature from one generation to the next. Of course, some of the offspring's poor health could also be due to similarities in environment and lifestyle across generations (for example, in terms of eating and drinking habits and taste for physical exercise). Moreover, economic resources typically go hand in hand with other family characteristics that potentially affect child outcomes.

In recent years a substantial body of research has emerged focussing on the relationship between the health status of individuals and their labour force participation and earnings; see, e.g., Ruhm (1999), Smith (1999) and Currie and Madrian (1999) for recent surveys. At least the North American literature suggests that poor health can have a sizeable negative impact on the capacity to work and hence also on the earnings from work.[1] The magnitude of estimated effects varies across studies, however, and appears sensitive to the research methodology adopted. With substantially less income inequality (and poverty) in Denmark, the labour market consequences of impaired health could differ considerably from those in the United States. Also, in Denmark health care services are universally available and, in general, at a lower cost than in the United States.

Prior evidence of intergenerational earnings mobility in Denmark is scarce. Björklund et al. (2002) show that the correlation in income across brothers is lower than in the United States, suggesting that any influence of family background on adult outcomes may be weaker in Denmark. A recent study of intergenerational earnings persistence confirms this pattern (Jäntti et al., 2005).

In the present paper, we study the similarity in economic outcomes between parents and child by means of their wage incomes. The intergenerational transmission of economic status is captured by the intergenerational earnings elasticity, β, estimated from

[1] Detrimental effects of poor health have also been documented in micro data from developing countries (Strauss and Thomas, 1998).

$$(1) \qquad Y_{Ci} = \alpha + \beta Y_{Pi} + \varepsilon_i$$

where Y is the natural logarithm of earnings, subscripts P and C denote parent and child, respectively, and ε is the error term.[2] Below, we extend equation (1) with offspring health indicators (H) on the right-hand side and estimate the conditional intergenerational earnings elasticity, $\beta_{|H}$, and compare the conditional and unconditional estimates.

The difference between the two parental earnings elasticities reflects two mechanisms: (i) the extent to which parental earnings determine adult health problems of their children, and (ii) how health problems affect labour income. Even in the case where social background strongly affects health outcomes, the importance of health inequality would be negligible unless health status directly influenced labour market outcomes. Similarly, even if health problems strongly impair wage outcomes, they cannot explain (the lack of) intergenerational income mobility unless parental earnings were important to adult health problems among offspring.

A possible objection to the empirical strategy of this paper is that socioeconomic status may have important implications for one's health (Marmot, 2004), and that any reverse causality should be accounted for in the analysis. A recent empirical literature has, however, revisited the widely debated association between socioeconomic status and health. In particular, the new studies have used panel data sets to address the issue of endogeneity of income in this relationship. The evidence from these studies indicates that any causal effect of income on health either is absent (Meer et al., 2003; Case et al., 2005; Bender and Habermalz, 2005) or, if present, is very weak (Adams et al., 2003; Contoyannis et al., 2004; Frijters et al., 2005; Lindahl, 2005).

3. Data

Our data source is a Danish youth cohort study that followed a sample of individuals from 1968 until 2001. The original sample consisted of 3,151 pupils in 152 school classes – more specifically, in seventh grade – from different parts of Denmark. Most of the pupils were 14

[2] The intergenerational earnings elasticity relates to the intergenerational correlation coefficient in the following way, $\rho = \beta (\sigma_{YP}/\sigma_{YC})$, where σ denotes the standard deviation of earnings. Thus, if income inequality is unchanged across generations ($\sigma_{YP} = \sigma_{YC}$), the intergenerational earnings elasticity equals the intergenerational correlation.

years old at the time of the initial interview (i.e., born in 1954).[3] In the first waves of the study, carried out in 1968 and 1969, parents were interviewed as well. The subsequent interviews, in 1970, 1971, 1973, 1976, 1992 and 2001, have been directed exclusively at the pupils. In the last interview, in 2001, 2,902 individuals remained from the original sample (i.e., 249 individuals had either died, moved out of the country, or were not found for other reasons). Among those contacted in 2001, about ten percent did not want to be interviewed.

The 2001 interview, conducted around age 47, is the first wave that contains information on the health situation of the cohort members. Moreover, respondents were asked to provide the same health information, retrospectively, for both of their biological parents, and, in case they were dead, the cause of death. A possible drawback of obtaining information about parents' health from their offspring is that offspring may be more likely to recall parents suffering from illnesses with which they have own experiences. This might lead to an upward bias in the intergenerational resemblance of health problems.[4]

In addition, respondents were asked about their current labour market status including their earnings from work. From the first round of interviews, information is available allowing us to construct earnings and other labour market related data for the parents.

From *Table 1* it can be observed that, in 2001, for about one-third of the respondents both (biological) parents were still alive, whereas for one-fifth, both parents were dead. Not surprisingly, mothers were more likely to be alive than fathers; two-thirds of the mothers were alive, whilst the share was 46 percent for fathers. Because we use parental information from the 1968 survey, we do not need to condition the empirical analyses on parental presence in 2001.

Table 2 shows that one third of the fathers and two thirds of the mothers were either not wage earners (but typically farmers) or not in employment at the time of the initial interview. Among the offspring, labour market participation (at age 47) is high for both sons and daughters. More than 90 percent of males and about 87 percent of females are wage earners. The increased importance of public-sector employment during the three decades under study is evident from the fact that almost 40 percent of the offspring is employed in the

[3] Specifically, 83.0 percent were born in 1954, and 0.5, 12.0 and 4.5 percent in the years, 1951-52, 1953, and 1955-56, respectively.
[4] For extensive discussions of measurement error problems in connection with self-reported health, see Bound (1991) and Currie and Madrian (1999).

public sector, whereas the corresponding share for their parents was considerably lower, about 15 percent.

Wage income is measured within bounds for both generations: 7 intervals for parents (fathers[5]) and 11 intervals for the offspring. The income distributions of the wage earners among fathers and offspring are shown in *Table 3*. When not reported otherwise, in the analysis we use the logarithm of midpoints for individual observations, except for the highest interval where the lower bound is allocated.

There is little consensus about how to measure "health"; see, e.g., the survey and discussion in Currie and Madrian (1999). The questionnaire for the 2001 wave contains a battery of questions concerning whether the respondent is currently suffering from a list of different illnesses.[6] These questions are followed up with corresponding questions about whether the respondent has ever suffered from the same illnesses. Furthermore, the respondent is asked whether his/her father and mother, respectively, have suffered from these same illnesses. In the statistical analysis below, we distinguish between seven groups of illnesses. (The original data set lists a broader range of illnesses, some of which are excluded because they are very rare and turned out statistically insignificant, others are grouped together.) The results reported below refer to the answers to questions concerning whether the respondent is suffering or ever has suffered from the illness in question.[7]

Focusing first on the offspring, we see that back illness, allergies, migraine, and hypertension form the most common health problems (see *Table 4a*). Because health status of parents was obtained when their children were about 47 years of age, the distribution of parental health problems is quite different from that of the offspring. For parents, cancer, hypertension, and heart disease (for fathers) constitute the most common problems (see *Table 4b*). Because a relatively small proportion of parents and, especially, offspring have suffered from the individual sicknesses listed, we also constructed two broader measures of illnesses. The first measure is simply an indicator for whether or not the individual has ever suffered from at least one of the illnesses listed, and the second measure indicates whether or not the

[5] Henceforth parental income is father's earnings. Information about the earnings of the mother is not available. Two thirds of the mothers were not employed in 1968, and, consequently, father's earnings should be a reasonably good measure of family income.

[6] All major illnesses, except arthritis, are included in the list.

[7] Results from analyses using information about current illnesses (which to save space are not reported here but are available from the author upon request) do not differ markedly from those shown below. The main differences are with respect to the magnitudes of the negative effects of poor health, which are greater when the respondent is currently suffering from the illness.

individual has experienced at least two of the illnesses. As can be seen from the two bottom rows of the table panels, these proportions are considerably higher than those listed for the individual diseases, suggesting only limited extent of bundling of the various health problems.

4. Results

We begin the empirical analysis with an examination of the association between family background, measured by father's earnings at the time the offspring attended seventh grade, and adult health problems. Results are reported in *Table 5*. Columns 1 and 3 list, separately for sons and daughters, the estimated effect of growing up in a low-income household (i.e., father's earnings were less that 10,000 DKK) on the probability of experiencing specific health problems during adulthood. In columns 2 and 4, we control for parental health problems by including an indicator variable reflecting whether or not one of the parents has ever suffered from the same illness. Although not always statistically significant, the estimated coefficients show that children from low-income families are more likely to experience each the listed illnesses except for cancer and migraine. The effect is particularly strong for psychic illnesses and back problems. To illustrate, according to the coefficient estimate in column (2), adult males who grew up in a low-income household have a four percentage points higher incidence of back problems. Evaluated at the sample mean, a low-income background increases the likelihood of back problems by 30 percent. The last rows contain corresponding estimates for the encompassing illness indicators. They clearly show that children of low-income families face a higher risk of experiencing health problems as adults.

Next, we turn to the earnings equations reported in *Table 6*. First, it should be noted that, because our wage measure refers to annual earnings, actual weekly working hours (including overtime hours as well as hours worked in secondary jobs) are included as control variables. The standard Mincerian regressions, reported in columns (1) and (4), yield coefficient estimates in line with what has been obtained in prior Danish studies. In columns (2) and (5), only the illness indicators are included in the regression. From these columns we note that several of the illnesses listed are associated with reduced earnings and that the

coefficient estimate is particularly large for physic illness. Interestingly, the coefficient estimates tend to be larger for males, indicating that the detrimental impact of poor health on earnings is greater for men than for women. Columns (3) and (6) list coefficient estimates after augmenting the Mincerian earnings regression with the battery of health variables. The estimates reveal negative associations between poor health outcomes and earnings even after catering for traditional human capital measures. Specifically, psychic illness, heart problems, bronchitis, back illnesses (for men), and cancer are all strongly negatively associated with labour earnings. Again we find that the negative consequences of poor health are larger for men than for women. The one exception is cancer, with coefficient estimates of about the same magnitude for the two genders. Curiously, the coefficient of gastric ulcer, a rather common ailment among cohort individuals, is positive (although not statistically significant at the 5 percent level). This might serve as a warning of interpreting coefficients of health variables as estimates of causal effects. The estimated returns to schooling hardly change when the health variables are added to the model. Finally, we note that the health indicators attach slightly larger coefficients when traditional human capital variables are not controlled for, indicating an underlying positive association between health capital and other human capital measures.

So far, the empirical analysis reveals that health status affects wage income and that adult health status varies with parental earnings during childhood. We next consider implications of these empirical patterns for estimates of intergenerational mobility.

Most intergenerational earnings equations are estimated for fathers and sons and control for the ages of father and son (Solon, 2002). Because the age of the offspring does not vary in our data set, we include only the age of the father (in 1968) as a control variable plus the actual weekly working hours of the children. (The latter information is missing for the fathers.) The equations, displayed in *Table 7*, are estimated on a sample containing only those in the cohort that had positive earnings from work in 2000. Regressions are estimated separately for males and females.

The first and third columns in Table 7 provide the conventional intergenerational income elasticity estimates for males and females.[8] The estimates, 0.292 for men and 0.274

[8] Because we observe earnings from only one year each for father and offspring, we are unable to eliminate the transitory component from the earnings measures and hence the correlation between them is likely to be downward biased; see Solon (1992).

for women, are higher than previous estimates for Denmark based on administrative data (Jäntti et al., 2005), but similar to estimates for Sweden (Björklund and Jäntti, 1997) and, as expected, much lower than those typically obtained for the United States; see, e.g., Solon (2002). The difference between the income elasticities of sons and daughters is also smaller in Denmark than in the United States. Interestingly, the pattern found in the United States, that daughters are more mobile than sons (Solon and Chadwick, 2002), does not arise in the Danish data.

The health measures – indicators for whether or not the individual is currently suffering from, *or* has suffered from, the illness in question – are introduced as additional regressors in columns 2 and 4 of the table. The indicators of poor health yield, as in Table 6, negatively signed coefficient estimates that, in most cases, differ significantly from zero. Importantly, when we include the health measures, the coefficient of father's earnings falls by as much as 28 percent for sons (from 0.292 to 0.210) and 25 percent for daughters (from 0.274 to 0.206). The sizeable reduction in the estimates of intergenerational earnings elasticities implies that health problems account for a non-trivial part of the earnings resemblance between parents and children.

5. Discussion

(i) Specification checks; non-linearity and family income

In the cohort study, earnings variables are reported in bounded intervals and our estimation results are based on midpoints of reported intervals. To examine whether or not results are sensitive to the midpoint allocation, in Table 8, Panel A, we divide father's income into four groups and estimate the earnings differentials among offspring using the second lowest category (about 20^{th} to 50^{th} percentile in the fathers' earnings distribution) as the reference group. We see indications of diminishing marginal effect of father's wage income on that of offspring and of diminishing intergenerational persistence in father's earnings. More important for the present paper, however, is that the key pattern from Table 7 remains—the resemblance of earnings between father and offspring is reduced when we include offspring health problems as controls in the model.[9]

[9] We also used *interval regressions* to examine whether our principal results are sensitive to treatment of the dependent variable. Both the standard and conditional elasticities are very similar to those reported in Table 7.

Use of individual earnings as an indicator of welfare can be misleading as it is the economic resources of the households that typically determine the budget constraints faced by the individual. In particular, unequal distribution of household production between spouses will in many cases imply that individual earnings of women can be a noisy measure of her real economic status. We therefore check whether or not the results are sensitive to our use of individual earnings. Results based on family income are reported in Table 8, Panel B. The standard earnings persistence measures are similar to those based on individual earnings (Table 7), but the reduction in the intergenerational elasticity estimate is naturally smaller as the regression only controls for individual health problems and not those of the spouse. Nonetheless, our main finding appears not sensitive to the use of individual or family earnings for the offspring.

(ii) Do parental earnings really matter?

Our findings are consistent with economic conditions during childhood affecting adult health and the interpretation that health forms an important mechanism for transmission of economic status across generations. The empirical patterns can, however, also result from alternative mechanisms. First, social background characteristics are "bundled." The drop in the parental earnings effect we uncovered in Table 7 can possibly reflect other aspects of the family environment that are correlated with father's earnings and offspring health (see, e.g., Doyle et al. (2005) who re-examine the effect of parental income on childhood health). One obvious candidate is parental education. When we re-estimate the models and condition on father's educational attainment, the results are, however, qualitatively unchanged; see Table 8, Panel C.

Second, our results may reflect a structure in which (i) own health problems limit earnings capacity within each generation, and (ii) health problems are transmitted from one generation to the next by nature (genetics) or family culture (lifestyle). Indeed, Table 5 demonstrated that health problems are strongly correlated across generations. Specifically, the table revealed positive and significant correlations across generations for each of the illnesses considered (with the exception of gastric ulcer for men, in which case the correlation was not statistically significant). For example, having a parent who suffered back illness increases the risk of own back illness by ten percentage points for males. It is worth stressing,

however, that it is the offspring who provide information about parents' health, and correlated measurement errors in own and parental health information is likely to exaggerate the resemblance between parental and offspring's health problems.

If the drop in the intergenerational earnings elasticity shown in Table 7 were fully explained by an underlying parent-child correlation in health, then adding offspring health information *should not* affect the coefficient of father's earnings if the model already accounted for parental health problems. From Table 8, Panel D, we see that conditioning on parents' health problems does reduce the estimate of the intergenerational earnings elasticity, but that adding offspring health has the same dampening effect on the coefficient of father's wage income as we found in Table 7. The drop in the coefficient of father's earnings implies a correlation between father's earnings and offspring health beyond that already accounted for by including parents' health in the model.

Resemblance in health outcomes across generations appears to be an important mechanism that reduces intergenerational earnings mobility. What this section shows is that, in addition, money matters as low parental earnings have negative long-run implications for offspring health.

(iii) Health and education

A final concern is that our key control variables, the individual health measures, merely capture other individual characteristics that go hand in hand with health problems. One plausible candidate is educational attainment. Health and educational attainment are expected to be highly correlated (Grossman, 1972), and so, one could be a proxy for the other. Results from estimations where the offspring's own educational attainment is added to the intergenerational earnings equation are set out in Table 9. From these results we note that including educational attainment reduces the estimate of the intergenerational income elasticity by a similar magnitude for males, but somewhat less for females, as including the offspring's own health indicators (as in Table 7). For males, adding both educational attainment and health status further lowers the estimate of intergenerational elasticity, whereas for women this only gives rise to a minor reduction in the coefficient estimate (compared to the model that only controls for health). These patterns indicate that a large share of observed intergenerational income persistence may be the outcome of the joint effect

of health and education, and hint that untangling the two channels of transmission may be difficult. Nonetheless, as comparing columns (3) and (4) reveals, when the model already controls for educational attainment, adding health indicators reduces the intergenerational elasticity estimate and leads to an appreciable increase in model goodness of fit in both male and female samples. Although admittedly not strong, the evidence points to health as a channel for transmission of earnings across generations above and beyond that captured by parental investments in their children's education.

6. Conclusions

In this paper we have examined some less-studied mechanisms behind intergenerational earnings persistence – specifically, the channel operating through family conditions and adult health. We use of a unique Danish data set that contains information about individual health and earnings for two generations. We provide new evidence on intergenerational earnings persistence in Denmark; the elasticity of earnings with respect to father's earnings is .29 for sons and .27 for daughters. Children from low-income families are more likely to experience health problems in adulthood, even when we control for parental health problems. Moreover, we show that there are strong, negative relationships between poor health outcomes such as heart disease, cancer, and psychological illness, and individual labour earnings, and we find significant correlations in health problems across generations. When we condition on the offspring's health status, the estimate of the intergenerational elasticity of earnings falls by a substantial amount – 28 percent for sons and 25 percent for daughters.

Thus, the key finding of our analysis is that health may play an important role in reducing income mobility across generations. The resemblance of health problems in the two generations goes some way in explaining the intergenerational income persistence in the data. But health resemblance is not the whole story. In addition, growing up in a low-income family increases the risks of health problems that limit adult earnings capacity. Our analyses also point to educational attainment as an important factor explaining income persistence. Education and health are "bundled" factors, and disentangling their respective roles in the intergenerational transmission of socioeconomic outcomes is an important challenge for future research.

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Table 1. The parents in 2001

Status	Number	Percent
Both still alive	876	34.9
Both dead	524	20.9
Only mother is alive	837	33.4
Only father is alive	270	10.8
Total	2507	100.0

Table 2. Employment of offspring and parents. Main sector of employment, percent.

	Sons (2001)	Father (1968)	Mother (1968)
Private	64.4	47.8	19.3
Public	25.1	14.4	14.1
Cooperatives	0.6	0.5	0.2
Organisations	0.9	1.3	0.5
Not wage earner or not employed	9.0	36.0	65.8
	Daughters (2001)	**Father (1968)**	**Mother (1968)**
Private	36.0	43.9	21.2
Public	50.6	17.2	14.2
Cooperatives	0.1	0.8	0.0
Organisations	0.4	1.9	0.4
Not wage earner or not employed	12.9	36.2	64.2

Table 3. Wage income distributions

Wage income of offspring (2001)	Percent	Wage income of fathers (1968)	Percent
1-49,000	1.1	1-5,999	6.0
50,000-99,999	3.3	6,000-9,999	12.4
100,000-149,999	7.3	10,000-14,999	33.7
150,000-199,999	11.3	15,000-19,999	18.3
200,000-249,999	19.3	20,000-29,999	17.9
250,000-299,999	20.8	30,000-49,999	4.1
300,000-349,999	11.5	50,000-	7.6
350,000-399,999	8.6		
400,000-449,999	4.2		
450,000-499,999	3.0		
500,000-	9.6		

Table 4a. Incidence of illnesses, offspring.

	Males		Females	
	Suffers from now	Has ever suffered from	Suffers from now	Has ever suffered from
Psychic illness	2.6	3.2	3.3	4.5
Heart disease	0.9	2.0	0.2	0.2
Hypertension	6.2	6.8	6.0	6.5
Cerebral haemorrhage	-	0.8	-	0.4
Chronic bronchitis	2.0	2.0	1.6	1.6
Asthma	4.5	5.2	3.9	4.0
Gastric ulcer	1.2	4.3	0.8	2.8
Illness in the back	11.8	13.5	10.9	11.5
Amputation/removed organ	-	0.4	-	0.4
Paralysis (part/whole)	0.7	1.0	0.5	0.5
Allergy	9.6	10.1	14.3	14.8
Cancer	0.5	1.4	0.8	2.6
Migraine	7.0	7.4	11.3	13.3
At least one illness	31.4	48.7	30.5	48.5
At least two illnesses	24.8	41.6	25.6	41.9

NOTE: Sample sizes are 911 males and 913 females.

Table 4b. Incidence of illnesses, parents.

	Father		Mother		Father or mother	
	Suffers from now	Has ever suffered from	Suffers from now	Has ever suffered from	Suffers from now	Has ever suffered from
Psychic illness	2.3	3.5	6.2	7.5	8.2	8.5
Heart disease	2.8	21.2	2.9	8.0	2.9	24.3
Hypertension	17.6	18.5	19.9	20.4	23.3	24.0
Cerebral haemorrhage	1.6	10.5	1.2	7.8	2.7	13.3
Chronic bronchitis	5.7	5.8	3.8	3.9	7.7	7.9
Asthma	4.0	5.1	6.2	6.4	8.4	8.6
Gastric ulcer	1.0	8.3	1.2	4.3	1.8	11.8
Illness in the back	7.9	9.1	8.9	9.6	14.5	15.3
Amputation/removed organ	0.2	0.2	7.5	7.6	7.5	7.7
Paralysis (part/whole)	1.0	3.3	2.5	2.8	3.4	4.7
Allergy	2.5	2.5	4.6	4.7	6.4	6.4
Cancer	3.1	19.2	1.8	18.4	4.4	29.1
Migraine	4.3	6.0	6.7	12.3	9.9	14.4
At least one illness	52.3	65.8	55.1	56.4	68.7	74.8
At least two illnesses	48.5	60.3	51.1	52.4	63.3	66.6

NOTE: Columns labelled “Suffers from now” are conditional on father/mother being alive in 2001; sample sizes are 837 (fathers), 1251 (mothers), and 1440 (father or mother). Other columns reflect proportion of all fathers/mothers; sample size is 1824.

Table 5. Offspring health problems and father's wage income. Effect of low-income father on the probability of health problem (dP/dx), separate probit regressions

	Sons		Daughters	
Health problem	(1)	(2)	(3)	(4)
Psychic illness				
Low income	0.021	0.020	0.028	0.024
	(0.011)	(0.010)	(0.012)	(0.020)
Parental problem		0.041		0.087
		(0.019)		(0.026)
Heart disease, hypertension or cerebral haemorrhage				
Low income	0.019	0.011	0.005	0.037
	(0.013)	(0.007)	(0.026)	(0.024)
Parental problem		0.023		0.039
		(0.011)		(0.016)
Chronic bronchitis, asthma, allergy				
Low income	0.017	0.005	0.016	0.007
	(0.012)	(0.011)	(0.015)	(0.031)
Parental problem		0.064		0.057
		(0.025)		(0.022)
Gastric ulcer				
Low income	0.009	0.003	0.013	0.023
	(0.029)	(0.016)	(0.010)	(0.020)
Parental problem		0.034		0.046
		(0.021)		(0.023)
Illnesses in back, amputation, removed organ, paralysis				
Low income	0.038	0.040	0.040	0.028
	(0.019)	(0.024)	(0.018)	(0.017)
Parental problem		0.099		0.073
		(0.036)		(0.030)
Cancer				
Low income	0.001	-0.004	-0.003	-0.013
	(0.022)	(0.007)	(0.021)	(0.014)
Parental problem		0.016		0.014
		(0.008)		(0.011)
Migraine				
Low income	0.008	0.016	0.011	-0.001
	(0.028)	(0.022)	(0.011)	(0.032)
Parental problem		0.094		0.215
		(0.024)		(0.030)
At least one illness				
Low income	0.041	0.021	0.032	0.022
	(0.019)	(0.012)	(0.015)	(0.014)
Parental problem		0.077		0.086
		(0.043)		(0.040)
At least two illnesses				
Low income	0.047	0.046	0.035	0.043
	(0.021)	(0.017)	(0.016)	(0.015)
Parental problem		0.089		0.097
		(0.033)		(0.039)

NOTE: "Low income" denotes that father's wage income in 1968 was less than 10,000 DKK; "parental problem" is an indicator variable set to unity if either parent has ever suffered from the same illness. Standard errors are reported in parentheses. Sample sizes are 911 sons and 913 daughters.

Table 6. Earnings equation estimates.

	Males			Females		
	(1)	(2)	(3)	(4)	(5)	(6)
Years of schooling	0.039		0.038	0.040		0.038
	(0.013)		(0.012)	(0.013)		(0.013)
Verbal test score at age 14	0.038		0.039	0.031		0.033
	(0.008)		(0.008)	(0.008)		(0.008)
Tenure in current job	-0.002		-0.003	-0.005		-0.005
	(0.002)		(0.002)	(0.001)		(0.001)
Married	0.052		0.067	-0.069		-0.069
	(0.035)		(0.036)	(0.031)		(0.031)
Private sector employee	0.105		0.104	0.052		0.050
	(0.030)		(0.029)	(0.026)		(0.025)
Health:						
Psychic illness		-0.114	-0.084		-0.075	-0.042
		(0.044)	(0.022)		(0.021)	(0.018)
Heart disease, hypertension,		-0.088	-0.089		-0.044	-0.035
cerebral haemorrhage		(0.035)	(0.035)		(0.026)	(0.027)
Chronic bronchitis,		-0.094	-0.037		-0.031	-0.023
asthma, allergy		(0.051)	(0.016)		(0.018)	(0.015)
Gastric ulcer		0.044	0.064		-0.033	0.043
		(0.029)	(0.040)		(0.020)	(0.032)
Illness in back, amputation,		-0.078	-0.039		0.017	0.007
removed organ, paralysis		(0.033)	(0.022)		(0.042)	(0.045)
Cancer		-0.056	-0.053		-0.050	-0.048
		(0.034)	(0.037)		(0.025)	(0.029)
Migraine		-0.065	-0.028		-0.040	-0.008
		(0.055)	(0.051)		(0.037)	(0.032)
R^2 (adj.)	0.297	0.080	0.301	0.288	0.121	0.295

NOTE: Dependent variable is the natural logarithm of annual earnings. Sample sizes are 955 males and 940 females; samples are restricted to those with positive earnings from work in 2000. Standard errors are reported in parentheses. Regressions also include indicator variables for hours worked per week: 1-9; 20-30; 31-37 (omitted); 38-45; and more than 45 hours.

Table 7. Intergenerational earnings equation estimates.

	Males		Females	
Log wage earnings of father	0.292	0.210	0.274	0.206
	(0.077)	(0.055)	(0.065)	(0.061)
Age of father	0.010	0.009	0.008	0.008
	(0.005)	(0.005)	(0.004)	(0.004)
Age of father squared	-0.007	-0.006	-0.002	-0.001
	(0.005)	(0.005)	(0.005)	(0.004)
Health:				
Psychic illness		-0.078		-0.055
		(0.016)		(0.023)
Heart disease, hypertension, cerebral haemorrhage		-0.067		-0.041
		(0.023)		(0.015)
Chronic bronchitis, asthma, allergy		-0.054		-0.026
		(0.024)		(0.014)
Gastric ulcer		0.040		0.021
		(0.023)		(0.022)
Illness in back, amputation, removed organ, paralysis		-0.062		0.016
		(0.014)		(0.035)
Cancer		-0.057		-0.050
		(0.016)		(0.027)
Migraine		-0.017		-0.009
		(0.050)		(0.032)
R^2 (adj.)	0.033	0.086	0.020	0.131

NOTE: Dependent variable is the natural logarithm of annual earnings of offspring. Sample sizes are 911 males and 913 females. Standard errors are reported in parentheses. Regressions also control for hours worked per week.

Table 8. Intergenerational earnings persistence. Sensitivity analyses.

	Males		Females	
	Without health	With health	Without health	With health
Panel A. Non-linearity in father's income				
Less than 10,000	-0.123	-0.107	-0.099	-0.084
	(0.056)	(0.052)	(0.048)	(0.043)
15,000-30,000	0.149	0.125	0.144	0.130
	(0.039)	(0.041)	(0.057)	(0.051)
More than 30,000	0.179	0.164	0.156	0.137
	(0.045)	(0.049)	(0.063)	(0.055)
R^2 (adj.)	0.037	0.091	0.027	0.139
Panel B. Family income (offspring)				
Log wage earnings of father	0.289	0.243	0.265	0.223
	(0.084)	(0.060)	(0.071)	(0.061)
R^2 (adj.)	0.034	0.082	0.019	0.130
Panel C. Conditional on father's educational attainment				
Log wage earnings of father	0.263	0.201	0.262	0.214
	(0.068)	(0.057)	(0.061)	(0.060)
R^2 (adj.)	0.038	0.092	0.025	0.136
Panel D. Conditional on parents' health problems				
Log wage earnings of father	0.257	0.198	0.258	0.201
	(0.066)	(0.053)	(0.070)	(0.063)
R^2 (adj.)	0.029	0.094	0.024	0.144

NOTE: Dependent variable in panels A, C, and D is the natural logarithm of annual earnings of offspring; in panel B the dependent variable is the natural logarithm of family income. Sample sizes are 911 males and 913 females. Standard errors are reported in parentheses. Regressions also control for hours worked per week.

Table 9. Intergenerational earnings persistence. Effects of health vs. education.

Conditional on:	**None**	**Own health**	**Own education**	**Own health and education**
	(from Table 7)			
	(1)	(2)	(3)	(4)
Males				
Log wage earnings of father	0.292	0.209	0.202	0.187
	(0.077)	(0.055)	(0.047)	(0.045)
R^2 (adj.)	0.033	0.086	0.241	0.285
Females				
Log wage earnings of father	0.274	0.206	0.224	0.201
	(0.065)	(0.060)	(0.060)	(0.058)
R^2 (adj.)	0.020	0.131	0.220	0.257

NOTE: See notes to Table 7.