The Timing of Early-Life Health and Socioeconomic Disadvantage

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Introduction

This paper addresses the importance of the *timing* of a health or socioeconomic disadvantage during childhood. Specifically, it has two goals. First, I ask whether some periods of exposure to disadvantage during childhood are more important than others. Are there key points during childhood in which simultaneously experiencing an important educational transition with a health or socioeconomic disadvantage is particularly detrimental for later-life well-being? Secondly, does such a disadvantage affect all later points in an individual's life equally, or do the effects cumulate or attenuate over time? I will examine these questions using data from the British National Child Development Study (NCDS), unique life course data from the U.K., a context with many similarities but also a few important differences to the U.S.

Background

A recent wave of studies has linked conditions in childhood to social, economic and health-related well-being later in life (Case et al., 2002; Hayward and Gorman, 2004; Currie and Stabile, 2003; Hobcraft, 2004; Case et al., 2005). In particular, early-life health status has begun to receive significant attention as a contributor to later mortality, general health status, educational achievement and attainment, earnings and employment status (Wadsworth, 1986, 1991; Currie and Madrian, 1999; Conley and Bennett, 2000; Bengtsson and Lindstrom, 2003). Of course, the inverse of this relationship is already well established: disparities in physical and mental health status, behaviors and insurance are at least in part structured by social status (Marmot, 2001; Case et al., 2002; Finch, 2003). This brief discussion is meant to point out that individuals' health-related experiences early in life are determined in part by characteristics of their parents, and may have lasting consequences for subsequent social status and well-being. The magnitude of these relationships is still under debate, as we try to both isolate the independent effects of SES and health on one another, and to sort through the extent to which they operate directly or indirectly. The relationships clearly exist, however, and are of equal importance whether they operate directly or indirectly.

Despite the increasing recognition of childhood health as a correlate of prior and future socioeconomic status, and despite the reality that children's environments are variable and cumulative, we often represent the period of childhood as entirely static. As a result, it is unclear whether our results are sensitive to alternative representations of childhood, or if we are misrepresenting the effects of childhood by aggregating a large period of time. Wolfe et al. (1996), in discussing the tendency of researchers to measure children's social status at one point in time, call this the "windows problem." Aggregating many developmentally important years into one period may prevent us from identifying differences in the effects of the timing of health and socioeconomic disadvantage. Is disadvantage experienced at some periods during childhood more important than others, or not? And does the importance of a disadvantage affect all later points in an individual's life equally, or do the effects cumulate or attenuate over time?

These questions have received some research attention. Simmons et al. (1979, 1987), for example, study the transition to early adolescence, and find that children who face "multiple life events" in the transition to seventh grade experience lower self-esteem than their peers. Children who experience several events at one time, including the onset of puberty, dating, and changing schools, have a harder time than children who experience these events over a longer period; these effects may be particularly strong for girls. Other work has found that there may be differences in the effects of social background over the life course, with larger effects of parental background on educational attainment found in early and late childhood, rather than middle childhood (Schoon et

al., 2002). Case et al. (2005) begin to expose timing differences in the relationship between health and socioeconomic status. The authors find that health during infancy and adolescence has lasting effects on socioeconomic status in middle age, and they mention a few timing differences that emerge; having a chronic condition at age 7 has a larger effect on educational attainment at age 16 than does having a chronic condition at age 16. While their analysis focuses on testing pathways from health to SES, the differences in timing that they do uncover along the way in this effort expose a clear need for a systematic comparison of differences over the course of childhood in the effects of health and SES on one another later in life, as well as whether any associations that do exist strengthen or weaken over the life course.

Data and Setting

There are no existing prospective sample surveys in the United States that allow researchers to follow the same people from birth until adulthood. In contrast, there are several ongoing British studies that have followed members of the same cohort from birth until the present. In particular, the National Child Development Study (NCDS) provides information on the same individuals at birth, and again at ages 7, 11, 16, 23, 33, and 42. The survey is conducted by the Centre for Longitudinal Studies (http://www.cls.ioe.ac.uk/) and is ongoing, with the most recent wave (age 42) conducted in 1999-2000. The study follows members of the cohort born between the third and ninth of March, 1958. It was begun with the goal of understanding the causes and consequences of human development, and collects information on health, cognitive and social development, educational progress, income and family relationships.

Great Britain is similar in many ways to the U.S. It has a similar economic profile to the U.S., with a generally similar distribution of health status among children and adults. Given the many similarities between the U.K. and the U.S. contexts, these data provide a useful basis for understanding the importance of the timing of health and socioeconomic disadvantage during childhood, with great relevance to the U.S. setting. There are some important differences, which may or may not be consequential, but are worth considering in a study of health and social status. First, the U.K. has a national health service, with basic health care provided as a benefit for all citizens. This does not necessarily translate into fewer health disparities, but it clearly increases access to preventive and therapeutic care. Secondly, the educational system has historically been more rigid in the U.K. than in the U.S. The differences are less apparent since the end of the Tripartite system in 1976 and the growth of the comprehensive school system, but for this cohort, born in 1958, the old system is relevant. Under this system, students faced a series of important points in their educational careers during childhood, which had important consequences for their trajectories. At the age of 11, after completing primary school, students took exams (dubbed the "eleven plus") that determined (along with their own choice) whether they entered grammar school or the non-university secondary school track. Students in grammar school took O-level exams at the age of 16 and, depending on the result, could continue in school until the age of 18, when they took A-level exams that determined university entrance. Students in the non-university track generally left school at age 16.

Framework

The rigidity of the U.K. educational system during the time that the 1958 cohort experienced childhood provides a useful framework for thinking about the importance of the timing of health and socioeconomic disadvantage during childhood. While useful in any setting, it may be especially useful in the U.K. to examine timing differences during childhood from the perspective of key educational decision points in children's lives. Children experienced particularly critical decision periods in the educational system at ages 11 and 16. Do health and social status during these periods of childhood matter more than other periods for the socioeconomic and health outcomes that children experience? Figure 1 provides a simple illustration of the possible influence of health and social status in childhood (birth and ages 7, 11,

16) on health and social status in adulthood (ages 23, 33, 42). Having a health problem at a critical educational transition age (ages 11 and 16) may disadvantage children more for their future health and social status than having a short-lived health problem at a different period. This possibility is denoted in Figure 1 with thicker lines running to adulthood from ages 11 and 16 than from other points in childhood. The extent of this influence might also vary by current social status, since children with access to more resources may be better able to compensate for a health disadvantage. Similarly, experiencing a socioeconomic hardship at a critical educational period may be more strongly associated with future health status than experiencing that circumstance at a different point in childhood. This framework stems from evidence suggesting that children who experience "multiple life events" at one time have a harder time successfully transitioning to the next phase in life, as discussed earlier (Simmons et al., 1979, 1987).

It is also possible that these effects may not show up for some time, or may cumulate over time, raising the question of whether the strength of a health or social status effect at one point in time changes over the life course, whereby health or social status during infancy, early childhood or adolescence has a stronger effect on social status or health at age 42 than at age 33 or 23? This hypothesis is predicted by the "cumulative advantage" and "weathering" life-course models (Geronimus, 1992; Ross and Wu, 1996). According to these models, advantages and disadvantages, whether socioeconomic, race or heath-related, should cumulate over the life course. If so, a stronger effect of disadvantage should be observed at later ages; this has been observed cross-sectionally and over shorter periods of time. These relationships may vary by social status or health; the strength of health's influence may increase over time, for example, but only for those who lack compensatory resources and are unable to control their condition. Another possibility is that the effects do not cumulate but in fact grow weaker over time, as predicted by the "age as leveler" hypothesis. There is some evidence that education-based mortality disparities, for example, are weaker among those over age 65 than for younger people, perhaps due to selective survival into old age (Kitigawa and Hauser, 1973; Sorlie et al., 1995). This pattern may be more relevant for ages older than those that I will observe here; nonetheless, it remains a possibility. Case et al. (2005) peripherally examined these questions of timing and cumulative effects with the NCDS data. Their main interest was in identifying pathways, however, and a systematic comparison is needed. In addition, the authors did not include information about children at age 11, which may be a critical educational decision point for children in the U.K.

Measures

Health

The NCDS contains a large variety of childhood health measures. As in the U.S., however, small numbers of children experiencing any given health problem preclude researchers from investigating a particular condition in great detail for a large sample. Alternatives include using global health measures, including self or parent-rated general health status. The NCDS does not include measures of general health status until age 23. There are several options for earlier years. There are several measures of infant health, including birth weight and mothers' behaviors during pregnancy. One possibility for later years is to create a global measure of chronic conditions at a given point in childhood, by aggregating specific questions. An additional alternative is to create broad types of health conditions from the medical histories, by separating conditions into physical, mental/emotional and systemic impairments (Case et al., 2005). This permits some degree of specificity but also permits enough variation within groups for analysis. The NCDS also includes measures of height and weight, which can be used to construct a measure of obesity and a proxy for nutrition. At older ages (ages 23 and above), the data include self-rated health measures, as well as measures of more specific physical and mental health conditions and disability.

Social Status

The NCDS include several educational measures, including which educational transitions were made, scores on O and A-level exams, current educational and enrollment status, and highest degree attained. There is also substantial detail about income, employment, marital status and childbearing at each wave. At the time of the child's birth, the NCDS collected information about the child's parents and home environment, including parents' educational status, household size, parents' marital status, parents' social class in childhood and adulthood, and parents' income at both the present and previous periods.

Analytic Strategy

The analysis will proceed in several stages. The first step is to investigate the importance of the timing of health and socioeconomic disadvantage during childhood. Using information at birth and ages 7, 11 and 16, I will examine differences in the effects of, for example, health and ages 7 and 16 on health, educational attainment and employment at age 42. I will separately investigate the importance of the timing of socioeconomic disadvantage for later health. As a result, both health and social status will act as explanatory and outcome variables, depending on the analysis. This part of the analysis will be informed by the key educational decision points that took place during the childhood of this 1958 cohort.

In order to examine differences in the timing of health and social status during childhood, I represent the relationship between health and social status with reduced-form models:

$$SES_A = \beta_0 + \beta_1 Health_C + \beta_2 X_C + \varepsilon \quad (1)$$

$$Health_A = \beta_0 + \beta_1 SES_C + \beta_2 X_C + \varepsilon \quad (2)$$

Health in adulthood ($Health_A$) is modeled as a function of social status during childhood (SES_C) and a vector of observed childhood characteristics (X_C). Similarly, social status in adulthood (SES_A) is a function of childhood health and observed child and family-specific characteristics. Information at birth, and at ages 7, 11 and 16 will be included in the model simultaneously, in order to identify differences in the influence of various stages of childhood, and to compare the timing of disadvantage with key educational points with its timing at other points in childhood. One conceptual issue that will require attention is how to define social status during the period of late childhood/adolescence/early adulthood; in this paper, that corresponds to age 16. During this period, individuals' social status may still be determined completely by the characteristics of their parents, or alternatively, they may be beginning to earn their own money and access resources outside of the family. I will compare results with different measurements of adolescents' social status.

An ever-present problem in studies of the relationship between social status and health is the possibility of unobserved heterogeneity. If health and socioeconomic status both affect one another, as we know they do, then we risk attributing "effects" to one component when they could in fact be reflecting unobserved characteristics related to the other component. I will attempt to minimize this bias by "measuring the unmeasured" as much as possible to address potential extraneous circumstances in children's lives that might drive my relationships of interest. I will also employ individual fixed-effects models; these models are not appropriate for the whole analysis, since individual-change models are not realistic across many decades. They may be more useful for testing the sensitivity of the results over shorter time periods, however.

The second step in the analysis will be to examine persistence or fluctuation in these effects over the life course, through mid-adulthood. Is health at age 16, for example, more strongly associated with employment status at age 42 than at age 32? This point of this second component is to understand the extent to which influences during childhood cumulate, remain constant or weaken over the life course. This part of the analysis will rely on the models

described in Equations 1 and 2, where the dependent variable will vary depending on whether the outcome occurs at age 23, 33 or 42.

Conclusions

This project analyzes the importance of the timing of health and socioeconomic-related disadvantage during childhood for later-life well-being, and examines the persistence and fluctuations of these associations over the life course. Whether or not timing differences exist during childhood, it is important to understand the implications of aggregating a large and variable period in people's lives. Previous research points to the variation that exists in the relationship between health and social status over the life course, and suggests that children who simultaneously experience the "double-jeopardy" of an important educational transition with a health or SES disadvantage fare worse than their peers who do not. Examining the intricacies of these relationships as they unfold into adulthood is an important next step toward understanding the long-term consequences of conditions during childhood.

References

Bengtsson, T. & M. Lindström, 2003. "Airborne Infectious Diseases during Infancy, and Mortality in Later Life, Southern Sweden 1766-1894." *International Journal of Epidemiology* 32:2, 286-294

Case, Anne, Darren Lubotsky and Christina Paxson. 2002. "Economic Status and Health in Childhood: The Origins of the Gradient." *American Economic Review* 92(5): 1308-1334.

Case, Anne, Angela Fertig and Christina Paxson, 2005. "The Lasting Impact of Childhood Health and Circumstance." *Journal of Health Economics* 24: 365-389.

Conley, Dalton and Neil G. Bennett, 2000. "Is Biology Destiny? Birth Weight and Life Chances." *American Sociological Review* 65: 458-467.

Currie, Janet and Brigitte C. Madrian. 1999. "Health, Health Insurance and the Labor Market." Handbook of Labor Economics, Volume 3. O. Ashenfelter and D. Card (eds.). Amsterdam: North Holland.

Currie, Janet and Marc Stabile. 2003. "Socioeconomic Status and Health: Why is the Relationship Stronger for Older Children?" *American Economic Review* 93(5): 1813-1823.

Finch, Brian Karl. 2003. "Early Origins of the Gradient: The Relationship Between Socioeconomic Status and Infant Mortality in the United States." *Demography* 40(4): 675-699.

Geronimus, Arline T., Margaret Hicken, Danya Keene and John Bound. 2006. "'Weathering' and Age Patterns of Allostatic Load Scores Among Blacks and Whites in the United States." *American Journal of Public Health* 96(5): 826-833.

Hayward, Mark D., and Bridget K. Gorman. 2004. "The Long Arm of Childhood: The Influence of Early-Life Social Conditions on Men's Mortality." *Demography* 41:87-107.

Hobcraft, John N. 2004. "Parental, Childhood, and Early Adult Legacies in the Emergence of Adult Social Exclusion: Evidence on What Matters from a British Cohort." Human Development Across Lives and Generations: The Potential for Change, P.L. Chase-Lansdale, K. Kiernan and R.J. Friedman (eds.). New York: Cambridge University Press.

Kitigawa, Evelyn and Philip Hauser, 1973. *Differential Mortality in the United States.* Cambridge: Harvard University Press.

Marmot, Michael, 2001. "Inequalities in Health." *New England Journal of Medicine* 345: 134-136.

Ross, Catherine E. and Chia-Ling Wu. 1996. "Education, Age and the Cumulative Advantage in Health." *Journal of Health and Social Behavior* 37(1): 104-120.

Schoon, Ingrid, John Bynner, Heather Joshi, et al., 2002. "The Influence of Context, Timing, and Duration of Risk Experiences from Childhood to Midadulthood." *Child Development* 73(5): 1486-1504.

Simmons, Roberta G., Dale A. Blyth, Edward F. Van Cleave and Diane Mitsch Bush, 1979. "Entry into Early Adolescence: The Impact of School Structure, Puberty and Early Dating on Self-Esteem." *American Sociological Review* 44(6): 948-967.

Simmons, Roberta G., Richard Burgeson, Steven Carlton-Ford, and Dale A. Blyth, 1987. "The Impact of Cumulative Change in Early Adolescence." *Child Development* 58(5): 1220-1234.

Sorlie, P.D., E. Backlund and J.B. Keller. 1995. "U.S. Mortality by Economic, Demographic, and Social Characteristics: The National Longitudinal Motality Study." *American Journal of Public Health* 85: 949-956.

Wadsworth, Michael, 1986. "Serious Illness in Childhood and its Association with Later-Life Achievement." Pgs. 50-74 in *Class and Health: Research and Longitudinal Data,* R. Wilkinson (ed.). London: Tavistock.

Wolfe, B., R. Haveman, D. Ginther, and C.B. An, 1996. "The 'Window Problem' in Studies of Children's Attainments: A Methodological Exploration." *Journal of the American Statistical Association* 91(435): 970-982.

Figure 1: The Timing of Health and Socioeconomic Disadvantage