

The Social Determinants of Health: Coming of Age

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Abstract

In the United States, awareness is increasing that medical care alone cannot adequately improve health overall or reduce health disparities without also addressing where and how people live. A critical mass of relevant knowledge has accumulated, documenting associations, exploring pathways and biological mechanisms, and providing a previously unavailable scientific foundation for appreciating the role of social factors in health. We review current knowledge about health effects of social (including economic) factors, knowledge gaps, and research priorities, focusing on upstream social determinants—including economic resources, education, and racial discrimination—that fundamentally shape the downstream determinants, such as behaviors, targeted by most interventions. Research priorities include measuring social factors better, monitoring social factors and health relative to policies, examining health effects of social factors across lifetimes and generations, incrementally elucidating pathways through knowledge linkage, testing multidimensional interventions, and addressing political will as a key barrier to translating knowledge into action.

Social determinants of health (SDOH):

social (including economic) factors with important direct or indirect effects on health

World Health Organization (WHO)

Commission: Commission on the Social Determinants of Health

Robert Wood Johnson Foundation (RWJF)

Commission: Commission to Build a Healthier America

Social advantage or disadvantage:

refers to the relatively favorable or unfavorable social, economic, or political conditions that some groups systematically experience based on their relative position in social hierarchies

INTRODUCTION

Growing Attention in the United States to the Social Determinants of Health

The impact of absolute material deprivation—grossly inadequate food, clothing, shelter, water, and sanitation—on health has been recognized for centuries (93); until relatively recently, discussions of socioeconomic influences on health in the United States focused primarily on links between poverty and health. Over the past 15–20 years, however, a new discourse on social factors and health—with wider relevance to the general population—has emerged in the United States, building on earlier work in Europe and Canada. **Figure 1** illustrates the rapidly growing literature on the social (including economic) determinants of health (SDOH) in the United States and elsewhere. The concept is becoming far less marginal in the U.S. public health realm in general, not only in academia; the SDOH have received increasing attention from public health and nonprofit agencies (21, 29, 88, 90, 113).

This growing momentum reflects a confluence of several phenomena: First, an accumulating critical mass of knowledge in social and biomedical sciences from the United

States and other countries (1, 10, 123) has led to increased understanding of how social factors influence health and has enhanced the scientific credibility of relevant efforts. Notable recent initiatives include the World Health Organization (WHO) Commission on the Social Determinants of Health (122), the MacArthur Foundation Network on Socioeconomic Status and Health (111), and the Robert Wood Johnson Foundation (RWJF) Commission to Build a Healthier America (91). Incremental improvements in health with increasing social advantage have now been observed in the United States (14) as well as in Europe (69, 92), indicating the relevance of SDOH for middle-class as well as the most disadvantaged Americans. Systematic efforts have disseminated this knowledge and made it compelling for broader U.S. audiences (17, 91).

An increasing focus among U.S. researchers, health agencies, and advocates on the concept of health equity has also contributed, encompassing the spectrum of causes—including social determinants—of racial/ethnic and other social disparities in health that raise concerns about justice (8, 15, 79, 88, 113). Finally, U.S. public health leaders and researchers have increasingly recognized that the dramatic health problems we face

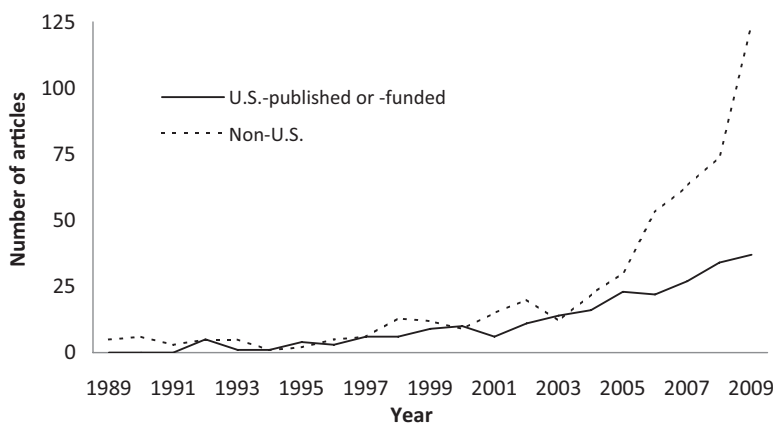


Figure 1

Increasing number of studies of social determinants of health in the United States and Europe. Source: Results of a PubMed search for “social determinants.” Literature related to health outcomes, indicators, or promotion was included; health-care literature was not included.

cannot be successfully addressed by medical care alone. The low U.S. ranking on key health indicators internationally has continued to fall as our medical expenditures skyrocket, far outstripping those of healthier nations.

Upstream and Downstream Social Determinants of Health

The term social determinant of health is often used to refer broadly to any nonmedical factors influencing health, including health-related knowledge, attitudes, beliefs, or behaviors (such as smoking). These factors, however, represent only the most downstream determinants in the causal pathways influencing health; they are shaped by more upstream determinants. To illustrate the upstream/downstream metaphor, consider people living near a river who become ill from drinking water contaminated by toxic chemicals originating from a factory located upstream. Although drinking the contaminated water is the most proximate or downstream cause of illness, the more fundamental (yet potentially less evident, given its temporal and physical distance from those affected) cause is the upstream dumping of chemicals. A downstream remedy might recommend that individuals buy filters to treat the contaminated water before drinking; because more affluent individuals could better afford the filters or

bottled water, socioeconomic disparities in illness would be expected. The upstream solution, focused on the source of contamination, would end the factory's dumping. Although these concepts may make intuitive sense, the causal pathways linking upstream determinants with downstream determinants, and ultimately with health, are typically long and complex, often involving multiple intervening and potentially interacting factors along the way. This complexity generally makes it easier to study—and address—downstream determinants, at the risk of failing to address fundamental causes.

This article focuses on the more upstream social determinants of health—the factors that play a more fundamental causal role and represent the most important opportunities for improving health and reducing health disparities. **Figure 2** illustrates the conceptual framework for the RWJF Commission's work. Although the relationships are more complex, this simplified schema highlights several important concepts. First, it shows that health-related behaviors and receipt of recommended medical care (key downstream determinants of an individual's health) do not occur in a vacuum. Rather, these factors are shaped by more upstream determinants related to the living and working conditions that can influence health both directly (e.g., through toxic exposures or stressful experiences) and indirectly (by shaping

Downstream social determinants: factors that are temporally and spatially close to health effects (and hence relatively apparent), but are influenced by upstream factors

Upstream social determinants: fundamental causes that set in motion causal pathways leading to (often temporally and spatially distant) health effects through downstream factors



Figure 2

What influences health? Upstream and downstream determinants.

Educational attainment (often referred to simply as “education”): years or level of completed schooling, which does not reflect the quality of education

the health-related choices that individuals have and make for themselves and their families). The diagram highlights how health is shaped not only by living and working conditions, but also by even more upstream determinants that reflect the economic and social resources and opportunities that influence an individual’s access to health-promoting living and working conditions and to healthy choices.

WHAT DO WE KNOW ABOUT THE ROLE OF SOCIAL FACTORS IN INFLUENCING HEALTH?

The Patterns of Association between Social Factors and Health

Evidence from decades of research examining associations between key social factors—primarily educational attainment and income in the United States and occupational grade (ranking) in Europe—and health outcomes throughout the life course overwhelmingly links greater social disadvantage with poorer health (1, 10, 27, 46, 66, 67). The striking and pervasive—albeit not universal—patterns are informative. Researchers have observed stepwise socioeconomic gradients in Europe, particularly the United Kingdom, for 30 years (69, 92) and more recently in the United

States (14, 73, 82). As seen in **Figure 3**, using U.S. data, overall and in multiple racial/ethnic groups, the improvements in health with increasing social advantage—measured here by income—generally follow a stepwise, incremental gradient pattern: Although the most disadvantaged—those with below-poverty-level incomes or without high-school completion—typically experience the worst health, even those with intermediate income or education levels appear less healthy than the most affluent/educated (14).

The social gradients in health provide clues to understanding the SDOH. Although other research is needed to clarify the underlying pathways, the dose-response relationship suggested by the gradient patterns supports the biological plausibility of a fundamental causal role for one or more upstream SDOH. Gradients by income, education, or occupational grade could reflect relatively direct health benefits of having more economic resources (e.g., healthier nutrition, housing, or neighborhood conditions, or less stress due to more resources to cope with daily challenges), unmeasured socioeconomic factors, and/or associated psychosocial/behavioral factors, such as health-related behaviors (109), self-perceived social status (121), or perceived control (68). Reverse causation as an alternative explanation is discussed below.

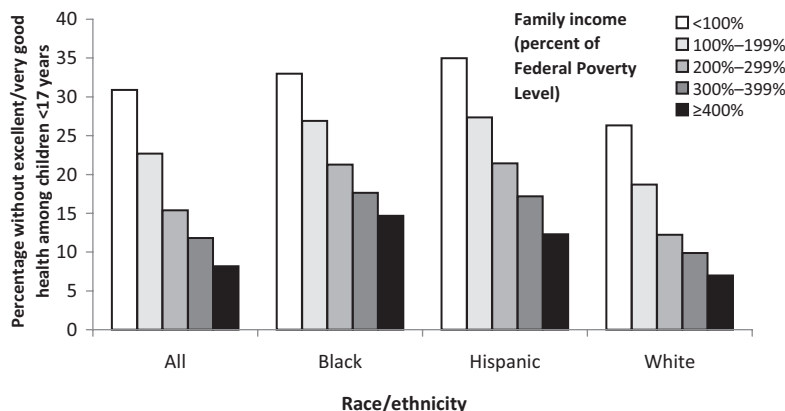


Figure 3

Social gradients in self-reported health overall and within racial/ethnic groups. Source: National Health Interview Survey 2001–2005.

Understanding the Pathways through which Social Factors Shape Health

Following the framework depicted in **Figure 2**, we briefly review current knowledge of how several important upstream social factors influence health.

Neighborhood conditions and health.

Neighborhoods can influence health through their physical characteristics, such as air and water quality and proximity to facilities that produce or store hazardous substances; exposures to lead paint, mold, dust, or pest infestation in housing; access to nutritious foods and safe places to exercise; or risk of pedestrian accidents (6, 23, 48, 49, 51, 77, 97). The availability and quality of neighborhood services—including schools, transportation, medical care, and employment resources—can also influence health, e.g., by shaping residents' opportunities to earn a living (43, 83, 117). Neighborhoods' physical and service characteristics can create and reinforce socioeconomic and racial/ethnic disparities in health. Health is also shaped by social relationships. For example, neighborhoods where residents express mutual trust and are willing to intervene for the public good have been linked with lower homicide rates (76, 98); conversely, less closely knit neighborhoods and more social disorder have been related to anxiety and depression (32, 84, 94).

Many—but not all—studies have found that neighborhood features are associated with health even after considering residents' individual-level characteristics (37). Surprisingly, some researchers—albeit not many—have found poorer health among disadvantaged individuals living in relatively advantaged neighborhoods (85, 89, 120), possibly because of adverse psychological effects of feeling worse off than one's neighbors and/or stronger social ties or reduced exposure to discrimination associated with a greater geographic concentration of one's own group (119).

Working conditions and health. The physical aspects of work—the traditional domain of occupational health and safety—represent an obvious pathway through which work influences health. For example, jobs requiring repetitive movements and/or high physical workload put workers at higher risk for musculoskeletal injuries and disorders (81), whereas physically inactive workers in sedentary jobs are at increased risk of obesity and chronic diseases such as diabetes and heart disease (115); physical conditions in the workplace such as inadequate ventilation, high noise levels, and hazardous chemical exposures can also harm health. Psychosocial aspects of work represent another pathway to health. For example, working overtime has been associated with injury, illness, and mortality (20). Workers in jobs characterized by high demands coupled with low control or by perceived imbalance of efforts and rewards are at higher risk of poor health (34, 56); control at work may be a major contributor to socioeconomic differences in health among employed persons (56, 68). Social support at work has also been linked with health (104–107); environments facilitating mutual support among coworkers may buffer against physical and mental health stressors (60).

Work-related opportunities and resources can also influence health. Employment-related earnings represent most Americans' primary economic resource, shaping health-related decisions made for themselves and their families; work-related benefits—including medical insurance, paid leave, schedule flexibility, workplace wellness programs, child- and elder-care resources and retirement benefits—could also be important. Well-paying jobs are more likely to provide benefits, greater financial security, and ability to afford healthier living conditions. In contrast, the working poor—estimated at 7.4 million U.S. workers in 2006 (112)—generally do not earn enough to cover basic necessities and are less likely to have health-related benefits (27, 54). Different pathways linking work and health may interact to exacerbate social disparities in health: Socially disadvantaged groups

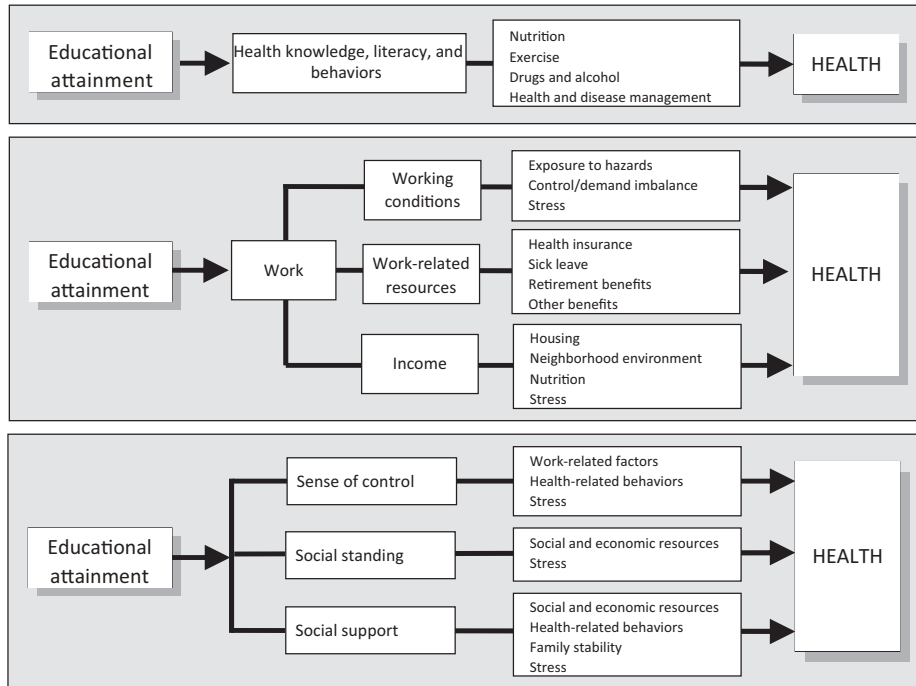


Figure 4
Multiple pathways linking education to health.

are more likely to have health-harming physical and psychosocial working conditions, along with disadvantaged living conditions associated with lower pay (38).

Education and health. Figure 4 depicts three interrelated pathways through which educational attainment (completed schooling) is linked with health. It is widely recognized that education can lead to improved health by increasing health knowledge and healthy behaviors. This may be explained in part by literacy, allowing more-educated individuals to make better-informed, health-related decisions—including about receipt and management of medical care—for themselves and their families (36, 99). Greater educational attainment has been associated with health-promoting behaviors (3) and earlier adoption of health-related recommendations (31).

Education also plays an important role in health by shaping employment opportunities, which are major determinants of economic resources. More-educated individuals experience lower rates of unemployment, which is strongly associated with worse health and higher mortality (4); they are more likely to have jobs with healthier physical and psychosocial working conditions, better health-related benefits (44), and higher compensation (30) (which determines affordability of health-promoting living conditions). Education may also affect health by influencing social and psychological factors. More education has been associated with greater perceived personal control (74), which has frequently been linked with better health and health-related behaviors (63, 74, 75). Greater educational attainment is generally associated with higher relative social standing; subjective social status (an individual’s perception of his or her ranking in a social

hierarchy) may predict health even after controlling for more objective indicators of social status (35). More education also has been linked with increased social support (72), which is associated with better physical and mental health (5); social support may buffer the health-damaging effects of stress (110), influence health-related behaviors (24), and if one's social networks are socially advantaged, enhance access to employment, housing, and other opportunities and resources that can influence health (19).

The role of educational quality—e.g., the employment opportunities, prestige, social networks, and other advantages accompanying a degree from an elite institution—is rarely considered in health studies. Educational attainment thus can underestimate health-related differences related to education (75, 95).

Income, wealth, and health. Economic resources reflect access to material goods and services, including income (monetary earnings during a specified time period) and wealth (accumulated material assets, such as the value of one's home, household possessions, vehicles and other property, bank accounts, and investments). Theoretically, wealth may better reflect economic resources overall, but it is more difficult to measure than income and hence less frequently measured in health studies. Among studies that have included both, many (but not all) have found links between wealth and health after considering income (87). Racial/ethnic differences in income markedly underestimate differences in wealth (13).

Reverse causation (income loss due to poor health) occurs but does not fully account for the observed associations of income/wealth and health (58, 78). Many longitudinal studies show that economic resources predict health or its proximate determinants, even after adjustment for education (2, 33, 52) [although education is a stronger predictor for other outcomes (52) and both are likely to matter (13, 58)]. Health effects of increasing income have been observed in randomized and natural experiments (58).

Several researchers have observed health effects of income/wealth even after adjusting for many other relevant factors (33, 58, 62). Particularly when other socioeconomic factors are inadequately measured, however, observed associations between income/wealth and health may reflect effects of other socioeconomically linked factors such as educational attainment and quality, childhood socioeconomic circumstances, neighborhood characteristics, physical and psychosocial working conditions, and subjective social status. The health effects of low economic resources may be ameliorated by access to other resources and opportunities; for example, some relatively low-income countries/states (e.g., Cuba, Costa Rica, and Kerala, India) have favorable health indicators that may be explained by long-standing societal investments in education, social safety nets, and/or prevention-oriented medical care (41).

Income inequality (measured at an aggregate level) has often been linked with health (116), although a causal link is debated (65, 116). Income inequality could affect health by eroding social cohesion (59). The link could also be explained by other factors strongly associated with both income inequality and health, such as lack of social solidarity, which could be both a cause and an effect of income inequality.

Race, racism, and health. In the United States and many other societies, race or ethnic group is another important social factor that influences health, primarily because of racism. Racism refers not only to overt, intentionally discriminatory actions and attitudes, but also to deep-seated societal structures that—even without intent to discriminate—systematically constrain some individuals' opportunities and resources on the basis of their race or ethnic group. Racial residential segregation is a key mechanism through which racism produces and perpetuates social disadvantage (22, 117). Blacks and Latinos are more likely to reside in disadvantaged neighborhoods with inadequately resourced schools and hence to have lower educational attainment and quality

Racial discrimination, racism: includes societal structures, such as residential segregation and social networks, that systematically perpetuate social disadvantage along racial or ethnic lines, even without conscious intent to discriminate

(96), with resultant health effects through pathways discussed above. Racism may also affect health more directly through pathways involving stress; chronic stress related to experiences of racial/ethnic bias, including relatively subtle experiences arising even without consciously prejudicial intent, may contribute to racial/ethnic disparities in health, regardless of one's neighborhood, income, or education (80, 118). More education or income may paradoxically expose blacks or Latinos to more discrimination because of more contact with (non-Latino) whites. Race-health links could also be shaped by perceptions of how one's race—and its associations with social influence, prestige, and acceptance—affects one's relative place in social hierarchies. Associations between discrimination and health similar to those observed in the United States are being found in other countries (118).

The pervasive role of stress. Coping with daily challenges can be particularly stressful when one's financial and social resources are limited. Recent evidence implicates chronic stress in the causal pathways linking multiple upstream social determinants with health, through neuroendocrine, inflammatory, immune, and/or vascular mechanisms (71, 108). Stressful experiences—such as those associated with social disadvantage, including economic hardship (12, 40) and racial discrimination (118)—may trigger the release of cortisol, cytokines, and other substances that can damage immune defenses, vital organs, and physiologic systems (71, 101). This mechanism can lead to more rapid onset or progression of chronic illnesses, including cardiovascular disease (108), and the bodily wear and tear associated with chronic stress may accelerate aging (70, 102, 103). The accumulated strain from trying, with inadequate resources, to cope with daily challenges may, over time, lead to more physiological damage than would a single dramatically stressful event (70). A recent collection of papers summarizes current knowledge of pathways and biological mechanisms likely to be involved in the health effects

of stress and other psychosocial factors—including perceived control, subjective social status, and social support (1).

The Health Effects of Social Factors Across Lifetimes and Generations

The importance of early childhood experiences. Among the strongest bodies of SDOH evidence is work considering adverse health effects of early childhood experiences associated with family social disadvantage. Many studies have shown that early experiences affect children's cognitive, behavioral, and physical development (7, 25, 53, 55), which predicts health; developmental differences have been associated with socioeconomically linked differences in children's home environments, including differences in stimulation from parents/caregivers (7, 39, 50, 114, 123). Biological changes due to adverse socioeconomic conditions in infancy and toddler years appear to become "embedded" in children's bodies, determining their developmental capacity (53). Several longitudinal studies following children from early childhood through young adulthood have linked childhood developmental outcomes with subsequent educational attainment (18, 47, 100), which is strongly associated with adult health (discussed above).

Substantial evidence indicates that pathways initiated by childhood adversity can be interrupted. Studies show that high-quality early childhood development interventions—including center-based programs to nurture and stimulate children and to support and educate parents—greatly ameliorate the effects of social disadvantage on children's cognitive, emotional/behavioral, and physical development (57); the first five years of life appear to be most crucial (55), although opportunities for intervention continue throughout childhood (55) and adolescence (42).

The intergenerational transfer of advantage and health. A rich literature over the past two decades examines how differences in social advantage can influence health both

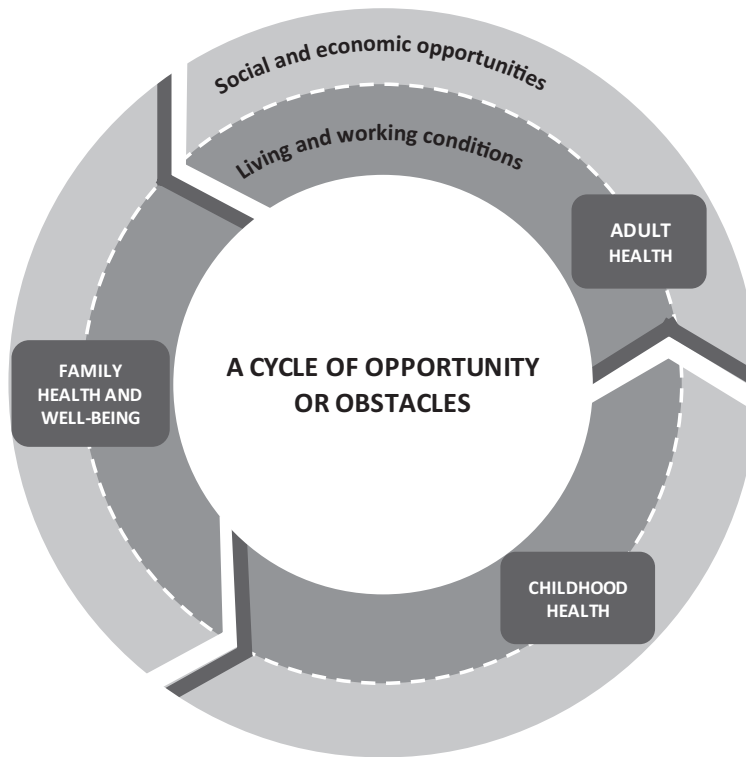


Figure 5

Social advantage and health advantage are transmitted across lifetimes and generations.

over lifetimes and across generations (9, 26, 40, 45, 46, 53, 55, 64, 66, 102, 108, 124). As illustrated in **Figure 5**, developed for the RWJF Commission, upstream social factors influence health at each life stage, with accumulating social advantage/disadvantage and health advantage/disadvantage over time. Children of socially disadvantaged parents are less healthy and have more limited educational opportunities, both of which diminish their chances for good health and social advantage in adulthood. Emerging research on gene-environment interactions suggests that the intergenerational transmission of social advantage and health may be partially explained by epigenetic changes in gene expression, which in turn are passed on to subsequent generations (61).

ADDRESSING THE KNOWLEDGE GAPS

Gaps in Current Knowledge about the Social Determinants of Health

A large body of evidence from observational research strongly and repeatedly links multiple upstream social (including economic) factors with a wide array of health outcomes, and understanding—albeit incomplete—of underlying pathways and biological mechanisms has been growing. With notable exceptions, however, we know little about effective ways to address social factors to improve health and reduce health disparities—about when, where, and how to intervene.

The gaps in knowledge reflect several challenges. More often than not, the relationships

between upstream social factors and health are complex and play out over long periods of time, involving multiple intermediate outcomes subject to effect modification by characteristics of people and settings along the causal chain. This complexity makes it difficult to learn about the specific pathways through which upstream social factors shape health and to identify priorities for intervention. Addressing the knowledge gaps is also complicated by our limited ability to measure upstream social factors. Current measures do not fully capture—or tease out the distinct effects of—relevant aspects of income, wealth, education, or occupational rank. For example, the observed effects of race/ethnicity on adult health after adjustment for available socioeconomic measures suggest a potential role for unmeasured social influences (13)—e.g., childhood circumstances, neighborhood characteristics, accumulated wealth, racial discrimination. Development of better measures of these influences is in its infancy (13, 37, 80, 118). Research funding is also an issue. Most U.S. research funding supports studies of single diseases rather than causal or contributory factors with effects that manifest across multiple diseases, putting SDOH research at a disadvantage. The health effects of upstream social factors—or interventions to address them—may not manifest for decades or generations; longitudinal studies are expensive and access to longitudinal databases is particularly limited in the United States (9). Conducting randomized trials, the gold standard for establishing effectiveness in health sciences, is particularly challenging for upstream interventions.

Priorities for Further Research

Investment at this time would be particularly strategic in several areas. Research to improve the measurement of social factors is an important requisite for effective efforts in all of the following areas.

Descriptive studies and monitoring. Ongoing descriptive research is needed to monitor changes over time both in the distributions

of key upstream social factors (e.g., income, wealth, and education) across groups defined by race/ethnicity, geography, and gender, and in their associations with health outcomes in specific populations and settings. Interpreted in light of relevant policies, these findings can indicate the extent to which social and health disadvantage affects different groups and gauge progress toward improving health and reducing health disparities.

Longitudinal research. We need more life-course research, including longitudinal studies to build public-use databases with comprehensive information on both social factors and health, collected over time frames long enough—ideally multiple generations—for health consequences of early childhood experiences to manifest. A more reasonable balance is needed between investments in studying adult disease and examining children’s trajectories of health and social advantage across the life course.

Connecting the dots: linking knowledge to elucidate pathways and assess interventions. Even robust longitudinal data are unlikely to provide sufficient information for tracing the effects of an upstream determinant (A) through relevant pathways to its ultimate health outcomes (Z), particularly if exposure to A occurs in childhood and outcome Z occurs much later. Attempting to document and quantify the effects of A on Z in a single study represents an important obstacle to understanding how social factors influence health—and how to intervene. Considering the potential for effect modification by characteristics of people and contexts at each step of multiple complex causal pathways, the consistency of existing findings linking upstream social determinants with distal health outcomes seems remarkable.

To strengthen our understanding of how upstream social factors shape health, we need to connect the dots by building the knowledge base incrementally through linking a series of distinct studies (perhaps spanning multiple disciplines) that examine specific segments of the

pathways connecting A to Z. For example, one study could test the effects of an upstream determinant on an intermediate outcome, which then could be the independent variable in subsequent studies of increasingly downstream intermediate outcomes; no single study would be expected to span all steps from A to Z. Once the links in the causal chain are documented, a similar incremental approach could be applied to study the effectiveness of interventions, e.g., testing the effects of an upstream intervention on an intermediate outcome with established links to health. This approach to advancing knowledge is not new: Medicine and public health often rely on evidence from studies of intermediate outcomes (e.g., obesity) with demonstrated links to other outcomes (e.g., diabetes or cardiovascular disease) (11). Although not definitive, the knowledge gained from connecting the dots can be compelling when confirmed in multiple studies; furthermore, policy makers must recognize that the limited generalizability of findings from randomized experiments introduces uncertainty as well (11).

Testing multidimensional interventions versus seeking a magic bullet. We need research to inform translation of existing knowledge about the SDOH into effective and efficient policies. Often, the rate-limiting step may not be insufficient knowledge of pathways but rather lack of solid evidence about what, specifically and concretely, works best in different settings to reduce social inequalities in health. For example, although we have convincing evidence that educational quality and attainment powerfully influence health through multiple pathways, lack of consensus about interventions is often invoked to justify inaction. Knowledge of pathways can point to promising or at least plausible approaches but generally cannot indicate which actions will be effective and efficient under different conditions; that knowledge can come only from well-designed intervention research, including both randomized experiments (when possible and appropriate) and nonrandomized studies with rigorous attention to comparability and bias.

Intervention research often seeks to identify the magic bullet that will yield results on its own, a stand-alone intervention with independent effects after adjusting for other factors. This notion may be reasonable when considering surgery, but the complex pathways linking social disadvantage to health suggest that seeking a single magic bullet is unrealistic. Interventions with individuals may require simultaneous efforts with families and communities. Recognizing the expense and methodologic challenges, we need multifaceted approaches that operate simultaneously across domains to interrupt damaging (and activate favorable) pathways at multiple points at which the underlying differences in social advantage and the consequent health inequalities are produced, exacerbated, and perpetuated.

Other issues must also be addressed. Research funding must be expanded beyond a focus on single diseases and/or biomedical factors exclusively. The time frame for evaluating program or policy effectiveness should be extended (11). Researchers must be trained in the concepts, measures, and methods needed both to study SDOH and their interactions with biomedical factors (e.g., gene-environment interactions) and to consider social factors in clinical and laboratory studies focused on other questions.

Political barriers to translating knowledge to action. The field of SDOH is coming of age in many ways, with respect to increased attention within and beyond academia; documentation of strong and pervasive links between social and economic factors and health; and the accumulation of knowledge of pathways and biological mechanisms that provide a scientific foundation for appreciating the role of social factors in health. Although associations between social factors and health are no longer in question, we have much to learn, both about the underlying processes linking upstream social determinants and most health outcomes and about effective ways to intervene.

Lack of evidence, however, is not always the major barrier to action. Often, the chief

obstacle is lack of political will; particularly in the United States, our deeply embedded culture of individualism can impede actions that require a sense of social solidarity. For example, as noted in an Institute of Medicine report, “whether early childhood programs can make a difference has been asked and answered in the affirmative innumerable times”; the remaining questions are about the most effective and efficient interventions (55). Even after major business groups have advocated universal high-quality preschool as essential for achieving a productive—i.e., healthy and educated—future workforce (16, 28, 86), this goal remains elusive.

Descriptive, explanatory, and interventional research can play a supportive role in building consensus about the need for action by increasing public and policy-maker awareness of unacceptable conditions such as racial and socioeconomic disparities in health; by making the links

between social factors and health meaningful and plausible to the public and policy makers; and by suggesting, testing, and helping to estimate the costs of promising science-based approaches. Information about the pathways and mechanisms through which social advantage influences health can provide an important counterweight to victim-blaming, which too often impedes policies focused on upstream social and economic factors. Based on current understanding of the role of stress in the links between multiple social factors and health outcomes, studies of pathways involving stressful circumstances and physiological responses to stress may yield knowledge needed to help achieve consensus for action. Research on the SDOH can provide practical guidance for policies and add meaning and credibility to ethical and economic arguments for the need to act, not only to ameliorate the adverse health consequences but also to reduce social disadvantage itself.

SUMMARY POINTS

1. A critical mass of knowledge related to the social determinants of health has accumulated in the United States and elsewhere, documenting associations, exploring pathways and biological mechanisms, and providing a previously unavailable scientific foundation for appreciating the fundamental role of social factors in health.
2. The questions are no longer about whether social factors are important influences on health, but rather about how social factors operate and how we can most effectively intervene to activate health-promoting pathways and interrupt health-damaging ones.
3. Too little attention has been given to the upstream social determinants of health, such as economic resources, education, and racial discrimination. Although most research has focused on the more easily studied and addressed downstream factors, these upstream determinants represent the fundamental causes in pathways that influence downstream factors and ultimately lead to health effects.
4. One barrier to expanding our understanding of how upstream social determinants influence health is a widespread expectation that a single research study can encompass an entire pathway from upstream factor to downstream health effects. Such studies are unlikely to be achieved, however, given the complex causal chains and long time periods involved. Rather, we should focus on advancing knowledge of pathways incrementally by linking results from studies of specific pathway segments.
5. More research on pathways and biological mechanisms is needed, but this will not necessarily yield sufficient information for identifying the most effective and efficient interventions. Well-designed studies of interventions are essential.

6. On the basis of experience and awareness of the complexity of pathways, isolated interventions focused on single discrete (upstream or downstream) social factors may not be effective. The challenge is to design and adequately study multidimensional interventions that address multiple factors simultaneously.
7. Lack of evidence is not always the major barrier to action on the social determinants of health. Particularly in the United States, the crucial obstacle is often lack of political will. A strategic research agenda on the social determinants of health should also address the factors that can enhance or impede political will to translate knowledge into effective action.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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