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Can individual conditions during childhood mediate or moderate the long-term cognitive effects of poor economic environments at birth?

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ABSTRACT

Recent analyses revealed that the business cycle at the time of birth influences cognitive functioning at older ages, and that those individuals born during economic boom periods on average display better cognitive functioning later in life. The current study examines the impact of childhood conditions on late-life cognitive functioning and investigates whether they mediate or moderate the effects of the business cycle at the time of birth. The underlying purpose is to find potential starting points for societal interventions that may counterbalance the negative long-term outcomes of adverse living conditions early in life. We use data from 7935 respondents at ages 60+ in eleven European countries from the first three waves of the Survey of Health, Ageing and Retirement in Europe (SHARE). The survey data was collected in 2004, 2006/07, and 2008/09. Country fixed-effects models are used to examine the impact of macro-economic deviations in the year of birth and the indicators of childhood circumstances on late-life cognitive functioning. This study shows that the effects of boom and recession periods at birth are not simply mediated or moderated by living conditions during childhood. Conditions at birth have biological long-run effects on late-life cognitive functioning. Individuals born during boom periods display signs of having better cognitive functioning later in life, whereas recessions negatively influence cognition. Furthermore, a series of childhood conditions in and of themselves influence late-life cognition. Good childhood cognition, high education as well as a high social status, favourable living arrangements, and good health have a positive impact. Policy interventions should aim at a better access to school or measures to improve the economic and social situations of disadvantaged households.

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1. Introduction

As a result of ageing and rising levels of life expectancy, the proportion of older individuals has grown substantially in most developed countries in recent decades. In response to this demographic shift, researchers have increasingly focused on health in ageing populations, especially on the decline in mental health. The need for cognitive fitness is becoming more pressing and the analyses by Skirbekk et al. (2012) showed that macro-level factors, such as education or a higher age at retirement, are associated with an improvement in the relative cognitive performance of a population over the life cycle.

Understanding the determinants of poor mental health among the elderly allows us to identify potential risk groups. A large number of existing studies have shown that the environment during pregnancy and the first months of life may affect the development of vital organs and the immune system, with long-lasting effects on physical and mental health later in life.

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In our previous work, we showed that the business cycle at the time of birth influences cognitive functioning at ages 60+ (Doblhammer et al., 2013), and that individuals born during economic boom periods display signs of better cognition later in life. This current study analyses the influence of childhood conditions on late-life cognitive functioning and to what extent these mediate or moderate the effects of the business cycle at the time of birth. The aim was to find potential starting points for societal interventions that may counterbalance the negative long-term outcomes of adverse living conditions early in life.

We used data from 7935 elderly respondents from the first three waves of the Survey of Health, Ageing and Retirement in Europe (SHARE). We examined a summary score of cognitive functioning at ages 60+, linking this measure to the indicators of childhood and to the macro-economic deviations in the year of birth.

First, we describe pathways that link early-life conditions to late-life well-being and then present possible mediating and moderating effects of living conditions in childhood. We specify the data and describe the statistical method. Finally, we present the results of the regression models and discuss them in light of the literature overview.

1.1. Pathways linking early-life conditions and late-life well-being

The mechanisms underlying the effect of economic boom and recession periods on late-life cognition cannot be easily determined. However, several possible links exist that are closely related to the present knowledge about causal pathways from early-life conditions to late-life outcomes. Boom and recession periods differ plausibly in terms of the quality and quantity of nutrition as well as the psychological stress level in the household. Differences in the extent of types of housing and access to health care might also create differences in disease exposure. Studies on possible pathways linking early-life experiences and later-life outcomes, such as health or mortality, can be divided into those that focus on biology and those that focus on social aspects. While the SHARE data are not suitable for testing biological pathways, the survey did contain indicators that can be linked to biological pathways discussed in the literature. In addition, the third wave of SHARE includes a particularly large amount of life course information that can be linked to social pathways.

Biological pathways may act in different ways. Many conditions increase the risk of poor cognitive functioning and dementia late in life. Foetal malnutrition (Barker, 1994; Kuzawa, 1998), exposure to infectious diseases or other illnesses (Bengtsson and Lindstrom, 2000; Costa, 2000; Crimmins and Finch, 2006; Kuzawa, 1998), childhood adversity (Morozink et al., 2010), and distress during critical periods in utero or early in life (Brunson et al., 2005) have all been shown to affect health outcomes late in life, including mental outcomes. Those conditions directly increase the risk of cognitive functioning and dementia late in life by affecting brain development (Drury et al., 2012; Kuzawa, 1998; Landrigan et al., 2005; Stein et al., 2008) or indirectly by affecting known risk factors for cognitive impairment. Early-life circumstances may affect the hormone system and the inflammation level (Crimmins and Finch, 2006), which in turn leads to a chronic activation of inflammatory pathways and increases the risk of diabetes, cardiovascular diseases, and the metabolic syndrome.

In contrast, social pathways describe the short-term effects of economic conditions on the development of children's cognitive skills (see the overview in (Duncan, 2006)), which may then become persistent due to the level of educational achievement (Borghans et al., 2008). In general, education plays a crucial role in triggering indirect pathways which can lead to worse health outcomes later in life (see the overview in (Cutler and Lleras-Muney, 2008)).

1.2. Mediating or moderating effects of living conditions in childhood

The pathway from conditions at birth, indicated by the business cycle, to the cognitive status in late-life has been shown in our previous work. Now we turn to the conditions in childhood and explore whether they are able to mediate or moderate this pathway. The former considers whether the long-run effects of economic conditions at birth on late-life cognitive impairment run indirectly through childhood conditions. The latter considers whether childhood conditions mitigate or exacerbate adverse conditions at birth.

We investigated the impact of childhood conditions on the long-term consequences of economic fluctuations at the time of birth, thereby classifying five dimensions of childhood conditions: cognitive abilities in childhood, education, early-life social status, living arrangements, and health.

1.2.1. Cognitive abilities in childhood

Cognitive abilities in childhood may work as a mediator since it is known that deprivation in utero and around birth is associated with lower IQ (Shenkin et al., 2004), and cognitive ability influences late-life health, cognition and dementia. Higher childhood intelligence was shown to improve cognitive performance at old age, while people with low childhood intelligence tend to experience cognitive decline (Bourne et al., 2007). Fritsch et al. (2005) found that a high adolescent IQ and greater activity levels in youth reduce the risk of cognitive impairment at higher ages.

1.2.2. Education

Low education has been associated with a greater risk of cognitive impairment (van Hooren et al., 2007) and dementia (Sharp and Gatz, 2011). Within the pathway from early to later life education may act as a mediator by being a surrogate for cognitive abilities in childhood, which in turn are affected by conditions in utero and around birth. Levels of education attained may also work as a moderator without being influenced by conditions earlier in life. One possible explanation is the concept of cognitive reserve (Stern, 2002). The systematic review about the relationship between education and dementia by Sharp and Gatz (2011) stated that “it is important to think of education as a proxy or surrogate indicator.” Therefore, education might be a proxy for the cognitive reserve (Stern, 2002). People with high levels of education tend to process tasks in a more efficient manner and are able to sustain greater brain damage before displaying major functional deficits. Additionally, successful learning, and thus the final educational level, depends not only on intelligence but also on social class at school-going ages (Duncan, 2006) and other personal characteristics: persistence; interest in school; willingness to study; encouragement for academic achievement that is received from family, peers, and teachers; and general cultural factors (Neisser et al., 1996).

1.2.3. Early-life social status

Parental social class may capture determinants that buffer an individual against adverse conditions at birth. Indeed, individuals born into families of low social class may be less likely to reach higher levels of educational attainment (Duncan, 2006). Smith et al. (1998) showed that men whose fathers had manual occupations during a respondent's childhood were more likely to have manual jobs themselves as adults and to be living in deprived areas. Furthermore, they showed higher risks for respiratory diseases and increased cause mortality, and these risks increased with the lower social class of the father.

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