

Social Science and Health Research: Growth at the National Institutes of Health

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Programs within the National Institutes of Health (NIH) have recently taken steps to enhance social science contributions to health research.

A June 2000 conference convened by the NIH Office of Behavioral and Social Sciences Research highlighted the role of the social sciences in health research and developed an agenda for advancing such research. The conference and agenda underscored the importance of research on basic social scientific concepts and constructs, basic social science research on the etiology of health and illness, and the application of basic social science constructs in health services, treatment, and prevention research.

Recent activities at NIH suggest a growing commitment to social science research and its integration into interdisciplinary multilevel studies of health. (*Am J Public Health*. 2004;94:22–28)

THE NATIONAL INSTITUTES OF Health (NIH) has had a long and growing commitment to behavioral and social scientific research relevant to health. Although this commitment at times has been tenuous and even perhaps reluctant, it has grown in magnitude and strength over the past 30 years. In fiscal year 2002, about \$2.64 billion (10% of the NIH total budget) was devoted to behavioral and social sciences research and training. Almost all NIH institutes and centers have played a role. For example, following President Lyndon Johnson's call in the 1960s to apply research to the alleviation of social and public health problems, the National Institute of Mental Health established various topical research centers to focus on issues such as crime and delinquency, suicide, metropolitan problems, mental health and aging, minority group mental

health, and substance abuse and alcoholism.

During the 1960s and 1970s the National Heart, Lung, and Blood Institute developed a pioneering extramural program on health and behavior, and the National Institute on Child Health and Human Development and the National Institute on Aging (NIA) both established broad-ranging programs in support of basic and applied behavioral and social research. Other institutes, including the former constituent parts of the Alcoholism, Drug Abuse, and Mental Health Administration (ADAMHA), also played significant roles in fostering such research. For example, ADAMHA joined forces with NIH in 1979 to commission the landmark study by the Institute of Medicine (Health and Behavior: Frontiers of Research in the Biobehavioral Sciences) that subsequently gave direction to

NIH's expanding activities in the behavioral and social sciences, especially when ADAMHA rejoined NIH more than a decade ago.¹

Historically, the behavioral sciences have been better represented than the social sciences at NIH. By the late 1990s, the behavioral sciences were generally recognized as having a firm place at NIH. However, many observers within and outside of NIH believed that the actual and potential contributions of the social sciences had not yet been fully recognized. Consequently, the NIH Office of Behavioral and Social Sciences Research (OBSSR) convened a committee, with representatives from most NIH institutes and centers and from 3 nongovernmental social science organizations, to consider the contributions of the social sciences to health research and the rele-

vance of various social science concepts, theories, and methodologies as well as to identify examples of successes in and challenges to effectively integrating these elements in health research.

Out of these discussions developed a major conference on social science contributions to health research. David Takeuchi and Christine Bachrach chaired the conference, *Towards Higher Levels of Analysis: Progress and Promise in Research on the Social and Cultural Dimensions of Health* ("Levels of Analysis conference"), which was held in June 2000. Its purposes were to highlight the past and potential future contributions of the social sciences to health research and to generate a forward-looking research agenda. Eighteen months later, based on the conference, 15 NIH institutes and centers issued a joint program announcement on the social and cultural dimensions of health.²

THE SOCIAL SCIENCES AND HEALTH RESEARCH

The Levels of Analysis conference was based on a multilevel model of the etiology, prevention, and treatment of disease. The model recognizes that processes producing health and illness exist at multiple distinct but interdependent levels. For example, Anderson³ identified 5 major levels of analysis in health research: social/environmental, behavioral/psychological, organ systems, cellular, and molecular. A variety of other conceptual models have also been advanced to address the linkages among levels of analysis, from the macro-societal levels to the biology of a disease.⁴⁻⁶ The conference title was chosen to reflect the focus on social sci-

ence research that contributes to understanding influences on health at levels of analysis higher than that of individual or psychological. The conference reflected 3 major themes:

- Basic scientific concepts and constructs in the social sciences are highly relevant to health research and are themselves important subjects for basic social science research in the health arena.
- Basic social science research on the effects of social constructs and social processes is central to research on the etiology of health and illness.
- The application of basic knowledge about social science constructs and processes to health services, treatment, and prevention research is essential to addressing health problems and health disparities.

Basic Concepts

Social science concepts such as socioeconomic status and culture are used widely in health research, as are demographic concepts such as race, ethnicity, age, and gender. A central concern of the conference was to explore the contributions of the social sciences in "unpacking" these concepts, that is, in providing a deeper understanding of their meanings and the processes that shape their meanings. Research on these basic constructs and processes and a broader integration of such research into health studies are essential to guiding their appropriate use in health research and to counter the common tendency to use them superficially and mechanically.

For example, a long-standing tradition of research in the social sciences has examined the structures (e.g., educational systems,

systems of production) and processes (e.g., discrimination, marital homogeneity) that create and maintain differences in status, rewards, obligations, and constraints among members of a population. *Socioeconomic status*, a concept widely used in health research, is a measure of an individual's position in such stratification systems. Scientists have extensively documented the relationship of socioeconomic status to health but are barely beginning to understand the processes generating the relationship.⁷ Pathways of influence are likely to be complex, and to reflect the multifaceted interactions between social structures and individual attributes and behaviors that produce and maintain stratification in a society.

Culture is another concept commonly invoked in health research. Culture constitutes a powerful explanatory variable, but one that does not coincide very well with ethnic group labels, as is often assumed. The term has many interpretations. Perhaps in this context, it most commonly refers to meanings that are shared to varying extents with other people by virtue of membership in social groups. This concept of culture is complex and implies an ongoing, dynamic process.⁸ Culture affects health through numerous pathways, including influence on risk and protective behaviors, the nature of family and social relationships, and the meanings and expectations associated with group memberships based on gender, race, ethnicity, religion, social class, and other socially defined categories. For example, shared beliefs that disease symptoms are part of normal life and should be "toughed out" cause delays in accessing medical services and in-

crease risk of harm in some minority populations.⁹ Culture may also be a mechanism through which other social processes, such as socioeconomic status, affect health.¹⁰⁻¹²

As noted earlier, several key sociodemographic constructs, including race, ethnicity, gender, and age, are widely used in studies of the etiology of health and disease and in research that describes and monitors the distribution of disease across social categories, geographic areas, and time. However, the meanings of such constructs depend on their cultural, geographical, and historical context, and their utility in health research depends on their being used in ways that are theoretically and historically grounded. Scientists face a significant challenge in incorporating sociodemographic constructs into their studies in ways that are sensitive to these complex issues.

Implicit in the preceding discussion of concepts and constructs is the idea that social and cultural phenomena are not merely qualities attaching to an individual but emergent properties of systems that operate at levels above the individual (but in which individuals are embedded and which they influence). These social and cultural systems have important consequences for health and are legitimate foci for health research. Such a perspective is fundamental to truly integrative, multilevel research strategies that consider the pathways to health operating at and between the social, cultural, individual, and biological levels.

Basic Research on Etiology

Within a multilevel model of the etiology of health and illness,

the level of the social environment encompasses a diverse set of mechanisms operating among and within social structures existing at different levels. At the highest levels are structures and processes that involve and affect populations broadly: government, media, economic systems, social stratification, political processes and policymaking, and broadly held cultural values and practices. Some of these processes also operate in communities, neighborhoods, and institutions such as schools or professional organizations. At these levels, processes contributing to social cohesion, social support, social control, social and cultural conflict, and the development and enforcement of social and cultural norms also play a significant role. In families and small groups, interpersonal processes such as conflict and support, socialization, and sharing of resources play a dominant role. Characteristics of the individual and of biological mechanisms fill out the multilevel model.

The Levels of Analysis conference highlighted promising traditions of research on social environmental influences on health. One focus was on interpersonal processes that influence health. A broad set of research studies has documented that individuals engaged in supportive social networks are more likely to be healthy, to live longer, and to recover better from serious illnesses.^{13,14} Involvement in religious groups and marriage also appears to benefit health.^{14–17} Such social engagement is hypothesized to increase access to information as well as emotional and instrumental support. Emotional and instrumental social support affect health through mechanisms operating at the in-

terpersonal level (e.g., a neighbor providing transportation to the doctor's office) and the physiological level (e.g., impact on the immune system).¹⁸ Much of the research in this area has focused on the positive facets of social interaction. However, health is also negatively influenced by social interactions that promote stressful experiences (e.g., marital discord) or that explicitly and implicitly exploit, discriminate against, or unfairly treat groups of people.¹⁹

Other research traditions address how mechanisms that link social and cultural phenomena to health operate within, and emerge from, the attributes of social contexts.²⁰ *Social context*, as defined here, refers to a variety of groups or institutions in which individuals may be embedded (e.g., families, peer groups, workplaces, and neighborhoods) and that may have an impact on individuals' health by affecting resources, constraints, and social norms.²¹ Researchers have considered diverse contexts and characteristics of contexts in addressing "contextual" influences on health.

Some researchers have examined the characteristics of neighborhoods and communities, including socioeconomic properties (e.g., concentrated poverty), cultural properties (e.g., shared values and norms), residential stability, and racial/ethnic composition. Others have focused on processes such as social cohesion and social control, which refer to the extent to which groups are knit together and able to enforce behavioral norms, or *collective efficacy*, a term introduced by the Project on Human Development in Chicago Neighborhoods to refer to neighborhood residents' collective sense of trust and co-

hesion combined with their willingness to intervene to achieve shared goals.²²

A similar concept, used in relation not only to neighborhoods but to other social groupings, is *social capital*.²³ This term refers to resources that are inherent in social relationships and that facilitate the achievement of some end. Social capital may contribute to health both at the group level, through political action and the enforcement of shared norms, and at the individual level, through increasing access to resources.²⁴ The structure, characteristics, and dynamics of social networks within a group or collectivity are a fundamental feature underlying these concepts and the mechanisms through which they influence health.

Beyond the social attributes of groups and neighborhoods, many aspects of the broader society also need to be considered in explanatory models of health and illness. Political processes affect the distribution of public resources, such as decisions to locate highways and redevelop urban areas as well as kinds and extent of health and income support for indigent populations. Economic conditions and the structure of the economy affect the availability and characteristics of jobs and employees' ability to negotiate benefits, along with the price and availability of housing and other necessities. The content of messages offered in the media is influenced less by the local community than by broader social, economic, and cultural processes in national and international marketplaces. These broader influences have far-reaching effects on health, but this same breadth of influence makes it difficult to study

them using conventional empirical approaches.

Research on Improving Health

The Levels of Analysis conference also highlighted the importance of basic social science knowledge for improving health. The social sciences can contribute to preventing and treating illness by pinpointing the environmental settings, social relationships, interpersonal processes, and cultural factors that lead people to engage in healthy and unhealthy behaviors, seek health services before disease symptoms worsen, and participate with medical professionals in treating illness.^{25–27} Moreover, social science approaches emphasize social structural and organizational factors that influence the kinds of care available, access to that care, and quality of care. Insights from this research can guide the design of health care delivery practices and interventions that acknowledge and adapt to social, cultural, and economic barriers; harness social mechanisms to increase their effectiveness; or even attempt to manipulate social and cultural determinants of health directly.

Drawing upon social and behavioral science research on communication, diffusion, and behavior change, mass media campaigns have a long history in health promotion and disease prevention.²⁵ For example, the Back to Sleep Campaign strove to reduce mortality from sudden infant death syndrome by changing the common and culturally preferred practice of placing infants in a prone sleep position. Over a period of 4 years, in response to a campaign that involved the use of a variety of professional and

media channels, the prevalence of use of the prone sleep position fell from 70% to 24%, and the rate of sudden infant death syndrome declined by 38%.²⁸

Another common approach is the community-level intervention that attempts to modify multiple influences on health within a community. This approach seeks to magnify intervention outcomes by producing mutually reinforcing effects across domains of the social and cultural environment. For example, a project seeking to reduce alcohol-involved injuries and deaths in 3 experimental communities developed 5 mutually reinforcing components: community organization, intervention in bars and restaurants, intervention in retail outlets to reduce sales to minors, increased drunk-driving enforcement, and use of zoning and municipal controls to reduce availability of alcohol. The intervention communities achieved greater reductions than comparison communities in high-risk alcohol consumption and in alcohol-related injuries resulting from motor vehicle crashes and assault.²⁹ An extensive literature exists on community-level health interventions, but significant challenges to definitive evaluation designs limit what we know about their effectiveness.²⁵

In recent years, a variety of prevention programs have taken their inspiration from basic research on social processes. For example, an HIV prevention researcher drew on the resources inherent in naturally occurring friendship groups by enrolling entire groups into an HIV prevention intervention.³⁰ Another successful HIV prevention program recruited opinion leaders in gay bars to promote HIV risk reduction behaviors. As a result

of the intervention, risky sexual practices decreased and condom use increased among the patrons of the bars in the intervention city.³¹

Home-visiting programs have recently emerged as a strategy for delivering services to individuals and families. This strategy recognizes social, economic, and other barriers to seeking services and draws at least in part on concepts of social support. Home-visiting programs have been shown to reduce mortality among the elderly,³² to contribute in many cases to healthy pregnancies and child development,^{33,34} and to improve asthma management among inner-city children.³⁵

A long tradition of health care research relies heavily on social science concepts and approaches drawn, for example, from organizational sociology, health economics, and social anthropology to explore how the organization and structure of health care affect a wide range of process and health outcomes (e.g., morbidity, mortality, satisfaction with care, quality of life) among individuals and populations. The structural and organizational features studied include staff characteristics (e.g., years of experience, educational background), size of the organization, staffing mix and ratio, type of ownership (e.g., private vs public, for-profit vs non-profit), standardization of care (e.g., clinical protocols, practice guidelines), specialization, volume of services, and centralization (e.g., locus of decisionmaking).³⁶ For example, greater conformity and uniformity in the behavior of physicians is found in larger group practices (e.g., they are more likely to adhere to care protocols).³⁷ Other studies indicate that communication, coordination, and control mecha-

nisms in nursing homes are associated with degree of inappropriate drug prescribing and overall quality of care.³⁶

Finally, research on the health effects of policy is also an important aspect of applied health research in the social sciences. Research suggests that income transfer programs such as Aid to Families with Dependent Children positively affect health outcomes such as infant birthweight.^{38,39} A substantial body of research demonstrates positive outcomes of programs designed to alleviate the effects of poverty on health. For example, Medicaid has been linked to decreased infant mortality,⁴⁰ while nutritional supplementation through the Special Supplemental Nutrition Program for Women, Infants, and Children has been shown to improve birthweight⁴¹ and developmental and growth outcomes.⁴² Evidence from the Moving to Opportunity Study, an experimental investigation in which families eligible for housing assistance were offered the opportunity to move to more affluent neighborhoods, suggests that the study program (vs a housing voucher alternative) reduced injuries, asthma attacks, and crime victimization rates among children.⁴³

SETTING AN AGENDA FOR SOCIAL SCIENCE RESEARCH

A key goal of the Levels of Analysis conference was the development of a research agenda for furthering social science contributions to health research. About 60 of the conference participants met in small groups during the third day of the conference to consider research opportunities, gaps, and chal-

lenges. Table 1 summarizes the key recommendations produced by the group. Most of the recommendations speak to the expansion and further development of health-related social sciences research at NIH.

The first 3 sets of recommendations call for basic research on social science constructs and processes, improving research on social and cultural influences on health, and integrating basic social science theories, concepts, and methods into applied health research. A fourth set calls for the development of needed scientific resources and approaches, including the continued development of social science research methods, research on ethical issues and best practices in studies with communities and other groups, adoption of a global perspective on health, and support of appropriate training and infrastructure programs.

A fifth and equally important goal calls for the integration of social science research into interdisciplinary multilevel studies of health. Integration of social science research with the biological and behavioral sciences is an essential component of this task. A growing chorus of voices is endorsing this goal, perhaps best exemplified by the recent National Research Council report *New Horizons in Health*,²⁰ but also by other recent National Research Council/Institute of Medicine reports (Table 2). Such integration is a 2-way street. Social and biomedical scientists need to become more conversant with each other's concepts and methods. Proactive efforts will be needed to foster a multidisciplinary, multilevel health science. We will need to foster communication among scientists who have been isolated too long within disciplinary walls; learn to work to-

TABLE 1—Summary Recommendations of the Conference Towards Higher Levels of Analysis: Progress and Promise in Research on the Social and Cultural Dimensions of Health

Foundational research

- Support research to improve the measurement and clarify the meaning of basic constructs used in sociocultural research on health, including culture, social change, gender, age, socioeconomic status, race, and ethnicity. Study the effects of historical and cultural context on meaning and measurement, and address their implications for monitoring trends in health and health disparities
- Study the characteristics and dynamics of social and cultural systems. Examine the processes that shape and change the social, cultural, political, economic, and institutional environments of individuals and groups

Understanding health and illness

- Expand research on social and interpersonal factors that influence health, including racism and other forms of discrimination; social interactions and social networks; social integration, social cohesion, and social capital; and religion and spirituality. Study the ways in which these factors intersect, and the cultural, social, and biological mechanisms through which they affect health
- Conduct research that examines how social contexts such as families, neighborhoods, schools, work sites, and political jurisdictions influence health and that elucidates the mechanisms through which these influences operate. Develop innovative strategies for understanding and accounting for the process by which individuals and groups organize in networks and other social arrangements and occupy particular social contexts
- Study the consequences of health and illness at the family, community, and societal levels. Study the social, cultural, and institutional factors influencing the nature and extent of consequences for individuals

Improving health

- Conduct research on social and cultural aspects of treatment, including cultural competence, stigma, provider–patient interaction, treatment context, and issues related to involuntary treatment
- Expand research on health care services and health care seeking to address social, cultural, economic, and policy factors that influence access to care and the delivery, quality, and accountability of health services
- Study the development of new health technologies and their impact on services
- Conduct research that translates basic social science studies of the etiology of disease into the development and testing of new strategies for prevention, treatment, and service delivery. Study the social and cultural factors influencing the dissemination and uptake of health care technologies, messages, and interventions

Supporting responsible science

- Support the continued development of social science methods. Challenges include measurement at the group, network, neighborhood, and community levels; the further development of methods for longitudinal research; multilevel research designs that integrate diverse qualitative and quantitative approaches (e.g., surveys, ethnography, social network studies, clinical studies); experimental designs; and the development of improved methods for data collection and analysis
- Encourage research that examines the social and cultural dimensions of health in a global context, recognizing that this science will be advanced by examining the etiology of health in a broad set of social and cultural settings and that issues involving health and illness transcend national boundaries
- Study and address the ethical issues arising from research that links the individual to higher levels of analysis such as communities, institutions, and identifiable groups, and further develop the science of actively involving communities in health research
- Support the development of training programs to meet the need for social science expertise in health research and the challenges of an interdisciplinary research agenda, with special emphasis on the recruitment of underrepresented minorities into the health-related social sciences. Encourage the development of infrastructure for interdisciplinary programs of research that address the social and cultural dimensions of health

Integrating health science

- Encourage and support the integration of social science methods and theory into interdisciplinary studies of health that consider multiple levels of analysis, from the molecular, cell, or organ system to the individual and sociocultural levels

Note. Information presented was obtained from http://obssr.od.nih.gov/Publications/HigherLevels_Final.PDF.

Health, the National Cancer Institute, NIA, and OBSSR issued a request for applications for centers on population health and health disparities,⁴⁴ setting aside about \$15 million for awards made in 2003. The centers will support interdisciplinary research involving multilevel, integrated research projects aimed at elucidating the complex interactions of the social and physical environment, mediating behavioral factors, and biological pathways that determine health and disease.

Similarly, the National Institute on Drug Abuse published a request for applications for community multisite prevention trials⁴⁵ to (1) accelerate research on the processes and mechanisms that contribute to the adoption, adaptation, and implementation of science-based prevention models and (2) examine prevention delivery factors such as structural features, management practices, and financial strategies that foster the sustainability of such models in community settings. During the past 2 years, OBSSR and the NIH institutes and centers have convened various workshops and organized trans-NIH committees as the first step toward developing funding initiatives addressing such topics as the effects of community-level factors, education, economic disparities, and racial discrimination on health; the role of social epidemiology in studying drug abuse; and interactions among genetic, behavioral, and social factors in health.

In addition, plans for major data collection efforts reflect the growing recognition of the social environment as a contributor to health over the life course. For example, current planning for the National Children’s Study, a large

gether across barriers of language, culture, and scientific prejudice; and put in place institutional structures that will ensure our long-run success.

SIGNS OF PROGRESS

In addition to the program announcement on social and cultural dimensions of health, other

activities at NIH point toward a growing commitment to social science research relevant to health. For example, the National Institute of Environmental

TABLE 2—Shared Recommendations in 6 National Academy of Sciences Reports

- Focus on the factors underlying good health, as well as disease
- Adopt a life span approach in behavioral and social sciences research on issues related to health and disease
- Support research on interventions to promote health
- Support an interdisciplinary approach to research on health and disease encompassing multiple levels of analysis and integrating across levels
- Develop new methodologies and statistical tools
- Integrate basic and clinical research
- Train investigators in interdisciplinary research
- Support research on animals, as well as on humans
- Build infrastructure
- Advance these research goals through collaboration among NIH institutes/divisions, other government agencies, and the private sector

Note. The National Academy of Sciences recently convened 6 committees to address issues relevant to behavioral and social sciences research supported by the National Institutes of Health (NIH). All of the committees recommended that NIH support interdisciplinary research integrating the study of social, behavioral, psychological, and biological factors in health and disease (for listings of the individual reports, see National Research Council^{20,46,49} and Institute of Medicine^{25,47,48}). The recommendations listed here were common across the reports (see <http://obssr.od.nih.gov/Publications/NRC-Reports.htm>).

cohort investigation of environmental effects on children's health and development (information on the study is available at <http://www.nationalchildrensstudy.gov>), provides an outstanding opportunity for pursuing an integrated health science. Over the next few years, we expect to see the publication of multiple funding announcements designed to stimulate the submission of grant applications and contract proposals that integrate social science concepts and methods more fully into health research. ■

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Contributors

C.A. Bachrach cochaired the conference described in this article and developed most of the text of the article. R.P. Abeles initiated the program announcement described in the article and also contributed to the writing of the article.

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References

1. Institute of Medicine. *Health and Behavior: Frontiers of Research in the Biobehavioral Sciences*. Washington, DC: National Academy Press; 1982.
2. Social and cultural dimensions of health: NIH guide to grants and contracts. Available at: <http://grants2.nih.gov/grants/guide/pa-files/PA-02-043.html>. Accessed October 29, 2003.
3. Anderson NB. Levels of analysis in

health science: a framework for integrating sociobehavioral and biomedical research. *Ann N Y Acad Sci*. 1998;840:563–576.

4. McKinlay JB, Marceau LD. To boldly go. . . . *Am J Public Health*. 2000;90:25–33.

5. Krieger N. Epidemiology and the web of causation: has anyone seen the spider? *Soc Sci Med*. 1994;39:887–903.

6. Susser M, Susser E. Choosing a future for epidemiology: II. From black boxes to Chinese boxes and eco-epidemiology. *Am J Public Health*. 1996;86:674–677.

7. Adler NE, Marmot M, McEwen BS, Stewart J, eds. *Socioeconomic status and health in industrial nations: social, psychological, and biological pathways*. *Ann N Y Acad Sci*. 1999;896(theme issue):1–500.

8. Newman-Giger J, Davidhizer R. *Transcultural Nursing: Assessment and Intervention*. St. Louis, Mo: Mosby; 1999.

9. Wright R, Fisher EB. Putting asthma into context: community influences on risk, behavior, and intervention. In: Kawachi I, Berkman LF, eds. *Neighborhoods and Health*. New York, NY: Oxford University Press Inc. 2003.

10. Dressler WW. Modernization, stress, and blood pressure: new directions in research. *Hum Biol*. 1999;71:583–605.

11. Dressler WW, Bindon JR, Neggers YH. Culture, socioeconomic status and coronary heart disease risk factors in an African American community. *J Behav Med*. 1998;21:527–544.

12. Dressler WW, Bindon JR. The health consequences of cultural consonance: cultural dimensions of lifestyle, social support, and arterial blood pressure in an African American community. *Am Anthropologist*. 2000;102:244–260.

13. Berkman LF, Glass T. Social integration, social networks, social support, and health. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. London, England: Oxford University Press Inc; 2000:137–173.

14. House JS, Landis KR, Umberson D. Social relationships and health. *Science*. 1988;241:540–545.

15. Ellison CG, Levin JS. The religion-health connection: evidence, theory, and future directions. *Health Educ Behav*. 1998;25:700–720.

16. Strawbridge WJ, Shema SJ, Cohen RD, Kaplan GA. Religious attendance increases survival by improving and maintaining good health behaviors, mental health, and social

relationships. *Ann Behav Med*. 2001;23:68–74.

17. Waite L, Gallagher M. *The Case for Marriage*. New York, NY: Doubleday; 2000.

18. Cohen S, Doyle WJ, Skoner DP, Rabin BS, Gwaltney JM. Social ties and susceptibility to the common cold. *JAMA*. 1997;277:1940–1944.

19. Rook K. The negative side of social interaction. *J Pers Soc Psychol*. 1984;46:1097–1108.

20. National Research Council. *New Horizons in Health: An Integrative Approach*. Washington, DC: National Academy Press; 2001.

21. Billy JOG, Brewster KL, Grady WR. Contextual effects on the sexual behavior of adolescent women. *J Marriage Fam*. 1994;56:387–404.

22. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*. 1997;277:918–924.

23. Coleman JS. *Foundations of Social Theory*. Cambridge, Mass: Harvard University Press; 1990.

24. Kawachi I. Social capital and community effects on population and individual health. *Ann N Y Acad Sci*. 1999;896:120–130.

25. Institute of Medicine, Committee on Health and Behavior. *Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences*. Washington, DC: National Academy Press; 2001.

26. Sue S. In search of cultural competence in psychotherapy and counseling. *Am Psychol*. 1998;53:440–448.

27. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav*. 1995;36:1–10.

28. Willinger M, Hoffman HJ, Wu K, et al. Factors associated with the transition to nonprone sleep positions of infants in the United States. *JAMA*. 1998;280:329–335.

29. Holder HD, Gruenewald PJ, Ponicki WR, et al. Effect of community-based interventions on high-risk drinking and alcohol-related injuries. *JAMA*. 2000;284:2341–2347.

30. Stanton BF, Li X, Ricardo I, Galbraith J, Feigelman S, Kaljee L. A randomized, controlled effectiveness trial of an AIDS prevention program for low-income African-American youths. *Arch Pediatr Adolesc Med*. 1996;150:363–372.

31. Kelly JA, St. Lawrence JS, Diaz YE, et al. HIV risk behavior reduction following intervention with key opinion leaders of population: an experimental

- analysis. *Am J Public Health*. 1991;81:168–171.
32. Elkan R, Kendrick D, Dewey M, et al. Effectiveness of home based support for older people: systematic review and meta-analysis. *BMJ*. 2001;323:719–723.
33. David & Lucile Packard Foundation. Home visiting: recent program evaluations. *Future Child*. 1999;9(theme issue):1–223.
34. Margie NG, Phillips DE, eds. *Revisiting Home Visiting: A Summary of a Workshop*. Washington, DC: National Academy Press; 1999.
35. Carter MC, Perzanowski MS, Raymond A, Platts-Mills TAE. Home intervention in the treatment of asthma among inner-city children. *J Allergy Clin Immunol*. 2001;108:732–737.
36. Zinn JS, Mor V. Organizational structure and the delivery of primary care to older Americans. *Health Serv Res*. 1998;33:354–380.
37. Ross CE, Duff RS. Quality of outpatient pediatric care: the influence of physicians' background, socialization, and work/information environment on performance. *J Health Soc Behav*. 1978;19:348–360.
38. Kehrer BH, Wolin CM. Impact of income maintenance on low birth weight: evidence from the Gary experiment. *J Hum Resources*. 1979;14:434–462.
39. Currie J, Cole N. Welfare and child health: the link between AFDC participation and birth weight. *Am Econ Rev*. 1993;83:971–985.
40. Currie J, Gruber J. Saving babies: the efficacy and cost of recent changes in the Medicaid eligibility of pregnant women. *J Political Economy*. 1996;104:1263–1296.
41. Metcalf J, Costiloe P, Crosby WM, et al. Effect of food supplementation (WIC) during pregnancy on birth weight. *Am J Clin Nutr*. 1985;41:933–947.
42. Hicks LE, Langham RA, Takenaka J. Cognitive and health measures following early nutritional supplementation: a sibling study. *Am J Public Health*. 1982;72:1110–1118.
43. Katz LF, Kling JR, Liebman JB. Moving to Opportunity in Boston: early results of a randomized mobility experiment. *Q J Economics*. 2001;116:607–654.
44. Centers for Population Health and Health Disparities. NIH guide to grants and contracts. Available at: <http://grants.nih.gov/grants/guide/rfa-files/RFA-ES-02-009.html>. Accessed October 29, 2003.
45. National Institute on Drug Abuse National Prevention Research Initiative. NIH guide to grants and contracts. Available at: <http://grants.nih.gov/grants/guide/rfa-files/RFA-DA-02-004.html>. Accessed October 29, 2003.
46. National Research Council. *The Aging Mind: Opportunities in Cognitive Research*. Washington, DC: National Academy Press; 2000.
47. Institute of Medicine. *Bridging the Disciplines in the Brain, Behavioral and Clinical Sciences*. Washington, DC: National Academy Press; 2000.
48. Institute of Medicine. *Promoting Health: Intervention Strategies From Social and Behavioral Research*. Washington, DC: National Academy Press; 2000.
49. National Research Council and Institute of Medicine. *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Washington, DC: National Academy Press; 2000.