Health Disparities Beginning in Childhood: A Life-Course Perspective

abstract

In this article we argue for the utility of the life-course perspective as a tool for understanding and addressing health disparities across socioeconomic and racial or ethnic groups, particularly disparities that originate in childhood. Key concepts and terms used in life-course research are briefly defined; as resources, examples of existing literature and the outcomes covered are provided along with examples of longitudinal databases that have often been used for life-course research. The life-course perspective focuses on understanding how early-life experiences can shape health across an entire lifetime and potentially across generations; it systematically directs attention to the role of context, including social and physical context along with biological factors, over time. This approach is particularly relevant to understanding and addressing health disparities, because social and physical contextual factors underlie socioeconomic and racial/ethnic disparities in health. A major focus of life-course epidemiology has been to understand how early-life experiences (particularly experiences related to economic adversity and the social disadvantages that often accompany it) shape adult health, particularly adult chronic disease and its risk factors and consequences. The strong life-course influences on adult health could provide a powerful rationale for policies at all levels—federal, state, and local—to give more priority to investment in improving the living conditions of children as a strategy for improving health and reducing health disparities across the entire life course. Pediatrics 2009;124:S163–S175
A life-course perspective will not strike pediatricians, family physicians, or other providers of health care to children as an alien concept. The developmental perspective is a standard component of their training, through which they learn to consider the dynamic nature of growth during childhood and children's evolving needs at different physical, cognitive, and socioemotional developmental stages. What, then, is new when we focus on the “life-course?”

LOOKING ACROSS MULTIPLE LIFE STAGES
A life-course perspective encompasses a developmental approach and adds important new elements. The most prominent difference between a life-course and a developmental approach is that, whereas a developmental perspective generally focuses on development during childhood or adolescence (occasionally extending into early adulthood), a life-course study generally extends across multiple life stages, typically examining links between early childhood and later adult health. A life-course study focuses on understanding how early-life experiences can shape health across an entire lifetime and potentially across generations. A life-course study might examine child or adolescent health as intermediate outcomes while investigating links between childhood experiences and adult health. A life-course perspective can be thought of as extending the developmental perspective across the life span.

EXAMINING THE ROLE OF SOCIAL CONTEXT OVER TIME
Although developmental researchers often examine social influences on physical, cognitive, or socioemotional development, the social context is not necessarily an inherent component of developmental studies. In contrast, a life-course perspective explicitly considers the psychosocial as well as the physical environment, along with biological factors, as potential influences on child development and adult health. This perspective focuses attention on the role of context, including social context, over time. A major focus of life-course epidemiology has been to understand how early-life experiences (particularly experiences related to economic adversity and the social disadvantages that often accompany it) shape adult health (particularly adult chronic disease and its risk factors and consequences). Again, the life-course perspective is entirely compatible with a developmental perspective, but it explicitly broadens the focus to include contextual elements that might not always be applied by investigators using the developmental model.

Important concepts in life-course research include the notions of critical or sensitive periods, cumulative effects over time, trajectories or pathways, and intergenerational models. A “critical period” generally refers to a window of time during the life course when a given exposure has a critical or even permanent influence on later health. According to the “Barker hypothesis” or “fetal or biological programming,” the fetal period is a particularly critical period during which certain exposures can permanently alter particular organ structures and metabolic functions. According to Barker’s hypothesis, adult cardiovascular disease, type 2 diabetes, stroke, hypertension, and other adverse adult health outcomes have their origins in a response to inadequate nutrition during fetal and infant growth, leading to altered metabolic and endocrine function and/or increased vulnerability to the effects of later adverse living conditions. Some reserve the term “critical period” for a period during which exposures result in unalterable changes; they may use the term “sensitive period” to refer to periods during which exposures have large effects that might be modified by later experiences. Others use “critical period” more generally to encompass the latter. Cumulative effects result from the accumulation of risk (or protection) over time in additive or synergistic ways. Kuh et al have discussed different ways in which risks can accumulate over time and how the relationships can be conceptualized in a life-course study. The notion of cumulative risk is that long-term damage occurs through the compounding of environmental, socioeconomic, and behavioral exposures over the life-course; risks may accumulate through independent exposures, or exposure clusters related to, for example, an individual’s or family’s socioeconomic position. Another model posits a chain of sequential exposures, with each exposure increasing the probability of the next exposure as well as influencing later disease risk in an additive effect, independently of subsequent exposures. Alternatively, in a model with a so-called trigger effect, exposures follow one another sequentially (and probabilistically), but disease risk is not increased until the effect of the final event in the chain, “Trajectory” or “pathway” generally refers to the sequence of exposures and outcomes over an individual’s lifetime, whereas intergenerational studies focus on the transmission of health or ill health, and the predictors of both, across more than 1 generation.

Several excellent reviews of the life-course literature have been published. In this article we provide a brief introduction to the life-course perspective to discuss its relevance to understanding and addressing health disparities.

WHAT EVIDENCE SUPPORTS THE LIFE-COURSE PERSPECTIVE?
Considerable epidemiologic evidence has accumulated, particularly over the past 2 decades, linking exposures in
TABLE 1  Adult Health Outcomes Associated With Childhood Socioeconomic Conditions

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause mortality</td>
<td>15–19</td>
</tr>
<tr>
<td>Cause-specific mortality</td>
<td></td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>13</td>
</tr>
<tr>
<td>Diabetes</td>
<td>13</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>13</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>13</td>
</tr>
<tr>
<td>Stroke</td>
<td>13–20</td>
</tr>
<tr>
<td>Carotid atherosclerosis</td>
<td>13</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>13</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>13</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>13</td>
</tr>
<tr>
<td>Impaired glucose tolerance</td>
<td>13</td>
</tr>
<tr>
<td>Metabolic syndrome</td>
<td>13</td>
</tr>
<tr>
<td>Spontaneous hypothyroidism</td>
<td>13</td>
</tr>
<tr>
<td>Self-rated health</td>
<td>13</td>
</tr>
</tbody>
</table>

This list is not exhaustive; it is provided to indicate the scope of adult health outcomes that have been examined with life-course research.

dysfunction during childhood and risk factors for several leading causes of death.14

The life-course literature is particularly rich in studies that have investigated the early-life antecedents of cardiovascular disease; outcomes have spanned ischemic heart disease and stroke, associated mortality, and risk factors, including hypertension, other biological markers, and behavioral risk factors. As shown in Table 1, childhood socioeconomic conditions also have been linked to adult-onset diabetes mellitus and mortality from diabetes, respiratory disease, smoking-related cancer, stomach cancer, and other adult outcomes.

Table 2 lists selected studies (also not an exhaustive list) that have linked low birth weight to adult ill health or its predictors. Other studies have linked low birth weight of offspring to adverse socioeconomic conditions during their parents’ childhood.53–56 Some intergenerational studies have examined low birth weight as an intermediate outcome between childhood adversity in 1 generation and adult ill health (or its predictors) in the subsequent generation.57

TABLE 2  Adult Health Outcomes Associated With Low Birth Weight

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause mortality</td>
<td>15–19</td>
</tr>
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<td></td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>13</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>13</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>13</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>13</td>
</tr>
<tr>
<td>Hypertension</td>
<td>13</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>13</td>
</tr>
<tr>
<td>Metabolic outcomes</td>
<td></td>
</tr>
<tr>
<td>Impaired glucose tolerance</td>
<td>13</td>
</tr>
<tr>
<td>Metabolic syndrome</td>
<td>13</td>
</tr>
<tr>
<td>Type 2 diabetes</td>
<td>13</td>
</tr>
<tr>
<td>Other health outcomes</td>
<td></td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>13</td>
</tr>
<tr>
<td>Depression</td>
<td>13</td>
</tr>
</tbody>
</table>

This list is not exhaustive; it is provided to indicate the scope of adult health outcomes that have been examined with life-course research.

As we attempt to understand the social patterning of birth-outcome disparities according to class and nativity as well as to race, many of us have come to suspect that stressful experiences over women’s lives before pregnancy represent a biologically plausible missing piece of the puzzle. At every level of current income and education, black women are more likely than their white counterparts to have experienced chronic stress as children caused by economic difficulties, racial discrimination, or both.86 Accumulating evidence about the physiology of stress demonstrates that stressful experiences, particularly when they are chronic, could result in hypothalamic-pituitary-adrenal axis and/or immune function dysregulation, making a woman more likely to have an excessive physiologic response to even minor stress.81,82 High cortisol levels or immune dysfunction during pregnancy could lead to adverse birth outcomes through immune, inflammatory, or vascular pathways or a combination of these pathways.83–88

QUESTIONS UNANSWERED BY EXAMINING ONLY PROXIMATE EXPOSURES (ie, EXPOSURES OCCURRING SHORTLY BEFORE AN OUTCOME)

Some of us have been drawn to consider a life-course approach as we confront persistent gaps in knowledge from research focused on exposures occurring not long before outcomes. For example, the two- to threefold disparity in low birth weight and preterm birth between black and white newborns is not explained by the known risk factors for adverse birth outcomes; these risk factors include current or recent smoking, drug use, underweight or inadequate pregnancy weight gain, and chronic disease.79

early life to health at later life stages. A range of predictors and outcomes has been examined, but a recurring theme has been consideration of early-life social factors and their links to adult chronic disease. Behavioral and mental health outcomes in adulthood also have been linked to early experience of trauma or adversity. In the retrospective Adverse Events in Childhood (ACE) study, adult respondents were assigned scores on the basis of their reports of abuse (emotional, physical, or sexual) or 5 types of household dysfunction in their first 18 years of life; a graded relationship was observed between this ACE score and adverse outcomes in measures of depression, anxiety, substance abuse, and sexual risk behaviors in adulthood.13 Data from the same population also revealed a strong dose response between the level of exposure to abuse or family dysfunction during childhood and risk factors for several leading causes of death.14

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HOW IS THE LIFE-COURSE PERSPECTIVE RELEVANT TO HEALTH DISPARITIES?

The term “health disparities” often means different things to different people. Although the dictionary could lead one to conclude that the term refers generically to all differences in health, it is used here to refer to potentially avoidable differences in health among groups of people who have different levels of social and economic advantage or disadvantage; it refers to differences in health on which socially disadvantaged groups (e.g., people of low incomes or educational attainment or members of a racial or ethnic group that historically has experienced discrimination) systematically do worse. For example, the large and persistent black-white disparities in low birth weight, infant mortality, and maternal mortality are examples of health disparities; the higher incidence of breast cancer among white women compared with black women is a health difference that deserves attention, but it is not what is meant by the term health disparity according to established usage in public health. In other words, health disparities are a subset of differences in health that deserve particular attention not only because they may be avoidable but also because they are unfair and unjust.

People might be socially advantaged or disadvantaged by virtue of their race or ethnic group or because of such socioeconomic factors as income, accumulated wealth, education, or residence in a socioeconomically advantaged or disadvantaged community. Other relevant dimensions include gender, religion, sexual orientation, disability, and other social characteristics that are associated with different levels of social stigma or influence and, hence, with different resources and opportunities in life. In this article, the term “health disparities” refers to differences in health according to race or ethnic group, socioeconomic factors, or both, on which the socially disadvantaged groups systematically experience worse health.

Figure 1 illustrates disparities in health by showing national data on child health levels (as assessed by parents) according to family income and race or ethnic group. It shows a striking stepwise gradient in health according to income within each of the largest racial or ethnic groups; as income rises, health improves.

The patterns are noted here to make 2 important points. First, substantial socioeconomic and racial disparities in health adversely affect the middle-class and low-income groups; these patterns have been observed for a wide range of health indicators among adults and children. Second, when investigating health disparities, one needs to consider not only socioeconomic factors such as income and education (the socioeconomic factors most frequently used in health research in the United States) but also racial or ethnic identity. Socioeconomic factors do not fully reflect some experiences of race-based discrimination that could have large health effects. Neither socioeconomic disparities nor disparities according to racial or ethnic group can be reduced to the other; although many epidemiologic studies fail to do so, both must be examined.

Figure 2 demonstrates the importance of examining a range of social factors, including socioeconomic characteristics and other measures (such as racial residential segregation) associated with racial or ethnic group that might not be captured by socioeconomic information. The figure illustrates the need for a new way of examining health and health disparities. This new perspective does not negate the importance of medical care but recognizes the need to look beyond it at the circumstances in which people live, work, learn, and play. This broader perspective is necessary to improve the health of all Americans and reduce the large health disparities among different groups according to class and race or ethnic group.

The prevailing view has been that individuals are solely responsible for their health-related behaviors. In line with that thinking, our health-promotion efforts have focused heavily on informing and encouraging individuals to change their behaviors. The contention in this monograph, however, is that we need to take a fresh look, because current approaches have not provided an acceptable return on investment.
Some public health campaigns have actually led to a widening of disparities as individuals in more socially advantaged groups experience greater health improvements because they have fewer obstacles to adopting healthier behaviors; this was the case with antitobacco efforts and, at least initially, with efforts to reduce the prevalence of sudden infant death syndrome. Moreover, we spend far more per capita on medical care than any other country, yet our rank is lower than that of most other affluent nations (and lower than that of even some resource-poor nations) on key indicators such as infant mortality and life expectancy. Perhaps our lack of success stems from a failure to examine the factors that can constrain or enable people to behave in health-promoting ways, to look at the factors that society must influence because they are beyond the control of individuals by themselves. This perspective does not question individual responsibility; it does, however, emphasize the importance of developing policies to remove the obstacles that—by exposing individuals to more hazards, providing them with fewer options for healthy behaviors, or both—systematically make some people less healthy than others.

As shown in Fig 1, although those with the least income suffer from the worst health, even those who are in the middle class are less healthy than more affluent people. We need to overcome obstacles to good health for everyone, with particularly concerted efforts to improve the health of those who are at greatest social and economic disadvantage (ie, those with more obstacles and fewer resources to address those obstacles). We need initiatives that will improve the health of the society as a whole while reducing disparities.

Figures 2 and 3 are relevant to the life-course perspective because they illustrate a way of drawing attention to social context at 2 levels. The first level is the underlying resources and opportunities that people have, reflected partly by income and education as well as by race or ethnic group, because it is so strongly associated with differential access to resources and opportunities. The second level is the living and working conditions into which people are sorted according to their income, education, and race or ethnic group (and other underlying resources and opportunities). Figure 2 illustrates a building block for a life-course perspective, without the dimension of time; it is a static view of how social factors can influence health directly
and indirectly by shaping health-related behaviors.

Figure 3 adds the dimension of time, depicting how underlying resources and opportunities shape living and working conditions, which, in turn, influence health at each stage of life. Figure 3 also depicts the ways in which social context early in life can have a strong influence on resources and opportunities (and, thus, on living and working conditions) at later stages. The figure shows not only an individual's trajectory across a lifetime from childhood to adulthood but also the intergenerational transmission of social advantage or disadvantage and, hence, of health.

Figure 4 offers a deeper look at how health disparities are created and sustained or compounded over a lifetime and across generations. Starting at the top, it shows how social stratification or social inequality (the formation of social hierarchies that systematically give some groups, such as social classes or racial and ethnic groups, more resources and opportunities than others) results in different groups that have differential exposure to health hazards or to health-promoting factors. Also as a result of social stratification, some groups are systematically more likely to develop health damage if they are exposed to a given hazard. These groups are then more likely to suffer the adverse social consequences of developing a given disease. For example, someone with limited schooling who becomes disabled is more likely to become unemployable than someone with good computer technical skills, because these skills are compatible with telecommuting. This results in more social stratification—widening inequality—over the lifetime of an individual and across generations as the children of adults who are disadvantaged socially and by ill health grow up in adversity. Figure 4 depicts what can be a vicious or virtuous cycle of social disadvantage or advantage, producing health damages or benefits across a lifetime or across generations.

CHALLENGES IN APPLYING THE LIFE-COURSE PERSPECTIVE TO RESEARCH, POLICY, AND PRACTICE

The gold standard in life-course research is a longitudinal study that prospectively follows a birth cohort into adulthood and, ideally, across generations. In the ideal study design, the investigators collect extensive information on the physical and social environments and on psychosocial or behavioral and biological measures; the researchers then repeat these measures for the same individuals over time. Much of the life-course literature comes from Europe, where investigators have had access to high-quality longitudinal databases rich in contextual information. In Table 1, 28 (73.7%) of the 38 listed studies, documenting a wide array of adult health outcomes associated with childhood socioeconomic conditions, were conducted in Europe or Australia/New Zealand, and of these, 13 used longitudinal data sources that measured variables from birth onward. The scope and depth of these data sources are exemplified by the Centre for Longitudinal Studies’ 1970 British Birth Cohort, the current participants of which are the survivors from an original sample of over 17,000 births in England, Wales, and Scotland during 1 week in 1970. As of 2006, analysis of these data had yielded more than 300 publications, reporting key findings in areas such as prenatal and perinatal antecedents of conditions, social circumstances and health outcomes, adult outcomes of childhood disease and health status, and predictors of adult health status. Research based on this birth cohort has provided crucial evidence in a number of government inquiries that led to policy and practice changes. In the United States, however, many life-course studies have had to rely on
TABLE 3  Examples of Major Health-Focused Longitudinal Databases: United States

<table>
<thead>
<tr>
<th>Name of Study, Lead Agency</th>
<th>Initial Sample</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alameda County Study, NIA</td>
<td>6928 noninstitutionalized Alameda County residents, aged ≥21 y at entry in 1965 (≥18 y if married)</td>
<td>1965, 1974, 1994, and 1995</td>
</tr>
<tr>
<td>Coronary Artery Risk Development in Young Adults (CARDIA), NHLBI</td>
<td>5115 black and white men and women aged 18–50 y at entry in 1986, in 4 major US cities</td>
<td>7 waves over 20 y</td>
</tr>
<tr>
<td>Health and Retirement Study (HRS), NIA</td>
<td>≥22 000 men and women aged ≥50 y in 1988</td>
<td>Biennially to present</td>
</tr>
<tr>
<td>Midlife Development in the United States (MIDUS), NIA</td>
<td>7000 men and women aged 25–74 y in 1995 (MIDUS I)</td>
<td>Second wave — 10 y later (MIDUS II)</td>
</tr>
<tr>
<td>National Longitudinal Study of Adolescent Health (ADD Health), NICHD</td>
<td>~90 000 students in grades 7–12 in 1984 at 145 schools; more than ~20 000 students and their parents interviewed at home</td>
<td>Reinterviewed at ages 18–26 and 24–32 y</td>
</tr>
<tr>
<td>Nurses’ Health Study (NHS), NIH</td>
<td>Original cohort: ~122 000 married registered nurses, aged 30–55 y in 1976; NHS II: 116 686 women aged 25–42 y in 1988</td>
<td>Biennially to present</td>
</tr>
</tbody>
</table>

NIA indicates National Institute on Aging; NHLBI, National Heart, Lung and Blood Institute; NICHD, Eunice Kennedy Shriver National Institute of Child Health and Human Development; NIH, National Institutes of Health.

TABLE 4  Examples of Other Longitudinal Databases: United States

<table>
<thead>
<tr>
<th>Name of Study, Lead Agency</th>
<th>Initial Sample</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Longitudinal Study Birth Cohort (ECLS-B), Department of Education</td>
<td>14 000 children born in 2001</td>
<td>Data collection at birth, 9 mo, 2 y, preschool age, and entry to kindergarten</td>
</tr>
<tr>
<td>Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K), Department of Education</td>
<td>Nearly 4 million kindergartners enrolled in 1998–1999</td>
<td>Additional data collection in 1st, 3rd, 5th, and 8th grades</td>
</tr>
<tr>
<td>NLSY79 Children and Young Adults, Bureau of Labor Statistics</td>
<td>Ongoing enrollment of NLSY79 women’s offspring, beginning in 1996</td>
<td>Biennially to present</td>
</tr>
<tr>
<td>Panel Study of Income Dynamics (PSID), National Science Foundation</td>
<td>4800 families in 1968 core sample; ~7400 families by 2005</td>
<td>Annually 1968–1986, biennially to present</td>
</tr>
</tbody>
</table>

retrospective approaches, including case-control and retrospective cohort studies that often have long recall periods for early exposures. In contrast with prospective longitudinal measurement of information from individuals followed over time, life-course research, particularly in the United States, often depends on record linkage, natural experiments, or historical cohorts with limited follow-up across life stages. Given the United States’ high per-capita gross domestic product (in 2007 only those of 2 Organisation for Economic Co-operation and Development countries were higher), lower levels of investment in admittedly costly longitudinal databases and studies may be assumed to reflect primarily differences in priorities rather than resources.

Table 3 lists longitudinal health-focused databases that US investigators often have used for life-course studies. Table 4 lists longitudinal databases for which the primary focus is not health but which contain health information and have been used by health researchers. None of the existing primarily health-focused databases begin at birth, and the Early Childhood Longitudinal Study-Birth Cohort follows children from birth only through preschool. Table 5 is a list of selected European longitudinal databases that include some data on participants from birth through adulthood.

An exciting opportunity for many US health researchers is provided by the National Children’s Study, which is scheduled to begin collecting data soon on a representative sample of 100 000 newborns and to follow the cohort through the age of 21 years. The National Institutes of Health is leading the study but has been collaborating extensively with other sectors to ensure the collection of a rich array of contextual information.

As anyone who has analyzed longitudinal data knows, it is exceedingly challenging...
to study complex pathways over time, taking into account the temporal and potential relationships at any given point in time. In addition, previous research tells us that socioeconomic conditions in early life are strongly associated with later-life socioeconomic conditions, which, in turn, have demonstrated links with adult health.

To tease out the “independent” impact of early socioeconomic circumstances on later health (ie, to assess whether early adverse exposures themselves are manifested in later irreversible or difficult-to-reverse health damage, regardless of later experiences), most life-course studies have attempted to control for socioeconomic circumstances later in life. Such adjustments can lead to underestimates of the influence of early-life factors on subsequent health. For example, “overcontrolling” could mask the influence of key mediators on the causal pathway from early conditions to later adult health.

Life-course studies designed to better understand health disparities have an even greater challenge than life-course studies in general. To understand disparities not only in child health but also in adult health in relation to experiences during childhood, we must examine multiple determinants of health and of health disparities. The risk factors for disparities in a given health indicator are not always the same as those for levels of that health indicator on average.

To understand the underlying basis for disparities in a particular health outcome, we need to understand not only the causal exposures that occur in close temporal proximity to the outcome but also the more fundamental causes or, in other words, the causes of the causes. We must consider the social and physical environments that create great opportunities or daunting obstacles to health, in part by constraining choices. We must consider multiple dimensions of material deprivation, social disadvantage, discrimination, and marginalization. These dimensions include poverty- and race-based discrimination and their health consequences, as well as the health effects of chronic stress that arise from having inadequate resources to deal with crushing demands. These are some of the factors that belong in the 2 outer arches of Fig 2 as examples of economic and social resources and opportunities and of the living and working conditions that they produce. These are the factors that produce health disparities by tracking different groups of people into different exposures, different vulnerabilities to exposure, and different consequences of ill health. These harmful or protective factors should be examined at multiple levels of aggregation or analysis from the individual, family, community, and societal levels. A life-course study, furthermore, must examine these multiple dimensions of social advantage and disadvantage over time. This is a tall order to fill. It is impossible to describe fully all the significant social and economic influences at the individual, family, and community levels at any given point in time, let alone across a lifetime. We must be aware of this limitation as we interpret research findings that will inevitably be incomplete in some regard. We must also be careful not to invoke genes or “culture” to explain racial or ethnic disparities in health without considering the potential roles of unmeasured differences in social or economic experiences and in chronically stressful experiences related to low income or to racial discrimination.

The challenges in conducting life-course research are considerable, but the challenges in applying the life-course perspective to policy and practice are even greater. One major obstacle is that when the costs and benefits of proposed policies are being weighed, the time frame for outcome measurement is very short (typically 3 to 5 years) for the Office of Management and Budget, which assesses

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### TABLE 5 Examples of Major Longitudinal Health-Focused Databases: Europe

<table>
<thead>
<tr>
<th>Name of Study</th>
<th>Initial Sample</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avon Longitudinal Study of Parents and Children</td>
<td>&gt;14 000 mothers enrolled during pregnancy in Bristol, United Kingdom, during 1991 and 1992</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Millennium Cohort Study (MCS)</td>
<td>18 818 infants born in the United Kingdom over a 12-mo period in 2000–2001 and living in selected UK wards at 9 mo of age</td>
<td>4 waves between June 2001 and present</td>
</tr>
<tr>
<td>National Child Development Study (NCDS)</td>
<td>17 500 infants born in England, Scotland, and Wales in a week in March 1958</td>
<td>7 waves to the present</td>
</tr>
<tr>
<td>Newcastle Thousand Families Study</td>
<td>All 1142 infants born to mothers in Newcastle Upon Tyne, United Kingdom, May–June 1947</td>
<td>At ages 15, 22, 32, 50, and 54 y</td>
</tr>
<tr>
<td>Population, Cancer, Cause of Death, and Hospital Discharge Registries</td>
<td>Population-wide registries in the Scandinavian countries, linkable through the personal identification code</td>
<td>NA</td>
</tr>
<tr>
<td>Understanding Society Study</td>
<td>Household members aged ≥10 y in 40 000 households across the United Kingdom</td>
<td>Annually from 2009</td>
</tr>
</tbody>
</table>

NA indicates not applicable.
proposed federal legislation. Politicians typically want credit for the initiatives they enact, but a life-course perspective tells us that it can often take 1 or more generations to realize the full benefits of investments in early childhood.

Perhaps even more challenging are the “silos” that isolate different sectors. In the current structures, the education and social welfare sectors will not receive credit for improvements in adult health that result from investments in high-quality early-childhood development programs and improved K–12 schooling. The transportation sector will not receive credit for the health benefits that result from improving public transportation in ways that provide communities with more employment opportunities. The agencies that must invest in improving early-childhood living conditions to produce healthy adults are not the same agencies that will receive the credit or any monetary savings from improved adult health. The political and bureaucratic structures that separate different agencies, particularly across different sectors, are among the greatest obstacles to translating knowledge from life-course research into effective policy and practice.

**AN AGENDA FOR RESEARCH AND ACTION INFORMED BY LIFE-COURSE PERSPECTIVES**

We need more life-course research, which will require longitudinal studies with extensive multilevel information on social and physical context as well as biology and behavior over time. The National Children’s Study is a step in the right direction. However, future funding to follow the cohort into adulthood is not ensured. In addition, although the National Children’s Study will provide a rich source of contextual information, no single study can cover all important research questions, and many items desired by researchers are not included in the study.

We also need to incorporate more information on life-course social context into routine cross-sectional data sources as well as special studies. More investment is needed for developing measures that can, despite long recall periods, capture important information about past experiences. We need more research on the early-life origins of adult chronic disease. Understanding birth outcome disparities should receive special priority, given how powerfully low birth weight and preterm birth predict development and health across the life course.

In addition to more research, we need to apply the knowledge that we currently have; the available knowledge gives considerable guidance. Current evidence tells us that we need to give a higher priority to identifying and implementing policies that will ensure favorable living conditions in early childhood and that health care is important but not sufficient for achieving good health and reducing health disparities.\(^{119–121}\) Available evidence also shows that we must reduce child poverty and its social consequences if we are to improve adult health. We know that we must reduce multiple dimensions of disadvantage. We also know that effective interventions are available, including high-quality programs modeled on the most effective early Head Start approaches, high-quality child care, and support for parents.\(^{122,123}\) In the United Kingdom, the 1998 Report of the Independent Inquiry into Inequalities in Health, chaired by Sir Donald Acheson, recommended 39 actions that are intended to ameliorate health inequalities primarily by improving living conditions for vulnerable groups such as children, pregnant women, older people, and ethnic minorities. On the basis of the Acheson Commission’s findings, the Labor government enacted policies designed to reduce poverty and adversity in early childhood, targeting improvements in housing, schools, and child care in deprived areas, as well as wage, tax, and welfare reform.\(^{114,124,125}\)

Figure 4 is useful not only for elucidating the relationships involved in the production of health or disease across a lifetime and generations but also for calling our attention to the multiple points at which society can intervene through policies to interrupt the vicious cycles leading to health disparities that begin in early childhood. Policies can reduce social stratification, for example, by reducing poverty, racial discrimination, or both. Policies can reduce harmful exposures for those who are most disadvantaged, for example, by creating affordable and adequate housing, improving neighborhood environments, and enforcing antidiscrimination measures that affect access to health-promoting housing and neighborhoods. Policies can also reduce susceptibility to developing ill health once people are exposed to risk factors by, for example, supporting after-school programs for at-risk youth. Policies can markedly alter the social consequences of ill health through, for example, programs such as Social Security and Medicaid.

The life-course perspective tells us that we must change the time frame for evaluating policy outcomes and impact, and we must break down the sector-specific silos, which will require action at the highest levels of government. Child health advocates must recognize that children live with adults. As a result, we cannot improve children’s experiences without addressing the needs and improving the experiences of their adult caregivers.

Child health advocates should understand that a life-course perspective offers a very powerful argument for
more investment in childhood because of the impact of childhood experiences on later adult health. They should understand, however, that the evidence indicates that investment in medical care alone will not achieve the desired effect; investment in children’s living and learning conditions is required. Adult health effects might be more compelling than child health effects to many policy makers, because adults can vote and adult health translates into economic productivity.

The current economic crisis could create even more barriers to enacting bold new initiatives that require substantial resources, such as efforts to drastically reduce childhood poverty. Perhaps this is also a time of unique opportunity, when we might be willing to reexamine many of our most fundamental assumptions in the face of evidence that the course we have been following is not working. That evidence includes our country’s low standing on key health indicators compared with other affluent nations, although we spend more on medical care. The evidence also includes our rates of childhood poverty, which are among the highest among affluent nations. Can we afford to address child poverty in the United States? The life-course perspective indicates that we cannot afford not to address it.

REFERENCES

44. Barker DJ, Eriksson JG, Forsén T, Osmond C. Fetal origins of adult disease: strength
of effects and biological basis. Int J Epidemiol. 2002;31(8):1235–1239


65. Barker DJ, Bull AR, Osmond C, Simmonds SJ. Fetal and placental size and risk of hypertension in adult life. BMJ. 1990;301(6746):259–262


68. Koupiliová I, Leon DA, Vågåro D. Can confounding by sociodemographic and behavioural factors explain the association between size at birth and blood pressure at age 50 in Sweden? J Epidemiol Community Health. 1997;51(1):14–18


71. Kajantie E, Phillips DI, Osmond C, Barker DJ, Forsén T, Eriksson JG. Spontaneous hypothyroidism in adult women is predicted by small body size at birth and during childhood. J Clin Endocrinol Metab. 2006;91(12):4953–4956


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