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Problems With Parsimony in Research on Socioeconomic Determinants of Health

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Despite growing evidence that social and economic factors are important determinants of health disparities, there is a lack of understanding of how these factors operate in relation to health. This article explores 3 conceptual and methodological issues impeding nursing research in this area: (1) ambiguity surrounding socioeconomic status (SES), both conceptually and as a scientific indicator; (2) the narrow focus on biological and behavioral risks for chronic disease development; and (3) the persistent centrality of individual behavior in studies examining SES-health contextual relationships. A brief overview of emerging approaches for enhancing nursing science in the area of SES and health disparities is presented. **Key words:** *health disparities*, *nursing methodology research*, *social class*, *socioeconomic status*

"IDEAS about the inevitability of poverty, unequal access, unhealthy life styles, substandard living and working conditions, and poor health are reinforced when the relationships among these conditions are not fully examined or understood."[1(p11)] So ended Nelson's contribution on economic impoverishment to a 1994 issue of this journal. Nearly a decade later the relationships she spoke to remain largely unexplained, although the evidence that socioeconomic status (SES) makes a difference in health continues to mount. How, precisely, SES is linked to health status is still not clear.

Progress, however, is being made with respect to decreasing health disparities and to creating innovative approaches that address the complexities of measuring socioeconomic determinants of health. These beginning advances are critical given that individuals at lower social and economic rungs often bear the brunt of economic, cultural, and political upheavals. In the United States, upheaval is evidenced in current state budget crises that are contributing to increasing health care costs, decreasing publicly funded health insurance plans, and eroding social welfare programs.

Much of the impetus for examining disparities in health has emerged from federal funding priorities. The National Institutes of Health (NIH) Work Group on Health Disparities defines *health disparities* as "differences in the incidence, prevalence, mortality, and burden of disease and other adverse health conditions that exist among specific population groups in the US"[2] As written, this definition is broad in scope and does not

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specify features that consistently account for some of the greatest disparities in population health, such as SES. The gradient in morbidity and mortality by SES in nearly every physical and mental dimension of health has been documented for hundreds of years, observed consistently across studies, within and across countries and cultures, and persists today.[3,4] Yet, even if the definition specifically referred to SES, it does not provide any indication of what may be the etiology—or etiologies—that underlie persistent gradients observed between SES and health.

Requests for applications from NIH within the past 2 years highlight the need for studies that explicitly examine how the broader social environment, represented by some measure of SES, affects health either indirectly (eg, via health behaviors or psychological processes) or directly (eg, by exposure to environmental toxins).[5,6] NIH requests for research that links social and economic determinants to health reflects the growing evidence that behavioral interventions at the individual level have done little to reduce large inequalities in health at the population level.[7] It also suggests that investigators—including nurse investigators—left to their own devices, may not independently think or look outside the proverbial "box" in order to better understand the multiple, likely interacting, mechanisms behind SES-related health disparities. The fact that, with few exceptions, the etiology of most disease states can only be found in a "web of causation" is clearly articulated in the literature.[8]

Using Nelson's paper[1] as a foundation, this article advances the conversation about the conceptual and methodological issues implicated in exploring links between SES and health in nursing research. We concentrate on 3 conceptual and methodological issues that have impeded nursing research in the area of SES and health: (1) ambiguity surrounding SES, both conceptually and as a scientific indicator; (2) the narrow focus on biological and behavioral risks for chronic disease development; and (3) the persistent centrality of individual behavior in studies examining SES-health contextual relationships. Lastly, a brief overview of emerging approaches for enhancing nursing science in the area of SES and health disparities is presented.

CONCEPTUAL AND METHODOLOGICAL ISSUES

Increased funding for research on the social and economic determinants of health is critical to knowledge development in this area; however, serious conceptual and methodological problems remain. Left unresolved, these problems will continue to plague scientific progress, hamper understanding of how socioeconomic factors affect health, and, ultimately, diminish the likelihood of eliminating health disparities as called for in *Healthy People 2010*.[9] Although there are several challenges ahead, 3 that have received little attention in the nursing literature are reviewed here.

Socioeconomic status measurement

Scientific interest in socioeconomic health determinants has burgeoned over the past decade, as evidenced by increasing publications on this topic in nursing[10] and other disciplines.[4,11] Investigators, including nurse researchers, have generally represented social and economic factors in their studies by using some measure of SES.[12,13]

Despite the rapid pace of research in this area, Oakes and Rossi[14] remind us that researchers have largely ignored the conceptualization and validation of SES measures, with the greatest lack of attention coming from US social science and health research circles. This is ironic, given that as the world's wealthiest country,[15] the United States ranks toward the bottom in many health indicators, while having the highest level of funding for health research among all industrialized countries.[16] Part of the hesitancy in addressing issues around class, SES, and other forms of social hierarchies emerges from a history in which most conflicts in the United States have centered around race and

ethnicity. Thus, there is a common cultural perception that US society is classless, and that improvement in one's social position is a function of income, merit, and determination. On the other hand, historically, many nations (composed of primarily homogenous populations) engaged in divisions along class lines. Yet, even among European countries, where discourse on measuring socioeconomic determinants of health is plentiful, no consensus on a standardized measurement tool exists,[14] resulting in a wide array of studies using vastly different measures.

Indicators to measure SES in nursing research have ranged from education level and total family income,[12] to more complex tools. For example, to determine SES, Heilemann[17] and her associates used education, employment, net family income, number of people living on the subject's family income, and adequacy of financial resources for meeting daily needs. Hollingshead's Two Factor Index of Social Position, a tool that ranks individuals from I (highest) to V (lowest) based upon their highest education level and occupation, is also a measure of social class that occasionally appears in nursing studies.[13,18] Attempting to measure SES more comprehensively, investigators examining predictors of parents' use of psychosocial support garnered information through Aylward's Socioeconomic Status Composite—Revised.[19] This tool contains questions pertaining to family size, parental employment and education, family resources, as well as to housing and neighborhood characteristics.

Application of different SES measures across studies may be considered a moot point given the plethora of findings demonstrating a strong and consistent gradient in health that parallels SES. This gradient persists regardless of what measure is used, although the magnitude of associations are to some degree dependent on the socioeconomic and health variables selected, and at what point in the lifecourse they are measured.[3] Arguably, this presents less of a concern than when the use of different measures across studies also yields markedly inconsistent findings. The central conceptual question, however, of what we mean when we measure SES, remains problematic—not for finding associations between SES and health, but most certainly for informing our understanding of the multiple pathways through which SES exerts its influence on health.[3,14] This, of course, also has profound implications for where and how interventions should be directed.

In a review of conceptual bases for measuring socioeconomic position, Lynch and Kaplan[3] trace the sociological foundations of various measures adopted in the epidemiological literature. Drawing on Marxian, Weberian, and Functionalist schools of thought, they raise the following question: "Is it exploitation, few tangible resources, or lack of prestige that causes poor health, or some combination of these?"[3(p19)] When viewed as an indicator of one's rank within a social and economic hierarchy, SES broadly refers to the relative position(s) individuals or groups hold on a range of social and economic characteristics within a given societal structure, including power over and access to resources. Other terms, such as *social class*, *social status*, and *social position* are used synonymously to represent the basic construct of SES, although fundamental philosophical differences among them exist. In an extensive review, Krieger and colleagues[20] highlight the theoretical and analytic differences among social class, social position, and socioeconomic status. They argue social class is best understood from a Marxist perspective, where classes are socially determined through relationships to capital, and, most important, where class position is "logically and materially prior to its expression in distributions of occupations, income, wealth, education, and social status."[20(p346)] Based on this conception, it is only through class analyses (presumably through social class measures) that we can understand the *structural imperative for* socioeconomic stratification and thus the origin of inequalities in income, wealth, and health.

There are also diverse perspectives regarding appropriate measurement terminology in

the literature. Some scholars argue it is essential that social class replace SES as a measure in order to highlight the class-based system underpinning socioeconomic stratification,[21] some prefer social class but find SES-related indicators useful as well,[20] while still others contend SES is suitable for studying how differential access to resources affect health.[14] In our view, debate over social class versus SES terminology reflects, to some degree, discontent over apoliticized approaches to research—that is, demonstrating the effects of health disparities without advocating for social change, or ignoring capitalist- or class-based systems that result in social and economic stratification. It is, for example, possible to operationalize social class as a variable similar to traditional indicators of SES while disregarding the underlying processes that create inequalities. It is also possible to incorporate SES variables in studies intended to query sociopolitical systems that necessitate or exacerbate social, economic, and health inequalities. Given these 2 scenarios, substituting social class for SES does not guarantee interrogation of sociopolitical systems that drive inequalities,[22] just as choosing SES over social class terminology does not preclude it.

Whether SES or social class is ultimately adopted, it is important to consider how other socially determined stratifications associated with grave disparities in health—such as race and gender—interconnect. Although nursing is adamant in proclaiming the importance of studying the intersections of gender, race, and class, efforts directed toward the first 2 variables far outweigh efforts aimed at the last. One could hypothesize 2 reasons for this vacuum. First, factors that link SES with health are so complex that they overwhelm researchers in trying to determine the relative importance of any one of them. Second, the study of disparities along social class or SES lines "is not useful because the challenge of coming up with an intervention designed to eliminate class divisions from our society is too daunting."[23(p493)] For many, social class or SES differences are so embedded in capitalist societies such as the United States that it may be perceived as a waste of time researching them. It then becomes much easier to rationalize studying behavioral, biologic, and genetic problems for which answers appear more accessible.

Most US health studies that measure SES use individual or household income, poverty level, education, occupation, or some combination thereof. Yet income, as perhaps the most basic and seemingly forthright measure, is inherently complex. Take, for example, the number of options available for measuring different aspects of income: should the investigator use total gross or after-tax income? wage earnings alone or in addition to income receipts through child support, Temporary Assistance for Needy Families (TANF) payments, and food stamps? or disposable income? Another issue to consider with income measurement includes power differentials by gender in accessing household income. Ranking a married woman's status on the basis of her husband's occupation, for example, confounds the distinctions between individual income and household income. Research has demonstrated that for women, individual and household measures of SES function differently as health outcome predictors.[20] Still other well-known difficulties of measuring income include extremely high rates of nonresponse, as well as the volatility of income over short periods of time (eg, over 50% of US households report vast monthly income changes in a given year).[20] Conceptual and measurement problems with indices of education, poverty level, or occupation, including more sophisticated indices such as the Hollingshead Index, also are highlighted in the literature.[3,20] Moveover, recent evidence indicates that contextual effects of SES—represented as aggregate- or population-level, geographical-based measures—exert effects on health independent of individual- or household-level SES.[24] Thus, investigators interested in better understanding how social and economic factors influence health face a myriad of philosophical, conceptual, and measurement challenges.

Epidemiologists whose work concentrates on health disparities remind us that the obstacles to measuring socioeconomic determinants of health are not insurmountable, but require diligence in refining the measures.[3,20] Currently, this means taking a pragmatic approach in deciding which indicator(s) best represents the pathways involved in shaping the SES-health relationship(s) under investigation. This includes being mindful of (a) time-dependent relationships between exposure and disease onset (eg, exposure to poverty as a child versus as an adult), (b) possible dose-response relationships (eg, length or duration of poverty exposure), (c) type of exposure (eg, absolute material deprivation versus psychosocial stressors), and (d) level of exposure (eg, individual, household, or neighborhood/community). Ultimately, all of these considerations are essential for discerning which factors and underlying mechanisms are implicated in mediating SES-health relationships.

Biological and biobehavioral approaches

Contrary to the concept of a "web" in disease causation is the impetus to find single genes, or some limited combination of genes, as primary determinants of disease. Although genetic models are substantiated as the sole or primary determinant in a limited number of disorders, research to date continues to point to multiple etiologies for chronic diseases such as essential hypertension (HTN).[25] For example, monogenic (single gene) disorders presently account for less than 5% of all cases of HTN,[26] and, despite recent developments in our understanding of genetic and lifestyle contributions to essential HTN, approximately 50% of the variance in disease development remains unexplained.[27]

Environmental exposures play an important role in the regulation of gene expression,[28] although little is known about the environment-gene interface. As a discipline with strong historical roots in examining how environment affects health, this gap in knowledge presents opportunities for nurses to incorporate genetic components into their programs of research. Although genetic-related hypotheses are being tested by nurse investigators in both primary and ancillary studies, these hypotheses tend to focus on understanding how gene polymorphisms are related to physiologic endpoints and/or pharmacological-gene interactions.[25,29,30] Other studies are examining aspects of environment-gene interactions, although none examine overtly how SES-related environmental effects may differ.[31,32]

In both public health and nursing research, biobehavioral factors serve as core variables for examining patterns of health and disease. Several definitions of *biobehavioral* exist in the nursing literature, with little agreement on what the behavioral portion of the term means. For the purpose of this article, we define the *behavioral component* as the *intentional activities* of individuals. Most often, research in this area has concentrated on behavioral (eg, lifestyle) factors that either independently increase or decrease disease risk through changes in biological processes, or interact with preexisting familial (eg, genetic) characteristics to further modify risk. Research has clearly established that health behaviors are directly related to morbidity and mortality from select chronic diseases.[9] What has followed is the logical—and rigorous—pursuit to develop health behavior modification interventions that alleviate disparities in health.

Although this is a laudable goal, studies concentrating on behavior modification at the individual level have yielded disappointing results overall, and are particularly ineffective in lower SES groups,[7] who typically engage in less healthy behaviors than do middle- or upper-income groups.[33] Most biobehavioral intervention studies targeted to individuals are premised on the ideology of free choice,[33] however, which may explain why they are largely unsuccessful in lower income populations. In this context, free choice ideology casts aside the possibility that health behaviors can be heavily influenced by social

and economic circumstances whereby lower-income areas have fewer supermarkets and thus less access to heart-healthy foods, well-lighted paths or sidewalks for exercising, and access to preventive health services, to name a few.[4] That disease prevention messages to "see your health care provider" encourages people's use of the health care system in a time when other public policies are trying to limit health care services access portrays ignorance, denial, or public mockery of the sociopolitical backdrop that shapes life circumstances, opportunities for making healthy choices, and health-seeking behavior patterns of lower SES groups.[34]

Socioeconomic context approaches

Conducting studies in low-income, minority, or otherwise vulnerable populations is a growing trend in nursing research.[10] As noted, many of these studies concentrate on changing behavior among lower-income groups, while others focus on altering cognitive processes as a way of adapting to stressors encountered by persons living in socially or economically impoverished circumstances.[35] These studies could be characterized as "within SES" studies, as they leave the socioeconomic and sociopolitical antecedents to behavior, cognition, or coping tendencies outside the scope of inquiry. Some nurse researchers, however, are beginning to more critically examine socioeconomic context in health disparities research.[10,36,37] Studies in this area range from descriptive studies of how socioeconomic context shapes behavior[38] to those investigating effects of social and/or economic policies on health.[39]

Departing from the "within SES" cognition paradigm that nurse researchers usually occupy, investigators from public health and psychology are applying psychophysiological approaches to studying health and disease *across* SES. Findings from this approach are delineating the effects psychosocial and cognitive processes associated with SES have on health and how these effects may be mediated through neurohormonal mechanisms.[40] This group of studies differs from those originating from biological or genetic approaches in that there are clear linkages between characteristics of SES contexts, psychosocial processes, biological/physiological processes, and health endpoints. Examples of human studies falling under this approach include those suggesting that low-control/high-demand qualities clustered in low-income jobs are associated with increased blood pressure and cardiovascular disease (CVD).[41] These studies aptly highlight the point Wilkinson makes in saying "we need to think about the strength of power relations between order-givers and order takers, between people in different social ranks throughout society, rather than imagining that we have the security of belonging to one or other discrete, but mutually opposed, class communities."[42(p535)]

Because of the ability to eliminate selection bias as a competing hypothesis, animal studies in this area are especially revealing and generally support findings from human studies. Among nonhuman primates, for example, dominant social status in a stable environment is associated with less hypothalamic-pituitary-adrenal (HPA) activation,[43] higher high-density lipoprotein (HDL) levels,[44] and less coronary atherosclerosis in both males and females.[45] Reciprocally, animals that are socially subordinate, socially isolated, or in other socially stressful situations consistently demonstrate greater HPA activity.[46] In the immediate postpartum period, Bahr et al[47] found female gorillas living under more stressful environments in captivity (eg, being harassed by other adult and juvenile gorillas) had higher urine cortisol levels and less physical contact with their infants, suggesting the social environment affects parenting behavior and infant bonding via stress-related mechanisms. The neurohormonal outcomes in these studies are worth paying attention to as excessive HPA stimulation (evidenced by heightened cortisol secretion) may play a pivotal role in the development of diabetes as well as atherosclerosis and CVD.[11,41]

Other important dimensions of SES context are reflected in neighborhood

characteristics at the aggregate level. In recent years, social epidemiologists and public health researchers have reinvigorated interest in the effects of neighborhood or other geographically anchored area measures on health.[11] Living in a low-SES, high-poverty, or disadvantaged neighborhood, for example, is associated with poorer health along a range of health indicators, including higher rates of mental health disorders,[48] CVD risk,[49] cardiovascular mortality,[50] racial disparities in low-birth weight infants,[51,52] and premature mortality.[53] Importantly, these neighborhood or contextual effects on health persist after controlling for individual-level attributes such as income, race, and health behaviors, although the magnitude of the effect is often small.[54]

Recently appearing in the literature are the overlapping concepts of social cohesion and social capital, which are believed to mediate the relationship between neighborhood SES and health. Social and health scientists have studied social cohesion and social capital predominantly at the aggregate level and while there is lack of consistency in how each concept is defined and measured,[55] both reflect the degree of trust among people living within some geographically defined boundary, and both are strongly associated with multiple health indicators in ecological studies.[11,41] Kawachi et al,[56] for example, found social cohesion explained 58% of the variance of all-cause age- and SES-adjusted mortality, and for 15% to 20% of the variance in other CVD mortality. Although we are not suggesting social cohesion/capital is wholly satisfactory for explaining SES-health relationships, or that policy supports should necessarily be intensified in this area as a means for reducing health inequalities,[57] these studies point to the importance of considering contextual factors in health disparities research.

Emerging approaches

Two approaches appearing in the recent literature have particular relevance for health disparities research in nursing and will be reviewed briefly here. The first represents a shift in thinking with respect to novel conceptual models for inquiry. The Allostatic Load Model proposed by McEwen and Stellar serves as one example.[58] This model builds on earlier stress models familiar to many nurse investigators. *Allostatic load* refers to the cumulative effects, or wear and tear, on the body as a result of exposure to and physiologic reactivity to stress. Physiologically, allostatic load is imposed by repeated activation of the sympathetic nervous system (SNS) as well as the HPA axis. This model presumes physical and psychological stressors occur within a social and economic context, and that there is individual variation in the stress appraisal process, as well as behavioral and emotional responses to the perceived stressor. A primary strength of the Allostatic Load Model is its focus on the cumulative effects of stress-related physiological processes *over time*, rather than at relatively discrete points in time, as earlier stress models emphasized.

Considering the cumulative effects of exposure to chronic stressors (particularly in the face of having insufficient resources to meet them) is one approach for understanding how differing realities of everyday life experiences across differing levels of SES operate to "get under the skin" and play a role in shaping patterns of population health.[40] Increasingly, studies are beginning to delineate important differences between exposure to acute stressors (including "life events") and chronic stressors in their relative contributions to disease development.[59] *Chronic stressors* are generally defined as negative day-to-day events or "hassles," and can also be characterized as multiple acute microstressors that occur with regularity over a longer period of time.[59] Some data indicate a reciprocal relationship exists, whereby persons exposed to many chronic life stressors exhibit exaggerated cardiovascular responses to acute laboratory stressors.[60] The implication of this bidirectional relationship is that a potentially vicious cycle exists, resulting in physiological changes that exacerbate disease risk. Importantly, although premised on stress theory, the

Allostatic Load Model also takes into consideration behavioral responses that occur to cope with stressors, including how these are influenced by SES context and contribute to health and disease.

The second emerging approach is the use of multilevel analysis, or hierarchical analysis, to simultaneously examine relationships between contextual factors and health. Resurgence of interest in socioeconomic determinants of health precipitated several ecological studies linking group-, aggregate-, or population-level data—such as the percentage of households below poverty within a census tract, or the degree of neighborhood social cohesion—to individual health status. Early attempts to explain individual health outcomes on the basis of aggregate-level data, however, prompted ample debate over whether findings constituted ecological fact or fallacy, as well as the potential misuse of statistical models not originally intended for analyzing multilevel phenomena.[24] Although beyond the scope of this article, Diez-Roux[24] provides a comprehensive review of the advantages and disadvantages of multilevel analyses compared to standard methods. Researchers have applied multilevel analysis primarily to studies of SES characteristics at the neighborhood level, which have contributed greatly to understanding how contextual factors affect health.

One recent study by Buka and colleagues[61] illustrates the importance of using a multilevel approach to studying neighborhood influences on infant birth weight. Their study found that neighborhood economic disadvantage accounted for 80.8% of the between-neighborhood variance in infant birth weight for African American mothers and 76.3% for White mothers while controlling for individual factors (including infant gender, prenatal care, maternal age, mother's marital status, maternal smoking, maternal education, and parity), which accounted for a mere 5.3% of the variance. Moreover, increased levels of neighborhood social support were related to higher infant birth weights for White mothers only, while increasing levels of neighborhood economic disadvantage resulted in lower birth weights for African American mothers only. Buka et al concluded such differences, in part, could be attributed to residential segregation by race.

These findings highlight the importance of examining social and economic determinants of health, including how race and gender both shape and are shaped by socioeconomic hierarchies within societies. Although this study example did not incorporate psychological or physiological variables as potential mediators, future research using a multilevel method could. The role of social support, neighborhood characteristics, and healthy infant outcomes, among others, are central to nursing research and practice—particularly for nurses in public health and/or community health. Incorporating novel statistical approaches into nursing's research domains can inform understanding of which factors contribute to health disparities. However, just as no one single factor causes health disparities, and no single indicator measures the complexities of race, class, and other sociodemographic variables, no one method (in this case statistical modeling) ensures comprehensive awareness of the reasons for health disparities. Qualitative methods are also needed to give meaning to findings, assist with development of theoretical and methodological foundations for new approaches, and provide guidance for interventions.

SUMMARY

Funding directives from NIH clearly call for research that addresses each of the 3 limitations described in this article. Specifically, recent program announcements have noted that "linking research from the macro-societal levels, through behavioral and psychological levels, to the biology of disease will provide the integrative health research necessary to fully understand health and illness."[6(p2)] This includes incorporating biological/genetic, behavioral, and social and economic factors collectively in studies to better understand the

mechanisms underpinning SES-related disparities in health.

Because science does not generate information that is morally or politically neutral, research findings on SES-health relationships should influence public policy by identifying solutions to problems, including solutions that encompass policy intervention. Moreover, science cannot be dispassionate about its work. Ultimately, our goal should be to move beyond describing health disparities and toward research that more closely examines the mechanisms underlying them, including understanding not only how social and economic determinants operate, but also how psychological attributes may interact with biological processes. As Flaskerud and Nyamathi assert, "We need a new paradigm that recognizes societal factors as primary pathogenic forces . . . our research methods and designs must include the acquisition of economic resources and political power by the participants."[37(p139)] Finally, although parsimony is considered a quality many researchers are encouraged to achieve, too much of it in the form of isolated methodological approaches for understanding complex phenomena can be detrimental to understanding—and alleviating—socioeconomic disparities in health.

REFERENCES

1. Nelson MA. Economic impoverishment as a health risk: methodologic and conceptual issues. *Adv Nurs Sci*. 1994;16:1–12.
2. National Institute of Nursing Research. Strategic plan on reducing health disparities. Available at: http://www.nih.gov/ninr/research/diversity/mission.html. Accessed March 20, 2002.
3. Lynch J, Kaplan G. Socioeconomic position. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York: Oxford University Press; 2000:13–35.
4. Marmot M, Wilkinson RG, eds. *Social Determinants of Health*. Oxford: Oxford University Press; 2000.
5. National Institutes of Health. *Centers for Population Health and Health Disparities*. National Institutes of Health; 2002. NIH Guide. Release date series #PA-02-043.
6. National Institutes of Health. *Social and Cultural Dimensions of Health*. National Institutes of Health; 2001. NIH Guide. Series #RFA:ES-02-009.
7. Emmons KM. Health behaviors in a social context. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York: Oxford University Press; 2000:242–266.
8. Krieger N. Epidemiology and the web of causation: has anyone seen the spider? *Soc Sci Med*. 1994;39:887–903.
9. US Department of Health and Human Services. *Healthy People 2010*. Conference ed. 2 vols. Washington, DC: US Dept of Health and Human Services; January 2000.
10. Flaskerud JH, Lesser J, Dixon E, et al. Health disparities among vulnerable populations: evolution of knowledge over five decades in nursing research publications. *Nurs Res*. 2002;51:74–85.
11. Berkman LF, Kawachi I, eds. *Social Epidemiology*. Oxford: Oxford University Press; 2000.
12. Appel SJ, Harrell JS, Deng S. Racial and socioeconomic differences in risk factors for cardiovascular disease among southern rural women. *Nurs Res*. 2002;51:140–147.
13. Horner SD, Surratt D, Smith SB. The impact of asthma risk factors on home management of childhood asthma. *J Pediatr Nurs*. 2002;17:211–221.
14. Oakes JM, Rossi PH. The measurement of SES in health research: current practice and steps toward a new approach. *Soc Sci Med*. 2003;56:769–784.
15. Subramanian SV, Belli P, Kawachi I. The macroeconomic determinants of health. *Ann Rev Public Health*. 2002;23:287–302.
16. Global Forum for Health Research. Monitoring financial flows for health research. October 2001. Available at: http://www.globalforumhealth.org/FilesUpld/20.pdf. Accessed March 13, 2003.
17. Heilemann MV, Lee KA, Kury FS. Strengths and vulnerabilites of women of Mexican descent in relation to depressive symptoms. *Nurs Res*. 2002;51:175–182.
18. McClowry SG. The termperament profiles of schoolage children. *J Pediatr Nurs*. 2002;17:3–10.
19. Macias MM, Saylor CF, Kreh SM, Clifford SC, Romanczuk AN. Predictors of support service interest and participation by families of children with spina bifida. *Rehab Nurs*. 2000;25:54–58.
20. Krieger N, Williams DR, Moss NE. Measuring social class in US public health research: concepts, methodologies, and guidelines. *Ann Rev Public Health*. 1997;18:341–378.
21. Coburn D, Denny K, Mykhalovskly E, McDonough P, Robertson A, Love R. Population health in Canada: a brief critique. *Am J Public Health*. 2003;93:392–396.
22. Wright EO. *Interrogating Inequality: Essays on*

Class Analysis, Socialism and Marxism. London: Verso; 1994.
23. Syme SL. Social and economic disparities in health: thoughts about intervention. *Milbank Q*. 1998;76:493–505.
24. Diez-Roux AV. Multilevel analysis in public health research. *Ann Rev Public Health*. 2000;21:171–192.
25. Hill MN. Comprehensive hypertension care in young urban black men: an example of a program of nursing research that integrates genetic science, clinical interventions, and patient outcomes. *Nurs Clin North Am*. 2000;35:773–793.
26. Ambler SK, Brown RD. Genetic determinants of blood pressure regulation. *J Cardiovasc Nurs*. 1999;13:59–77.
27. Allen JK. Genetics and cardiovascular disease. *Nurs Clin North Am*. 2000;35:653–662.
28. Pravenec M, Wallace C, Aitman T, Kurtz TW. Gene expression profiling in hypertension research: a critical perspective. *Hypertension*. January 2003;41: 3–8.
29. Cashion A. Genetic markers of acute pancreas allograft rejection. *National Institutes of Health CRISP Database*. Available at: http://crisp.cit.nih.gov/. Accessed March 7, 2003.
30. Robbins WA. Multifactorial genetic disease model: schizophrenia/HLA. *National Institutes of Health CRISP Database*. Available at: http://crisp.cit.nih.gov/. Accessed March 7, 2003.
31. Robbins WA. Male reproductive effects from exposure to boron [abstract]. *National Institutes of Health CRISP Database*. Available at: http://crisp.cit.nih.gov/. Accessed March 7, 2003.
32. Briones TL. Gene expression-environment link in cerebral ischemia. *National Institutes of Health CRISP Database*. Available at: http://crisp.cit.nih.gov/. Accessed March 7, 2003.
33. Lynch JW, Kaplan GA, Salonen JT. Why do poor people behave poorly? Variation in adult health behaviors and psychosocial characteristics by stages of the socioeconomic lifecourse. *Soc Sci Med*. 1997;44:809–819.
34. Evans RG, Stoddart GL. Producing health, consuming health care. *Soc Sci Med*. 1990;31:1347–1363.
35. Reutter L, Neufeld A, Harrison MJ. Nursing research on the health of low-income women. *Public Health Nurs*. 1998;15:109–122.
36. Fleury J, Keller C, Murdaugh C. Social and contextual etiology of coronary heart disease in women. *J Womens Health Gend Based Med*. 2000;9(9):967–978.
37. Flaskerud JH, Nyamathi AM. New paradigm for health disparities needed. *Nurs Res*. 2002;51:139.
38. Sachs B, Hall LA, Pietrukowicz MA. Moving beyond survival: coping behaviors of low-income single mothers. *J Psychiatr Ment Health Nurs*. 1995;2:207–215.
39. Kneipp S. The health of women in transition from welfare to employment. *West J Nurs Res*. 2000;22(6):8–34.
40. Brunner EJ. Toward a new social biology. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York: Oxford University Press; 2000:306–331.
41. Stansfeld S, Marmot M, eds. *Stress and the Heart: Psychosocial Pathways to Coronary Heart Disease*. London: British Medical Journal Books; 2002.
42. Wilkinson RG. Income inequality, social cohesion, and health: clarifying the theory—a reply to Muntaner and Lynch. *Int J Health Serv*. 1999;29: 525–543.
43. Sapolsky RM, Alberts SC, Altmann J. Hypercortisolism associated with social subordinance or social isolation among wild baboons. *Arch Gen Psychiatry*. 1997;54:1137–1143.
44. Sapolsky RM, Mott GE. Social subordinance in wold baboons is associated with suppressed high density lipoprotein-cholesterol concentrations: the possible role of chronic social stress. *Endocrinology*. 1987;121:1605–1610.
45. Kaplan JR, Manuck SB, Clarkson TB, Lusso FM, Taub DM. Social status, environment, and atherosclerosis in cynomolgus monkeys. *Arteriosclerosis*. 1982;2:359–368.
46. Kalin NH, Carnes M. Biological correlates of attachment bond disruption in humans and nonhuman primates. *Prog Neuropsychopharmacol Biol Psychiatry*. 1984;8:459–469.
47. Bahr NI, Pryce CR, Dobeli M, Martin RD. Evidence from urinary cortisol that maternal behavior is related to stress in gorillas. *Physiol Behav*. 1998;64:429–437.
48. Silver E, Mulvey EP, Swanson JW. Neighborhood structural characteristics and mental disorder: Faris and Dunham revisited. *Soc Sci Med*. 2002;55:1457–1470.
49. Cubbin C, Hadden WC, Winkleby MA. Neighborhood context and cardiovascular disease risk factors: the contribution of material deprivation. *Ethn Dis*. 2002;11:687–700.
50. Kapral MK, Wang H, Mamdani M, Tu JV. Effect of socioeconomic status on treatment and mortality after stroke. *Stroke*. 2002;33:268–273.
51. Rauh V, Andrews HF, Garfinkel RS. The contribution of maternal age to racial disparities in birthweight: a multilevel perspective. *Am J Public Health*. 2001;91:1815–1824.
52. Pearl M, Braveman P, Abrams B. The relationship of neighborhood socioeconomic characteristics to birthweight among 5 ethnic groups in California. *Am J Public Health*. 2001;91:1808–1814.
53. Cohen D, Mason K, Bedimo A, Scribner R, Basolo V, Farley TA. Neighborhood physical conditions and health. *Am J Public Health*. 2003;93:467–471.
54. Diez-Roux AV. Investigating neighborhood and area effects on health. *Am J Public Health*. 2001;91:1783–1789.

55. Pearce N, Smith GD. Is social capital the key to inequalities in health? *Am J Public Health*. 2003;93:122–129.
56. Kawachi I, Kennedy BP, Lochner K, Prothrow-Stith D. Social capital, income inequality, and mortality. *Am J Public Health*. 1997;37:1491–1498.
57. Drevdahl D, Kneipp S, Canales MK, Dorcy KS. Reinvesting in social justice: a capital idea for public health nursing? *Adv Nurs Sci*. 2001;24(9):19–31.
58. McEwen B, Stellar E. Stress and the individual: mechanisms leading to disease. *Arch Intern Med*. Sept 27 1993;153:2093–2101.
59. Macnee CL, McCabe S. Microstressors and health. In: Rice VH, ed. *Handbook of Stress, Coping, and Health: Implications for Nursing Research, Theory, and Practice*. Thousand Oaks, Calif: Sage; 2000:125–142.
60. Lepore SJ, Miles HJ, Levy JS. Relation of chronic and episodic stressors to psychological distress, reactivity, and health problems. *Int J Behav Med*. 1997;4:39–59.
61. Buka SL, Brennan RT, Rich-Edwards JW, Raudenbush SW, Earls F. Neighborhood support and the birth weight of urban infants. *Am J Epidemiol*. 2003;157:1–8.