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Adolescent health and adult labor market outcomes

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ABSTRACT

Whereas a large literature has shown the importance of early life health for adult socioeconomic outcomes, there is little evidence on the importance of adolescent health. We contribute to the literature by studying the impact of adolescent health status on adult labor market outcomes using a unique and large-scale dataset covering almost the entire population of Swedish males. We show that most types of major conditions have long-run effects on future outcomes, and that the strongest effects result from mental conditions. Including sibling fixed effects or twin pair fixed effects reduces the magnitudes of the estimates, but they remain substantial.

1. Introduction

An[1] adult's success in the labor market importantly depends on his or her health status already before adulthood. This is suggested by a growing literature that links measures of early life health to various adult outcomes, such as education and earnings (Currie, 2009; Almond and Currie, 2011). Since individuals with poor health are disproportionally to be found in families of lower socioeconomic status, this implies that childhood and adolescent health may be an important factor in understanding how socioeconomic status is transmitted across generations. In order to design policies that prevent the disadvantaged from falling behind, and thus increase intergenerational mobility, more detailed evidence on the link between poor health and subsequent outcomes is however needed.

To date, most of the research on the relationship between early health and adult labor market outcomes has focused on measures of *very* early life health. In particular, a number of studies in the economics literature have shown the importance of birth weight for outcomes such as education, earnings, and cognition (e.g., Currie and Hyson, 1999; Behrman and Rosenzweig, 2004; Black et al., 2007; Royer, 2009; Bharadwaj et al., 2013; Figlio et al., 2013). At birth, however, many health problems that manifest themselves during childhood and adolescence have not yet emerged and they would thus not be reflected in lower birth weight. However, only a few studies have considered the importance of health status during childhood and adolescence for adult outcomes.

Case et al. (2005) used the 1958 British birth cohort study to show that adults that had suffered from chronic conditions at age 7

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or 16 had lower educational attainment, lower employment probabilities and lower earnings. Smith (2009) exploited data from the Panel Study of Income Dynamics (PSID) and used a sibling fixed effects design to analyze the relationship between retrospectively measured overall health up to age 16 and adult labor market outcomes. The results suggest a strong relationship between health at age 16 and outcomes such as earnings, wealth, and labor supply. Similar results were reported by Smith and Smith (2010) who used the same data source as Smith (2009) but focused on mental disorders such as substance abuse and depression. The results of Smith and Smith (2010) suggest that an important source for the lower earnings of individuals with mental disorders is less time worked and in particular a high probability of not working at all.

Also applying a sibling design, Currie et al. (2010) used data from public health insurance records for 50,000 children and adolescents aged 18 and younger born in Manitoba, Canada. Rather than using an overall indicator of health, a multitude of different health problems including mental conditions, asthma, injuries, and congenital/perinatal problems, was linked to educational outcomes and to the probability of receiving social assistance in young adulthood.[2] While their study improved on the previous literature by analyzing the effects of specific diagnoses, it was limited in terms of outcomes. As noted by the authors, "It would be very interesting to be able to measure adult earnings or employment status, but this information is currently unavailable." (Currie et al., 2010, p. 534).

We contribute to the literature on the relationship between adolescent health and adult outcomes by exploiting a unique dataset covering almost the entire population of Swedish males born between 1950 and 1970. The dataset has information on a large set of health measures obtained from a medical examination at the age of 18, including most of those analyzed by Currie et al. (2010), but also many others. It also includes data on adult labor market outcomes such as earnings, taken from registers.

In addition to enabling us to link health problems to labor market outcomes, our data offers several key advantages. First, since military enlistment was mandatory during the study period, our data covers more or less the entire population of males. We therefore do not have to worry that our results reflect differences in healthcare-seeking behavior, which might affect studies relying on hospital or insurance records. In addition, our full population data gives our results an unusually high degree of representativeness.

Second, our health data are based on obligatory assessments of individuals' health conducted by a physician. As a result, we do not have to rely on self-reports, which have been shown to suffer from issues such as justification bias or differences in expectations.[3] For simplicity and in order to increase precision, studies using self-reported health (e.g., Smith, 2009) have typically used self-reported indicators of *overall health*. Our data also includes an indicator of overall health, but has the advantage of not being self-reported but determined by a physician.

Third, our data allows us to compare outcomes and health between more than 275,000 sibling brothers. Like Smith (2009) and Currie et al. (2010) we are thus able to control for all unobserved factors at the family level. In addition, we are able to identify a relatively large sample of monozygotic twins in our data. This allows us to further difference out the influence of unobserved endowments, such as genes. With the exception of studies using birth weight and other measures of health already around birth, we believe our study is the first to estimate the effect of health on subsequent earnings using data on monozygotic twins.[4]

Fourth, our data includes cognitive and non-cognitive test scores. We are thus able to control for ability differences between siblings, while evaluating the impact of adolescent health. Without such controls, one risks confounding the effect of health with that of ability, since some previous studies, such as Case and Paxson (2008) and Lundborg et al. (2014a), have shown that the returns to height, when treated as an indicator of childhood health, is substantially reduced when accounting for cognitive abilities.

Our results suggest a strong relationship between health at age 18 and adult earnings both with and without sibling fixed effects, although the estimates are in virtually all cases reduced with the introduction of these fixed effects. In line with Currie et al. (2010) we find relatively small effects of asthma, injuries and congenital anomalies, but large effects of mental problems. In particular, having a mental condition at age 18 is found to give rise to an adult earnings penalty of about 20% when sibling fixed effects are included. Moreover, our analysis suggests strong negative effects or conditions of the nervous system and of endocrine, nutritional and metabolic conditions.

The paper is organized as follows. Section 2 describes our data in greater detail, and in Section 3 we introduce our empirical model. Section 4 presents the results, whereas Section 5 provides some concluding remarks.

2. Data

2.1. Data description

Our dataset is based on two databases that have been linked together. First, information on individuals' health status, cognitive ability and non-cognitive ability was obtained from military enlistment records from 1969 to 1997. These were provided by the Swedish National Service Administration (*Pliktverket*). Second, information on educational attainment, occupation, earnings and marital status was provided by Statistics Sweden (*Statistiska centralbyrån*). Almost all individuals can be linked to their parents, which enables us compare outcomes between brothers. Similar data were also used by Lundborg et al. (2014a,b).

At the time period under study, the Swedish military enlistment test was mandatory for men, with exemptions only granted for institutionalized individuals, prisoners, and individuals living abroad. Individuals usually underwent the examinations at the age of 18 or 19.[5] Refusal to enlist was punishable with a fine, and eventually imprisonment, implying that the attrition in our data is very low; only about 3% of each cohort of males did not enlist.

The military enlistment records include up to six medical conditions for every individual, coded according to the ICD8 classification (WHO, 1967). Any health problem, present or historic, that may interfere with the individual's ability to undergo military service is supposed to be recorded, whereas other and less important health problems are not supposed to be recorded. There is also a

[2] For mental problems, they focused on ADHD and conduct disorders, but noted that similar results were obtained when using a broad group of mental conditions.

[3] In the retirement literature, for example, it has long been recognized that individuals are likely to provide different evaluations of their health depending on their expectations or because they may justify their retirement decision by exaggerating their health problems (e.g., McGarry, 2004; Lindeboom and Kerkhofs, 2009). Bago d'Uva et al. (2008) shows that health reporting differs by education level and that measured health inequalities by education are often underestimated if these differences are not taken into account.

[4] Estimating the relationship between health and academic achievement, Fletcher and Lehrer (2009) used genetic markers to show that sibling fixed effects remove some, but not all, of the endogeneity of health. Since we do not have data on genetic markers, we can try to further remove the endogeneity either by using twins or by adding control variables.

[5] Up until 1972, a majority of individuals were called to undergo the military enlistment tests the year they turned 19, whereas in later years most individuals underwent the enlistment test the year they turned 18.