The Future (History) of Socioeconomic Measurement and Implications for Improving Health Outcomes Among African Americans

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Socioeconomic status (SES) has powerful and complex impacts on health, and understanding the relationship between SES and health is essential for long-term improvements in the health of populations. In addition, in the United States, the impact of SES on health is inextricably intertwined with racial and ethnicity status and the historical development and maintenance of health disparities. Most of the literature documenting this relationship has focused on individual-level socioeconomic factors. There are sound theoretical reasons and some empirical support to suggest that socioeconomic resources at both individual and neighborhood levels have strong influences on health outcomes such as disease, disability, and mortality. However, these relationships have been inadequately examined to date. In this article, the term “ecological SES” will be used to denote SES at geographic group levels. As the United States attempts to achieve the goals of the Department of Health and Human Services’ Healthy People 2010 program, understanding ecological SES and its impacts on health will be crucial. We review the theory, some of the empirical evidence, and likely future for the measurement and use of a broader approach to SES and offer a specific research paradigm for examining these issues. We focus in particular on one racial–ethnic group that experiences health disparity, that is, African Americans. We use our ongoing project investigating physical frailty in urban African Americans to illustrate the importance of a multilevel approach to understanding the impacts of socioeconomic resources on health and the potential implications for efforts to prevent or reverse frailty.

In the future, the second half of the 20th century is likely to be viewed as a period when racism was exposed, fought, and recognized as one of the most important social issues in the Unites States. However, it also will be criticized as a period during which the effects of racism were not expunged. In 1950, life expectancy was 69.1 years for whites and 60.8 years for American blacks. In 2001, the difference had narrowed from more than 8 years to 5 (77.7 years life expectancy compared to 72.2 years), but even with this gain there still is an unacceptable discrepancy in life span (1). Moreover, considerable differences in health status exist between the majority whites and disadvantaged minorities, such as African Americans (2,3), and are clearly present in the older population (4–6). During the 1990s the health disparities of African Americans compared to whites actually increased in coronary heart disease mortality rates, lack of participation in vigorous physical activity, limitation in major activities due to chronic conditions, diabetes, and lower extremity amputations (7). As all these conditions are seen more commonly among older persons, these disparities are particularly relevant for geriatrics and gerontology.

The health disadvantage of African Americans in particular is striking, and is apparent in mortality (2), cancer (e.g., 8–11), stroke (12), low birth weight (13), asthma (14,15), and kidney disease (16). Differences in individual socioeconomic status (SES) and access to health care explain some of these differences, but the complexity of the relationships remains unresolved (e.g., see 17–19). Of particular importance is the extent to which this disadvantage results from limited socioeconomic resources at the individual level versus lack of neighborhood and community-wide resources. The answers to this question have profound implications not only for how research is conducted but also for how efforts to remedy the disparities are structured.

The U.S. Department of Health and Human Services has identified the reduction of these disparities as a major health care goal for the country (4,7). A sizable part of the racial disadvantage appears to be explained by differences in social circumstances, at both the individual and community levels (20,21). Therefore, if the racial disparities are to be reduced or eliminated in this century, it will be imperative to understand the socioeconomic factors that help produce and sustain these health inequalities and to use that knowledge to design interventions to reverse those effects. Ascertaining these relationships is particularly pertinent at the population level and for public health programs but also for individual patient care. It is crucial for broad based programs (e.g., Healthy People 2010) that attempt to integrate care across the continuum and for the development of policies at the local, state, and national level that are responsible for funding and programmatic priorities.

We propose a model for examining the effects of SES, including aspects of race and racism, on the functional health of older adults. This model is derived from the strong theoretical work and empirical examples of others (e.g., 21–32), but we are proposing this in the context of gerontological research and practice and for broad health outcomes rather than for a specific disease or for mortality. In epidemiologic investigations of health outcomes, SES is complex and does not fit into an easy intervention model for public health or clinical care. This complexity, and the problem of identifying (and funding) interventions, should not dissuade us as gerontological researchers and geriatric clinicians from considering how to study the processes by...
which reduced SES adversely affects health and designing interventions to reverse these effects. Better understanding of these issues will lead to significant changes in the way we conceptualize and address health disparity and diversity as well as SES (4,25,33–35).

We use the term “ecological” throughout this article to refer to external factors that affect groups as geographic or social communities. Another term that is often used as a synonym is “environmental” level factors. However, because environmental is so often used in terms of the physical milieu only and ecological more broadly represents both social and physical conditions, we use the more general term.

**BACKGROUND**

Multiple theoretical models have been proposed that deal with social influences on health. Among these, perhaps the most accessible and transparent model is from epidemiologist Nancy Krieger (28). She argues for direct and indirect, and for individual and population-level impacts on health from SES. She places this type of epidemiologic work in an ecological–social (“ecosocial”) theory that links the relationships between inequality, discrimination, and health. Causal components of health in this framework include (a) societal arrangements of power and consumption (e.g., poverty) and (b) individual aspects, including biology and interaction with the socioeconomic milieu. Other approaches to understanding the relationships among ecological SES, individual SES, and health are described, and some operational details are provided below. In each, there are ecological measures—social, political, physical, cultural, and economic—that are theorized to provide strong direct and/or indirect paths to explain differences in human health outcomes.

For African Americans, the social environment includes discrimination and racism. Self-reported discrimination or racism is rare in research on health outcomes (24,28,36–39), so its potential influence, alone or in combination with SES, is poorly examined and understood. In studies that have looked at discrimination, the primary outcome of interest usually has been mental health, not physical frailty. However, extension of this promising approach to investigations into the relationships between broader understanding of SES and physical health is timely and deserving. The model we propose below recommends the use of explicit measures of the personal and ecological components of SES, including social experiences based on one’s race. We provide examples of a range of potential assessment instruments for these measures, as well as our choices in our ongoing cohort study of frailty and disability (6,40,41).

**COMBINING LEVELS OF SES TO EXPLAIN FRAILTY**

**Introduction**

In our African American Health (AAH) project (6,40,41), which investigates the development of physical frailty in urban African Americans, we hypothesize that socioeconomic factors at both individual and ecological levels lead to differences in incident frailty and disability. In AAH, we eliminated the independent effect of race and enrolled only African Americans. The sampling strategy included two geographic areas that differ widely in personal as well as ecological SES. Each catchment area can also be subdivided into smaller geographic components for ecological measures, for example, at the street, block, or census tract level. We also measure SES by self-reported individual characteristics and by variables measuring subjects’ local environments.

SES has powerful impacts on health experiences, and a full understanding of these impacts requires a broader understanding of SES than the traditional approach focused entirely on the individual’s socioeconomic circumstances, which ignores resources available at other levels (28,33,42). Figure 1 shows the broadened theoretical model that we are using to examine the effects of SES on functional outcomes in our work. In this model, we posit three types and two levels of SES. The individual level includes measures that describe characteristics and experiences of the individual (for example, educational attainment and racism). The ecological level includes the observed environment (e.g., housing stock) and neighborhood and community factors (e.g., percentage of block living in poverty [derived from the Census], as well as crime statistics and spatial relationships to needed resources [derived locally]). Note that each of the levels interacts with and, to some extent, influences the other level, with both direct and indirect effects on the outcome.

The effects of ecological SES might affect outcomes directly and indirectly via personal factors. For example, a person who lives in a disadvantaged neighborhood with high crime could develop a functional loss directly due to a crime (an interpersonal injury). High neighborhood crime might affect the development of frailty indirectly by reducing the opportunity for walking as an exercise, as demonstrated by the work of Ross and Mirowsky (30). As an example, two women with similar personal SES but living in neighborhoods with disparate ecological SES could experience different health outcomes due to environmental influences such as access to healthy foods and safe areas in which to exercise. These hypothesized effects are not original or untested (e.g., 25,43–45).

Personal and ecological levels each include more complex domains and operational measurements. An
individual’s personal-level SES and social experiences include traditional aspects such as education and income, but also experiences of race and racism. Ecological influence can be based on summary characteristics such as neighborhood poverty or measures of the observed environment, such as housing deterioration. Each of the levels demonstrated in Figure 1 has potential component measures, which are described in more detail below and summarized in Table 1.

Personal-level measures of SES are usually derived from self-report variables, including annual income, level of education, and employment (e.g., professional, labor). These variables can be used individually or combined as an index of “class” or SES [e.g., Hollingshead two-factor index of class (46)]. In addition to these fairly objective measures of SES, questions about financial adequacy (what the reported income can buy) and net worth are useful. The experience of racism and discrimination is another important personal-level SES variable and is also complex: Measures and research on health outcomes are intriguing, but require further development (14,24,37–39,48–50).

Studies that have linked health outcomes to neighborhood poverty or its physical characteristics include a number of measures based on direct observations. Options include observer/interviewer ratings (27,40,51–54) or resident/subject ratings (55,57). These ratings, although theoretically valuable, have not been subjected to tests of their reliability. Based on our experience in the AAH study, observer rating techniques require substantial training.

The most common source of ecological measures comes from the Census, where average levels of poverty, household education, or other demographic variables summarize geographic areas at various levels of detail (e.g., census tract, county). Early in their use, ecological SES measures were used by researchers to estimate, indirectly, SES characteristics of individuals who had not supplied this information themselves. For example, Census SES was added to addresses when analyzing administrative data from hospital patients. This approach has been judged to be an adequate representation of each individual’s SES. This problem has been denoted the ecological fallacy (e.g., 21,75,76). However, subsequent theories about the effects of ecological-level SES have given independent value to group- or area-level indicators (e.g., 58,63,64,70). In our model, we propose using ecological measures as supplements to self-reported personal-level SES measures, not as substitutes for them (32,43,58,60,61,64). In addition to traditional SES measures, Census 1990 and 2000 included measures of disability (59,62), and neighborhood prevalence of various functional levels also could contribute to an understanding of the development of frailty and disability both as predictor variables and as outcomes.

Geographic information systems (GIS)-based geocoding of neighborhoods is a new and potentially rich arena for studying the effects of ecological SES and health outcomes (65,68). Information on the location of community resources for healthy and unhealthy living [e.g., health care clinics or hospitals, recreational facilities, fast food restaurants (66), and liquor stores] can be combined with information about individuals’ locations to examine how proximity and density of resources affect outcomes. Research applying these methods to health outcomes is relatively sparse to date (e.g., 67,69), but methodology and expertise are growing rapidly.

Finally, social theories suggest that there are effects of segregation. In these measures, theoretical relationships combine among domains to provide a more comprehensive view of the ecological influence on health outcomes. Measures of these social phenomena also are derived from ecological levels, usually the Census. These measures

### Table 1. Examples and Measures Used to Examine Socioeconomic Status and Its Health Effects

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
<th>Recommended Reading and Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal level measures</td>
<td>Demographics, e.g., income, net worth, education, race/ethnicity, social class</td>
<td>Baquet and Commiskey (9); Dale et al. (17); Hollingshead (66); Nzerue et al. (16); Robert et al. (47); Williams (22)</td>
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<tr>
<td></td>
<td>Race experience</td>
<td>Grant et al. (14); Jackson et al. (48); Jones (24,49); Landrine and Klomoff (37); LaVeist et al. (50); Thompson (38); Utsey (39)</td>
</tr>
<tr>
<td>Observed neighborhood ratings</td>
<td>Observer ratings of neighborhood, e.g., litter, street, and housing conditions</td>
<td>Cohen et al. (51); Krause (27); Sampson and Raudenbush (52,53); Wilson (54)</td>
</tr>
<tr>
<td></td>
<td>Resident rating/experience, e.g., crime, litter, noise</td>
<td>Balfour and Kaplan (55); Cagney and Browning (56); Centers for Disease Control and Prevention–Anonymous (57); Ross and Mirowsky (30)</td>
</tr>
<tr>
<td>Ecological census measures</td>
<td>Area poverty, race composition, % disability, age, etc.</td>
<td>Anderson et al. (58); Andresen et al. (59); Blakely and Woodward (32); Cunradi et al. (60); Krieger (61); Lin (62); Picket and Pearl (43); Robert and Li (35); Sampson et al. (63); Subramanian et al. (64); Waitzman and Smith (45)</td>
</tr>
<tr>
<td>Geographic information systems</td>
<td>Area resources, e.g., health facilities, recreational facilities, stores</td>
<td>Moore and Carpenter (65); Morland et al. (66); Phillips et al. (67); Richards et al. (68); Schlundt et al. (69)</td>
</tr>
<tr>
<td>Social indexes and measures</td>
<td>Isolation, segregation, clustering, etc.</td>
<td>Acevedo-Garcia (70); Browning et al. (71); Cagney and Browning (56); Fang et al. (3); Hansen (72); Krivo et al. (73); Polednak (74)</td>
</tr>
</tbody>
</table>
WHAT CAN RESEARCHERS AND HEALTH CARE PROVIDERS USE NOW?

Measures of multiple levels of SES and social context are available to researchers now. Choice depends partly on the questions asked, and whether ecological influences are hypothesized (76). Individual self-reported measures such as income, income sufficiency, education, and neighborhood perceptions; GIS coding of community resources; and Census-derived social measures of neighborhoods all have substantial theoretical value and prior research. However, more development and testing are needed on measures for some factors that appear to influence health outcomes (e.g., perceived racism and observer ratings of neighborhoods) (53).

The use of multilevel understanding of SES is not limited to researchers. Physicians know that their ability to provide care to older patients depends on their patients’ social circumstances. For example, compared to individuals from higher SES neighborhoods, those from lower SES neighborhoods appear to exercise less due to inhospitable environments (77) and to use fewer appropriate mental health services (78). Even in Canada, a country with universal access to health care, persons from lower SES neighborhoods experience lower access to appropriate rehabilitation services and higher mortality rate after experiencing a major stroke (79).

In addition, Cooper and colleagues (80) have shown that race-discordant visits between African American versus white patients and African American versus white physicians were associated with greater observed patient positive affect, higher patient-reported visit satisfaction, physician participatory decision-making style, and willingness to recommend the physician to a friend than discordant visits. These differences persisted after control for other patient and physician demographic characteristics and for observed medical visit communication characteristics (e.g., duration of visit and patient-centered communication) (80). Arguably, a major explanation for these findings is an understanding by the concordant physician of the social-environmental context in which the patient lives, which has been denoted “implicit social cognition” (81). We believe that greater understanding of the effect of multilevel SES in clinical settings would help alleviate a sizable portion of these difficulties.

Geriatricians are particularly aware of the impact of the environment on older persons’ health. For example, they understand that housing and neighborhood environments are strongly associated with the ability of an older person with some degree of disability to live in the community (82), and environmental assessment and modification are accepted as appropriate parts of management for patients experiencing falls (83,84) or disability (85). However, the ability to act on this general understanding would be greatly enhanced by better understanding of the housing, immediate neighborhood, and broader community factors playing crucial roles in older persons’ health experiences.

THE FUTURE OF UNDERSTANDING MULTILEVEL SES IMPACTS ON HEALTH

The multilevel method of conceptualizing and measuring SES and its impacts on disease, function, and mortality (as advocated here) has the potential to revolutionize how we view SES, interpret SES-associated adverse health effects, and design interventions to remediate these adverse health effects. Use of the multilevel SES approach has been growing rapidly (20,21), and predictably this rapid growth will continue. Despite this promise and rapid growth, many challenges to successful application of multilevel SES remain.

The most important challenge relates to the demonstration of causality. Causality is most strongly supported, of course, by properly designed intervention studies, with randomized controlled trials as the ideal. However, interventions in the multilevel SES arena are unlikely to use complete randomized controlled trial designs, will need to be long term, will require political consensus building, and will be very expensive. Therefore, from a practical viewpoint, much research needs to be accomplished using descriptive studies (including observations of natural experiments) before properly scaled and targeted intervention studies are justified. The assessment of causality using descriptive designs has a long history in epidemiology, and the classic criteria (temporal sequence, strength and specificity of association, dose-response gradient, fall in risk when the purported cause is reversed, consistency across studies, epidemiological and biological plausibility) still apply (86,87). Assessing causality within the context of multiple levels involves many challenges in addition to those seen in traditional epidemiological studies, including multifaceted interaction effects, complex causal chains with feedback loops and reciprocal effects, and nested data structures. For example, neighborhoods’ effect on health can be underestimated if intervening variables are over-controlled. Thus, because neighborhood effects are likely mediated via individual-level SES, one essential task is to determine which individual-level SES factors should be statistically controlled for when identifying the true causal effect of neighborhoods on health. Moreover, much more work needs to be accomplished on the factors and mechanisms that mediate the effects of neighborhood-level SES on individual health outcomes (e.g., see 88) and on analytic techniques that better account for the complex set of relations operating within the multilevel context. These issues are well described by Diez Roux (21,23). Additional research tasks include (but are not limited to) how best to delineate “neighborhood” and “community” (21); the empirical development, evaluation, and revision of relatively new measures such as racism experience, observed neighborhood ratings, and social indexes; and integration of GIS approaches with previously devised census-based methods (e.g., see 89).

Despite these considerable challenges, the effort is worthwhile. Neighborhoods and communities are amenable to intervention and thus offer the chance to substantially improve the health of populations. Such interventions, however, will need to be well conceptualized and targeted based on descriptive research, including empirically derived understanding of the operant mechanisms.
Summary

SES has powerful and complex impacts on health, and understanding these impacts is essential for long-term improvements in population health. To fully understand and respond to SES’s influence on health, a multilevel approach is required and should include, at a minimum, individual, neighborhood, and broader community levels. In research, clinical care, and public health practice, the ability to understand and use to maximum advantage the multilevel approach to SES is in its infancy. A multilevel SES approach appears to be particularly important in the United States as the nation wrestles with the charge to reduce or eliminate health disparities for disadvantaged minority populations such as elderly African Americans (4). In this article, we have explained the importance of a multilevel approach to SES, offered a number of suggestions to improvements within each level as well as integration among levels, and outlined the likely future of this field. We look forward to responses and improvements from researchers, clinicians, and public health practitioners so that all citizens can enjoy their maximum opportunity for health and successful aging.

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REFERENCES


