

Contents lists available at [ScienceDirect](#)

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Early life conditions and long-term sickness absence during adulthood – A longitudinal study of 9000 siblings in Sweden

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ARTICLE INFO

Article history:

Received 5 February 2013

Received in revised form

28 January 2014

Accepted 5 February 2014

Available online xxx

Keywords:

Sickness absence

Early life conditions

Direct and indirect effects

Critical period models

Sweden, 1981–1991

Sibling fixed effect regression

ABSTRACT

This study examines the influence of health conditions experienced during the individual's first year of life on the incidence of sickness absence during adulthood. Using a sample of approximately 9000 biological siblings from 17 countries of origin and living in Sweden during the time period 1981–1991, sibling fixed effect models are estimated. This approach is combined with the use of an exogenous measurement of early life conditions, operationalized as the infant mortality rate. The link between early life conditions and later life outcomes is examined both with and without intermediary characteristics observed during the individual's childhood and adulthood, aiming for a better understanding regarding to what extent the effect of exposure to an early life insult can be mediated. The results suggest that exposure to worse health conditions during the first year of life is associated with an elevated risk of experiencing sickness absence during adulthood. An increase in infant mortality rate by ten per thousand is associated with a four percentage point higher probability of experiencing sickness absence. Despite the importance of adulthood socioeconomic status on sickness absence propensity, these factors do not mediate the influence from the health conditions experienced during the first year of life, suggesting that the association from early life conditions on sickness absence in adulthood operates as a direct mechanism. The link between early life conditions and sickness absence is only present for children to parents with primary schooling and not for individuals with more educated parents. These findings suggest that families with more abundant resources have the ability to protect their child from exposure to adverse health conditions during early life, or to cancel out the influence from an early life insult.

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1. Introduction

Results from several studies show that conditions experienced early in life have long-run effects on health throughout the life-course (Galobardes et al., 2004, 2008). Individuals who experience adverse health conditions during early life are likely to suffer from a permanent physiological debilitation, with health repercussions remaining throughout the remainder of life (Davey Smith et al., 1998; Hertzman and Power, 1997; Susser and Stein, 2002). In the framework proposed by Heckman (2007) and Cunha and Heckman (2007), health is considered as a capacity affecting the production of several future capabilities, emphasizing the importance of early environmental conditions on the development of adolescent and adult cognitive and non-cognitive skills.

In this framework, poor child health is likely to affect future health, in turn influencing labour supply and productivity (see Currie, 2009, for an overview). Consequently, exposure to adverse early life conditions may result in a reduction of the individual's capacity to work and thereby increasing the probability of long-term sickness absence. In Sweden and elsewhere, sickness absence represents a major societal and public health problem. Not only does it represent a heavy burden on the welfare system, as well as negatively affecting the individual's earnings and career prospects, but it has also been observed to be associated with several adverse health outcomes, including mortality risk (Vahtera et al., 2004). This study explores the relationship between health conditions experienced during the individual's first year of life on the incidence of sickness absence during adulthood.

The models proposed in the literature on the link between early life and later life health can be categorized into two groups: accumulation of risk models, emphasizing the importance of exposure to risk factors throughout the life-course as determinants of health, and critical period models, attempting to identify periods during

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which exposure to adverse conditions may result in a potentially irreversible poorer health (Ben-Shlomo and Kuh, 2002; Kuh and Shlomo, 2004). Within the critical period framework, two not necessarily competing hypotheses emerge. First, the foetal origins of adult disease hypothesis predicts that insults experienced while in-utero result in disrupted foetal growth and, potentially, adverse later life outcomes (Barker, 1995; Gluckman et al., 2008). The disadvantage associated with the majority of existing empirical studies investigating the relevance of this hypothesis relates to the fact that the stressor does not measure the individual's exposure, but rather the result of their in-utero circumstances. If individuals respond differently to a given insult, due to their genetic endowment or other characteristics, it may be difficult to identify the true influence caused by a given insult.

Second, the infancy inflammation hypothesis defines the critical period as occurring during the first year of life. This hypothesis emphasizes the development of several key physiological functions that occur during the individual's first year of life (Kuh and Shlomo, 2004). Exposure to disease or other environmental insults during this period has been suggested to trigger a permanent inflammatory response, elevating the risk of experiencing a range of diseases throughout the remainder of life (Elo and Preston, 1992). Empirical support has been obtained from several studies, pointing to a relationship between exposure to environmental insults during infancy and the risk of stroke (Leon and Smith, 2000), rheumatic heart disease (Elo and Preston, 1992), cardiovascular diseases (Forsdahl, 1977; Buck and Simpson, 1982) and stomach cancer mortality (Leon and Smith, 2000). Finch and Crimmins (2004) and Crimmins and Finch (2006) further emphasize that yearly variations in the exposure to infections during infancy to a large extent explain between-cohort differences in age-specific mortality.

In testing the infancy inflammation hypothesis, previous studies have relied on macro-level indicators as exogenous measurements of early life conditions. In analysing the link between early life conditions and mortality, Bengtsson and Lindström (2000, 2003) use variation in food prices and the infant mortality rate (IMR) measured during the individual's first year of life. Van Den Berg et al. (2006, 2010) uses the business cycle in a similar fashion.

While a link between early life conditions and health later in life has been supported by ample empirical research, the effect could at least partly be operating indirectly, through the generation of the individual's socioeconomic status (Bengtsson and Mineau, 2009; Heckman, 2007; Kuh and Wadsworth, 1993). More specifically, the physiological debilitation resulting from an early life insult could simultaneously be restricting the individual's educational and occupational attainment. Poor health and a weak labour market attachment may thereby work as mutually reinforcing mechanisms. To the extent that the individual's socioeconomic status influences the individual's health, the consequences of exposure to an early life insult may hence become accentuated throughout the life-course. The link between early life conditions and adulthood socioeconomic outcomes has been explored in several studies. For Norway, Kristensen et al. (2004) find that low birth weight and childhood disease are associated with unemployment during adulthood. For the U.S., Case et al. (2005) similarly finds that children who experience poor health have lower educational attainment, poorer health and socioeconomic status in adulthood, controlling for parental income, education and social class. Using a sample of biological siblings in Sweden, Helgertz (2010) shows that adverse early life conditions during infancy have a negative effect on income attainment later in life.

Despite the empirical support for the link between early life conditions and health in adulthood, research investigating the link between early life conditions and the reduction of an individual's capacity to work are scarce. Bäckman and Palme (1998) explore the

role of a range of early life factors on the probability of sickness absence in 1980 among a cohort of individuals born during 1953 in Stockholm, Sweden. They find that socioeconomic background is a more important factor in explaining sickness absence than biological factors, including birth weight and gestational age. Analysing the influence of early life factors on sickness absence due to musculoskeletal disorder in a Norwegian cohort, Kristensen et al. (2007) similarly point to the importance of parents' socioeconomic position rather than health circumstances around the time of birth.

In this study, the literature on the link between early life conditions and sickness absence is advanced in several respects. Firstly, the use of longitudinal data allows for a life-course approach, tracking individuals from childhood and into adulthood, thereby analysing the long run effect from early life conditions on sickness absence propensity. Secondly, following Finch and Crimmins (2004), Crimmins and Finch (2006) and Bengtsson and Lindström (2000, 2003), the IMR is used as an instrument of the health environment experienced during early life. The use of the IMR furthermore implies that the measurement of early life conditions can be considered to be exogenous to the individuals' health status later in life. This feature is important since unobserved "third factors" (e.g. genetic endowments) may influence both childhood health and adult circumstances. More specifically, socioeconomic conditions early in life and health outcomes later in life might be jointly influenced by certain unobserved characteristics of the individual. For instance, the educational attainment of the parents is partially a result of unobservable factors that also influence the health of the individual later in life. Thirdly, using a sample of biological siblings from different countries (although the sample are dominated by native born) and including sibling fixed effects, this allows for the cancelling out of the influence of unobserved and time constant characteristics shared by the siblings at the family level such as common genetic factors, traditions, norms and household practices. This is desirable, as such characteristics might otherwise influence the magnitude of the effect from early life conditions and thereby yield biased results if not taken into account.

In line with the infancy inflammation hypothesis, the *a priori* expectation is that exposure to adverse conditions during the first year of life increases the risk of experiencing long-term sickness absence during adulthood. The effect may primarily operate as a direct impact on the individuals' health, but it might also affect the sickness absence propensity indirectly, through its influence on the individual's attained socioeconomic status. Examining the relationship both with and without intermediary socioeconomic characteristics, such as attained education and workplace conditions, allows us to partly disentangle if the exposure to early life insults affects the sickness absence propensity directly or indirectly.

This study also investigates whether the magnitude of the effect from early life conditions are affected by the individual's socioeconomic resources during childhood. This approach is motivated by the literature, documenting a strong association between socioeconomic status in childhood and adult health and mortality (Currie, 2009; Preston et al., 1998). Presumably, the presence of an intergenerational transmission of socioeconomic status and differences in terms of knowledge and resources between parents and children implies that the influence of early life conditions on sickness absence might be mitigated or exacerbated by the individual's socioeconomic status in childhood.

2. Data and variables

The empirical analysis uses individual level data from the Swedish Longitudinal Immigrant Database (SLI). The SLI consists of demographic and socioeconomic information on 550,000 native

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