Toward Understanding the Association of Socioeconomic Status and Health: A New Challenge for the Biopsychosocial Approach

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The association of socioeconomic status (SES) with morbidity and mortality is a ubiquitous finding in the health literature. One of the principal challenges for biobehavioral researchers is understanding the mechanisms that link SES with health outcomes. This article highlights possible pathways by which SES may influence health. It also provides a discussion of sociodemographic and geographical modifiers of the SES-health relationship and offers several potentially fruitful directions for future research.

Key words: SES, health, ethnicity, gender, age, mechanisms.

INTRODUCTION

It is appropriate that the first article in this special issue on shared determinants of health outcomes focuses on social class, because understanding the relationship between social class and health requires addressing each of the other topics that constitute this volume. In the health literature, the terms social class and socioeconomic status (SES) are often used interchangeably. However, in some disciplines, such as sociology, these terms often have different meanings. As many authors have noted (1–4), there are explicit theories of social class and specific social class categories, as developed by Marx (4, 5), Dahrendorf (3, 6), Weber (7), and others, that have not heretofore been used to examine health outcomes. For this article, we use the expression SES as a synonym for education, income, or occupation. These are the principal ways by which SES has been operationalized in the literature.

This article addresses the following topics. First, it provides a brief overview of the relationship between SES and health outcomes. Second, it highlights possible mechanisms whereby SES may influence health. Our purpose is not to provide an exhaustive summary of this vast literature because there are a number of publications that adequately serve this purpose. Our goal is to provide a relatively brief introduction to this field. Next, we provide a more detailed discussion of sociodemographic and geographical modifiers of the SES-health relationship, given the lack of emphasis on these areas in most previous reviews. Finally, we outline one approach for future research on SES and health.

SES AND HEALTH

A relationship between SES and health has apparently existed for some time. Davey Smith et al. (8) examined the height of graveyard obelisks in the Victorian burial grounds of Glasgow, Scotland. Among individuals who died between 1800 and 1920, the age at death was significantly older for individuals with taller grave markers, whose families were presumably wealthier and could afford the taller obelisks. In 1924, researchers in Providence, Rhode Island analyzed United States Bureau of the Census data from 1865 and found that mortality rates were higher among nontaxpayers compared with taxpayers in that city. Nontaxpayers were lower income people who were exempted from income tax obligations (9).

More recent studies have also shown a consistent inverse relationship between SES and morbidity and mortality rates. Figure 1 provides a representation of the association between SES and health in developed countries. As one moves up the SES ladder, morbidity and mortality rates generally decrease. This inverse relationship is observed whether SES is measured using education, income, or occupational status and does not appear to be an artifact of the more physically ill individuals drifting down the SES hierarchy (10, 11). The SES-health gradient extends to a wide array of health problems, including heart disease, cancer, stroke, diabetes, hypertension, infant mortality, arthritis, back ailments, mental illness, kidney diseases, and many others (12) and may predict prognosis after illness is present

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Received for publication June 8, 1994; revision received October 27, 1994.

0033-3174/95/5703-0213$03.00/0

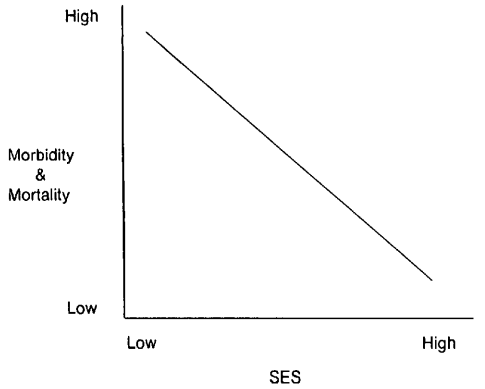

Fig. 1. Representation of the relationship between SES and health outcomes.

(13, 14). For more detailed information on specific studies on SES and health, there are several excellent reviews available (1, 11, 15–18).

What Accounts for the Linkage?

Perhaps *the* most pressing question for health researchers is how SES influences health outcomes or how it "gets under the skin." Figure 2 shows six categories of variables that might participate in the linkage between SES and health. These include sociodemographic; economic; social, environmental, and medical; behavioral and psychological; physiological, and health outcome variables. Although this diagram is a convenient method of illustrating many of the factors that may be involved in the SES-health linkage, it does not truly capture the numerous and complex interactions that may occur both within and across categories. However, using the SES literature, we hope to provide illustrative examples of some of these interactions.

SES and Access to Health Care

It is frequently assumed that SES differences in access to health care (Figure 2, Category 3) can account for SES differences in health outcomes. Indeed, this is one of the strongest arguments for universal health care coverage in the United States. However, although universal health care coverage is critically important, its initiation will probably *not* level out the SES-health gradient.

According to Adler et al. (15), there are at least three reasons why this is true. First, countries that have universal health insurance show approximately the same SES-health gradient as that found in the United States where such insurance is not provided. Second, SES differences can be found at the upper range of the SES hierarchy in which health insurance coverage is likely to be more universal. Third, SES differences appear in diseases that are amenable to treatment and those that are not (e.g., different types of cancers). Thus, even after the implementation of much needed health care reform in the United States, the SES-health gradient will more than likely persist.

SES and Residential Characteristics

In recent years, researchers have become increasingly aware of the potential importance of residential environment (Figure 2, Category 3) as a mediator of the SES-health relationship. As one moves down the SES ladder, residential choices become more limited. In fact, many of the environments in which individuals lower on the SES hierarchy live are associated with mortality rates independent of individual SES. Haan et al. (11) provide one of the most complete reviews of this literature. They state that many studies that examine community environment and SES show clear associations between SES and related environmental exposures and health outcomes. Most studies used both ecological measures of the environment and ecological measures of health, such as death rates in a geographical area (11). Few studies have linked ecological measures of the residential or physical environment with *individual*-level health status or health behaviors (19, 20).

One study that did link ecological measures of SES with individual outcomes was conducted by Haan et al. (19), who examined 9-year mortality rates as a function of poverty area in a random sample of residents aged 35 and older in Oakland, California. The United States Bureau of the Census defines poverty areas as those with a high percentage of families with low income, substandard housing, and lower than average educational attainment. After the multivariate adjustment for 15 potential confounders, including age, race, sex, initial health status, and individual SES, poverty area was associated with all-cause mortality rates after 9 years. Thus, the Haan et al. data suggest that poverty area may represent a new independent risk factor for individually as-

1 Sociodemographic	2 Socioeconomic Status	3 Social, Environ., Medical	4 Psychological & Behavioral	5 Physiological	6 Outcomes
Age	Education	Residential Characteristics	Psychological Distress	Cardiovascular	Health and Illness
Ethnicity	Income	Occupational Environment	Personality Factors	Immune	
Gender	Occupation	Social Support	Health-Promoting Behaviors	Muscular	
Location	Family Wealth	Social/ Professional *Hierarchy*	*Health-Damaging* Behaviors	Endocrine	
	Perceived SES	Access to Health Care		Height	
	Economic Mobility			Weight	
	Childhood SES				
	Material Possessions				
	Trading/Bartering Practices				
	National Income Distribution				

Fig. 2. Possible factors linking SES and health.

sessed adverse health outcomes, but one that is certainly correlated with individual SES.

SES and Psychological and Behavioral Factors

SES may influence health outcomes through its association with behavioral and psychological risk factors (Figure 2, Category 4). For example, it has been known for at least two decades that persons lower in SES experience more stressful life events and more subjective distress than their higher SES counterparts (21–24). Despite this, research has generally failed to support the hypothesis that their subjective burden is *due to* greater stress exposure (21, 22, 25). Instead, empirical research shows that the emotional *impact* of stressful life events is greater in individuals lower in SES compared with those higher in SES (21, 22, 24), suggesting that the former may have greater vulnerability to stress. In addition to subjective distress, other psychological characteristics such as depression (26, 27), hostility (28, 29), and locus of control (30–32) have also shown a consistent relationship with SES. Higher levels of SES have been associated with lower levels of depression and hostility and with an internal locus of control. Other psychological and personality constructs either remain relatively unexplored with respect to SES or the results thus far have been equivocal. These include anger, anxiety, Type A behavior, optimism, hardiness, subjective well-being, and neuroticism.

It is also possible that SES may exert its effects on health through the performance or lack of performance of health-promoting or health-damaging behavior. For example, with decreasing SES, research has clearly documented an increase in smoking prevalence (16, 33–35), a decrease in physical activity (36–37), an increased consumption of high-fat diets (38), and decreased knowledge about health (33).

SES and Physiological Processes

If SES is linked to health outcomes in a causative way, we should expect that it is also linked to physiological systems relevant to specific disorders (Figure 2, Category 5). Unfortunately, little research has examined this issue. Most large epidemiological datasets that contain good measures of SES do not have detailed physiological data. At the same time, most laboratory studies with sophisticated physiological assessments fail to assess SES thoroughly.

The possible exception to this is studies examining blood pressure where higher SES is related to lower blood pressure levels and a lower prevalence of hypertension (39–43). Hypertension, of course, is a risk factor for stroke, heart disease, and renal disease. Matthews et al. (44) recently examined the association of educational attainment with biological risk factors for heart disease in middle-aged women. They found that, with lower levels of education, the subjects' risk factor profiles were more atherogenic. Women with low SES had higher systolic blood pressure; low-density lipoprotein (LDL) cholesterol, apolipoprotein B, and triglyceride levels; fasting and 2-hour glucose values; 2-hour insulin values; and body mass indices and lower high-density lipoprotein (HDL) cholesterol levels and HDL/LDL ratio. Recently, Wilson et al. (45) found an inverse association between plasma fibrinogen concentration and three measures of SES (income, education, and lifetime occupation) after controlling for several covariants. In a comprehensive review of the literature on SES and obesity, Sobal and Stunkard (46) reported that, in developed countries, there was a strong inverse relationship between SES and obesity among women, with mixed results in men and children. Conversely, in developing countries, there was a *positive* association between SES and obesity among men, women, and children (46).

SOCIODEMOGRAPHIC FACTORS AND SES

Although the SES-health gradient is seen in every demographic group in the United States in which it has been examined, certain sociodemographic factors may influence the level of SES and the magnitude and nature of the SES association with health. These sociodemographic factors include age, ethnicity, gender, and location (Figure 2, Category 1).

Ethnicity, SES, and Health

The moderating effects of sociodemographic variables are perhaps most clearly seen with ethnicity, especially regarding differences between blacks and whites. It is well known that ethnicity influences SES in the United States. For example, African-Americans have a significantly lower SES than whites by every measure (47, 48). What is not often recognized, however, is that at most levels of SES, morbidity and mortality rates are higher for blacks than for whites. Using data from the 1986 National Health Interview Survey, Pappas et al. (49) reported that, even given the same educational attainment, mortality rates are higher among black men and women compared with their white counterparts (Figures 3 and 4). The black-white disparity is especially striking at the low end of the SES hierarchy.

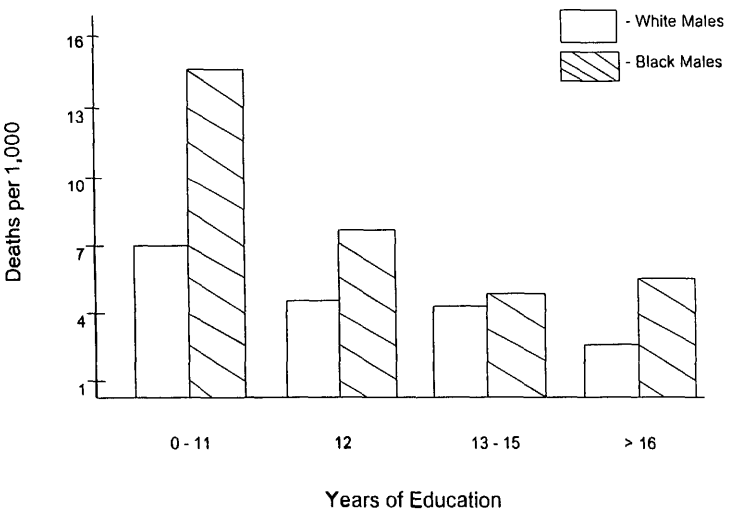

Fig. 3. Mortality rate in males by ethnicity and education. (From Pappas et al. (49), with permission.)

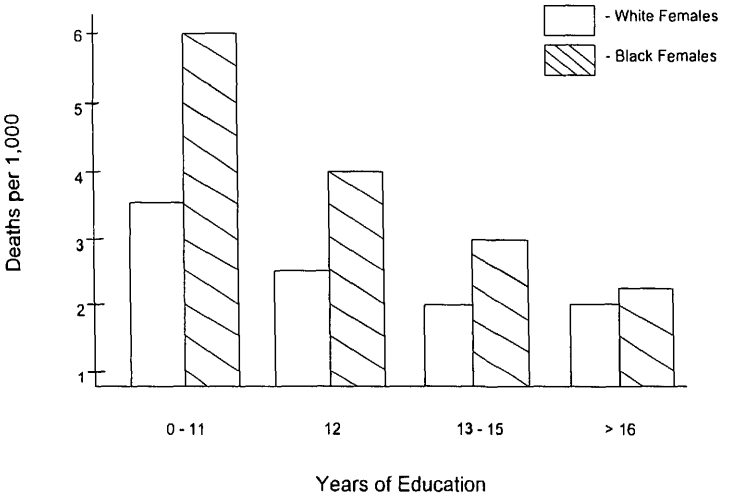

Fig. 4. Mortality rate in females by ethnicity and education. (From Pappas et al. (49), with permission.)

These data are particularly relevant given that black-white differences in health are often attributed to group differences in SES. That is, if blacks and whites were "matched" on SES, the group differences in health would be eliminated or at least substantially reduced. Indeed, some research indicates that ethnic group differences in SES can account for group differences in some health outcomes (11, 42). Yet, the Pappas et al. (49) data suggest that the issue may be more complex than is generally acknowledged. More importantly, however, is the possibility that there may be ethnic group differences in the nature and experience of SES. If this were so, research designed to understand the processes responsible for the SES-health gradient should be ethnic group specific and should not stop at the level of explaining group differences. This issue is addressed in the following section.

Ethnicity, SES, and Environmental Exposures

Clear relationships have been found between ethnicity, SES, and residential, social, and occupational environments (Figure 2, Category 3). Demographic research has shown that blacks in the largest United States metropolitan areas experience a phenomenon called "hypersegregation" or an extreme level of residential isolation from other groups and an associated "isolation from the amenities, opportunities, and resources that affect social and economic well-being" (50). This hypersegregation is the result of a number of factors, but most notable is the severe and pervasive housing discrimination against blacks at every level of SES, especially at the low end (51). This residential discrimination and resulting hypersegregation has social, economic, and ultimately health consequences.

William Wilson (52) showed that poverty is associated with different residential environments for blacks than for whites. Among residents of the five largest cities in the United States, Wilson found that, in 1980, 68% of all poor whites lived in census-defined *non*poverty areas, whereas only 15% of poor blacks and 20% of poor Hispanics lived in non-poverty areas. Furthermore, whereas only 7% of whites lived in extreme poverty areas, 39% of all poor blacks and 32% of all poor Hispanics lived in extreme poverty areas. Given the data presented earlier on the effects of living in impoverished environments on health (19), it is possible that residential environments partially explain the disparity in health outcomes between poor blacks and poor whites.

Furthermore, potentially health protective social relationships may occur less often in high-poverty environments. African-Americans residing in high-poverty areas have a higher percentage of individuals reporting being unmarried, having no current

partner, and having no best friend compared with those living in nonpoverty areas. These findings on the relative lack of potentially supportive social relationships have also been observed in whites (53, 54). Finally, African-Americans in general, but especially low-income blacks, are disproportionately exposed to hazardous waste facilities and uncontrolled toxic waste sites (55).

Given these substantial differences in residential environments, researchers should be cautious in comparing poor blacks with poor whites on variables related to SES. As quoted in Wilson (52), "simple comparisons between poor whites and poor blacks would be confounded with the fact that poor whites reside in areas which are ecologically and economically different from poor blacks. Any observed relationships involving race would reflect, to some unknown degree, the relatively superior ecological niche many poor whites occupy with respect to jobs, marriage opportunities, and exposure to conventional role models" (56). Thus, even when statistical controls for SES "explain" ethnic group differences in health, researchers should be cognizant of the fact that the processes by which SES influences health may not be uniform across groups based on differences in residential environments.

Ethnicity, SES, and Psychological and Behavioral Factors

Relatively little research has examined interactions of ethnicity, SES, and psychological and behavioral factors related to health. Literature on ethnic differences in health behavior frequently statistically control for SES rather than examining its interaction with ethnicity. Of the studies that have looked at these interactions, findings suggest that blacks with lower SES have a higher risk profile than other groups, which could possibly account for their higher mortality rate.

John Barefoot et al. (28), using a national sample, showed that Cook/Medley hostility scores were higher for nonwhites (who were predominantly black) compared with whites at most levels of SES, but especially at the low end of SES. Because the Cook/Medley scale taps into feelings of cynicism, perceived threat, and mistrust, one could interpret these findings as evidence of *adaptive* coping responses by poorer blacks to the more threatening environments in which many reside. However, although such responses are potentially adaptive on one hand, they may increase the risk for heart disease (57). Kessler and Neighbors (58) found that blacks with low SES reported more stress in their lives than did whites with low SES and upper income blacks. Finally, some epidemiological studies have documented a higher prevalence of smoking among blacks, especially among low-income blacks, who are at the greatest risk for lung cancer and heart disease (59).

Ethnicity, SES, and Physiological Processes

Although black-white differences have been observed on a number of physiological variables, few studies have examined the interaction of SES and ethnicity. The one exception is in the area of obesity where black women have been shown to have a higher prevalence during their adult years compared with black men, white women, and white men. Compared with white women, the prevalence of obesity in black women is higher at every level of SES, but especially among persons with lower SES (60, 61). Finally, although black-white differences have been observed in studies of cardiovascular reactivity (62), few analyses have examined the interactions of ethnicity with SES. A recent study by Armstead et al. (63) found SES to be inversely associated with reactivity to a stressful interview among black women but not among white women.

In conclusion, given the differences in the nature and experience of SES in blacks and whites, we suggest future research focus more carefully on how SES might be influencing health outcomes differently in the two groups. We further suggest that the effects of SES on behavioral and psychosocial functioning be explored in other cultural groups including Asian-Americans, Latinos, and Native Americans.

SES AND OTHER SOCIODEMOGRAPHICS: AGE, GENDER AND LOCATION

Relative to ethnicity, there has been relatively less research on the interactions of SES with age, gender, or location as they relate to health outcomes. However, there is sufficient evidence to warrant a closer examination of how SES interacts with these sociodemographic variables.

Age

The relationship between SES and health begins at the earliest stages of life. For example, according to *Healthy People 2000*, approximately three-fourths of

the deaths in the 1st month of life and 60% of all infant deaths occurred among low birth weight infants. Low and very low birth weight births are associated with lower SES.

Among children aged 1 to 14 years, the leading cause of death is unintentional injuries, which account for nearly one-half of all childhood deaths. The rate of unintentional injuries is especially high among Native American children (67), although no clear SES gradient has been reported. According to a review of the SES and child health literature (68), an SES-health linkage has been found with the following health problems: lead poisoning, vision problems, otitis media and hearing loss, cytomegalic inclusion disease, and iron deficiency anemia. In addition, mental retardation, learning disorders, and emotional and behavioral problems also occur at greater frequency among children with lower SES (65).

Among adolescents and young adults (ages 15–24 years), unintentional injuries associated with motor vehicle accidents, homicide, and suicide are the leading cause of death. Of these, SES is mostly clearly associated with homicide, especially for young black men (67).

There have been a handful of reports examining the relationship between age, SES, and health in the adult population. Studies have reported that the SES differential is most apparent during the middle years (69–71) but may be apparent even among the very old (72).

To address the question of the interaction of age and SES on health, House et al. (73) examined data from both the Americans' Changing Lives (ACL) Survey and the 1985 National Health Interview Survey (NHIS). Using a composite measure of SES from the ACL that combined income and occupation to create four SES categories (lower, lower-middle, upper-middle, and upper), House et al. found that, for the youngest cohort (persons 25–34 years of age), there was virtually no effect for SES on the number of chronic health conditions, functional status, and limitations of daily activities. Of individuals in the lowest SES category, the prevalence of chronic conditions peaked between ages 55 and 64 years; in the two highest SES categories, this peak did not occur until after age 75. The same general pattern was true for functional status and limitation of daily activities, i.e., practically no differences related to SES among persons 25 to 34 years of age, striking differences between ages 55 and 64, and a convergence of SES groups for persons older than age 75. These findings were generally replicated in the NHIS data. Interestingly, in the House et al. study, younger persons of lower SES experienced a degree of health impairment similar to that of *older* persons of higher SES. Thus, the House et al. findings suggest that "upper socioeconomic groups substantially postpone functional limitations into the later years of life, but the lower socioeconomic groups experience significant functional limitations quite early."

Gender

In the United States, there are striking gender differences in SES. In families that consist of a married couple with children younger than 18 years of age, the median annual income is approximately $41,000. If the wife is absent from these families (male householder/wife absent), this figure drops to $31,000. With the husband absent from these families (female householder/husband absent), the median income is only approximately $18,000 (74). In other words, female householder families earn only 57% of male householder families. Similarly, the median income for single females without children is only 62% of that of single males without children. In addition, investment in education does not bring comparable income returns for men and women. Female college graduates earn only 65% of the income of male college graduates; female high school graduates earn only 68% of the income male high school graduates. Even more striking is the gender difference in the percentage of low-income households. For married couples, only 10% make less than $15,000/year; for families in which the female is absent (male householder), the rate is 18%. However, this rate jumps to 42% for households in which the husband is absent (female householder). In nonfamily households that make less than $15,000/year, the rate is 32% for males and 51% for females.

The SES-health link has been confirmed for men and women. However, some gender differences have been observed in the impact of SES over time. Feldman et al. (75) examined SES-related mortality rates for middle-aged and older white men and women using 1960 data from the Matched Record Survey and 1971 to 1984 data from the first National Health and Nutrition Examination Survey. Although death rates declined between 1960 and 1971 to 1984 for men and women, the decline was more rapid for the more educated men compared with those who were less educated. This led to a stronger relationship between SES and mortality rates among men in 1971 to 1984. In contrast, the decline in death rates for women was about the same in 1960 and 1971 to

1984 regardless of educational attainment. Thus, the effects of education on mortality rate became stronger over time among men but remained unchanged over time in women. These gender differences were largely due to greater SES effects on cardiovascular disease mortality rates in men than in women. Similarly, Pappas et al. (49) showed that, between 1960 and 1986, the association of educational attainment and mortality rate increased by 20% in black and white women, but by more than 100% in men, which suggests that the SES-related disparity in mortality rate increased over time to a greater degree for men than for women.

Beyond the aforementioned trends in SES-health relationships over time, there are clearly other issues pertaining to SES and gender that require further examination. Obesity is a case in point. According to Sobal (76), the strongest inverse relationship between obesity and SES in developed countries is for adult women, with a more mixed pattern for other age-sex groups. In a study of black women, Croft et al. (77) found an inverse relationship of SES to age-adjusted body mass index in women but not in men. Other studies suggest complex interactions between gender, ethnicity, and SES with respect to body weight. Some evidence indicates that, although there may be a strictly inverse relationship between body mass and educational attainment among white women, there may be an inverted-U association among black women and among both black and white men, with body mass reaching a maximum around 8 to 12 years of education for black women and around 12 to 15 years of education for black and white men (78).

The SES and gender interactions on body mass may be associated with variations in physical activity level. In a study of physical activity in men and women with lower and higher SES, Ford et al. (36) found that women with lower SES reported the least amount of physical activity, with the highest amount being reported by the women with higher SES. Men with higher and lower SES reported activity levels that fell between these two female groups.

There are a number of other issues relating to gender, SES, and health that warrant further investigation. These include SES interactions with women's multiple home and work roles (79), the greater exposure to hazardous occupations in low-income men (80), experience of gender discrimination by SES status (81, 82), the potential differential impact of husbands' versus wives' SES on family SES and health outcomes (83), and the influence of SES on maternal and reproductive health (20). The association of SES with pregnancy outcomes is especially critical given the high rates of infant mortality and low birth weight infants among women with low SES. Even among those low birth weight infants who survive, they may be at higher risk for adult health problems (84, 85).

Location

Although SES and health have shown an inverse relationship in practically all developed countries, recent studies suggest that a *positive* correlation may be observed in some developing countries for certain health problems. Bunker et al. (86) found that higher occupational status among male civil servants in Nigeria was related to higher blood pressure levels. This effect was not explained by body mass index, alcohol intake, or years in the urban environment. In a separate study of Nigerian factory workers, education was found to have a significant positive association with blood pressure that was independent of age, body mass index, pulse, and alcohol consumption (87). These recent findings are provocative and suggest that we cannot always assume that the inverse SES-health gradient is universal in the developing world.

Even in developed countries, differences in income distribution may be predictive of national health outcomes. Studies by Wilkinson (88) suggest that, in Western industrialized countries where income distribution is more equitable (defined as the percentage of gross national income received by the least well-off families), there is an overall longer average life expectancy. Moreover, Wilkinson found a striking inverse relationship ($r = -.73$) between annual changes in the percent of the population in relative poverty and the annual changes in life expectancy. That is, those countries that evidenced the largest annual *decrease* in the national poverty rate also experienced the greatest annual *increase* in life expectancy.

FUTURE RESEARCH DIRECTIONS

In an area of research as complex and encompassing as SES and health, there is an almost infinite array of potential research directions and unanswered questions. However, we would like to focus on three areas that represent a good portion of the deficits in our knowledge of SES-health affects: measurement of SES, mechanisms linking SES and health, and SES interventions.

Measurement

Without question, education, income, and occupation as measures of SES have been extraordinarily useful for health researchers, despite some methodological challenges they present (83). As useful as these three measures have been, there may be measures of SES that are of equal or greater predictive value in some populations. Some of these alternative measures of SES are listed in Figure 1 (Category 2) and include indices of family wealth; perceived SES; economic mobility across generations; community-level measures of SES; SES during childhood; the use of trading or bartering for goods or services; material possessions such as cattle, lard, and housing structures in some countries; and, for cross-national studies, national income distribution. With respect to family wealth (defined as liquid assets), ethnic group differences have been found, even with the same level of family income. The median family wealth for whites in the United States is $17,500, but only approximately $300 for blacks and $32 for Hispanics (89, 90). This may be at least one explanation for the black-white differences in health status at similar levels of educational attainment (49). Also, it is unclear how health is related to intergenerational mobility, that is, moving up or down the income or occupational hierarchy or up the educational ladder relative to one's parents (91, 92). It would also be interesting to know whether exposure to poverty during childhood has an impact on adult health (92, 93), and if so, are there critical periods during childhood when economic deprivation is most detrimental (85). In addition, in some rural areas of developing countries, the measure of SES by material possessions such as land, the nature of housing structures, or cattle might be useful predictors of health status (94). Finally, some groups in the United States, particularly in some ethnic minority populations, may rely more on trading, exchange, or bartering for goods and services in addition to the cash economy. Here, caution must be taken then in comparing these groups with those who depend solely on a cash economy to purchase services, food, or health care (95).

Mechanisms and Interventions

Beyond these measurement issues, a good deal of the needed research on SES and health could be organized using the 2 × 2 matrix shown in Figure 5. The matrix identifies two principle research areas: a) mechanisms and b) interventions that might reduce the impact of SES. It also identifies two groups of

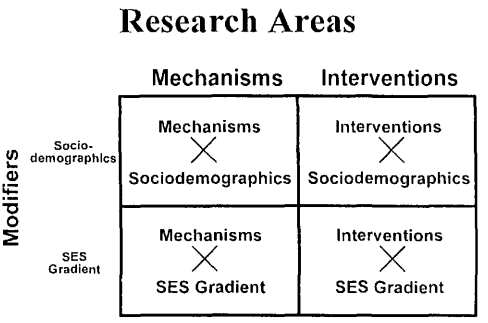

Fig. 5. Areas in which research on SES and health is needed.

potential modifiers of SES mechanisms and interventions: sociodemographic factors and the SES gradient.

Mechanisms. First, we need a more complete understanding of the mechanisms linking SES and health. Research in this area is uneven in that we know a great deal about the influence of SES on health-damaging behaviors such as smoking and lack of exercise but practically nothing about how SES affects physiological processes. We also need to be cognizant of the potential modifying effects of sociodemographic factors (discussed earlier) and the SES gradient. The SES gradient presents special conceptual challenges (16). To illustrate this point, Figure 6 shows different points of comparison along the SES gradient. It would be important to determine whether the mechanisms that account for the health differences between say, Groups A and B along this gradient, are similar or different from those that explain the differences between Groups C and D. At the present time, it is unclear whether the mechanisms that mediate the health differences between

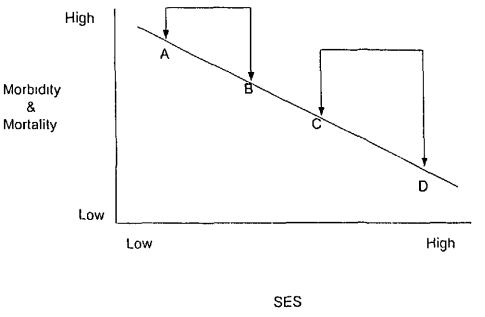

Fig. 6. Possible comparisons along the SES gradient.

people in poverty compared with the middle class are the same as those that are responsible for health differences between the middle class and the affluent.

One possibility in this regard is that, as one moves up the SES ladder, the nature of residential environments may change from those with largely health-damaging effects (poverty areas) to those with a relative lack of such deleterious effects, or what could be called low-risk areas (middle-class suburbs). However, the residential environments of the affluent may even be health *enhancing* when one considers the potential positive affect elicited either by living in a beautiful wooded area or next to a lake, by owning a swimming pool or an alarm system, or even by simply living in a quiet area. There may also be SES gradient differences in daily hassles, optimism, or perceived control over life circumstances, especially in the presence of higher demands in persons with lower SES. Any of these processes could have short-term physiological effects and long-term health consequences and should be examined as a function of age, gender, and ethnicity.

Interventions. Finally, given the SES association with health, the question becomes what do we do about it. In other words, do we have effective interventions for countering the untoward effects of low SES? Certainly, we have effective interventions for say, reducing smoking regardless of SES, but one must ask whether it is more difficult for people struggling with chronic economic difficulties to adopt and maintain healthful lifestyles compared with the more affluent (1, 18, 96, 97). If it is more difficult, we need to develop innovative strategies targeted specifically toward persons with lower SES. For example, are there coping strategies or skills that could be taught to assist low-income persons with life circumstances that may be characterized by high demand and low control?

In addition, we have to ask ourselves this question: what is the role of health researchers in exploring interventions to *improve* SES (i.e., increasing educational attainment or income)? If we assume that SES is causally related to adverse health outcomes, should not we, as health professionals, also be concerned with exploring ways to improve SES, especially with approaches that facilitate the movement of people out of poverty? This could have the biggest payoff in terms of influencing the mechanisms that link SES and health. If we begin to think this way, it raises some intriguing research questions that have not heretofore been in the domain of "health" research. For example, what are effective methods for reducing the high school dropout rate? How do we increase participation in literacy programs? What is the socioeconomic impact of job training programs? What are effective strategies for reducing housing discrimination that affects low and high SES African-Americans? What is the economic impact of free, state-supported higher education? Finally, are there specific *skills* that will enable individuals to improve their SES? For instance, what skills are required to achieve a higher-paying or higher-status job, move out of a high-risk residential environment, or improve educational attainment through adult education? Can these skills be taught and used effectively to improve SES? And if so, is the risk for illness reduced?

In conclusion, SES is indeed a ubiquitous aspect of health functioning. As such, it touches on the research and clinical interests of practically everyone interested in the biopsychosocial approach to health. Our challenge, then, is to use the unique advantages of the multidisciplinary approach to address this critical public health concern.

Preparation of this article was partially supported by a Research Scientist Development Award from the National Institute of Mental Health, grants AG12058 from the National Institute on Aging and HL4266 (to N.B.A.) and a Minority Supplement Award (HL36587) (to C.A.A.) from the National Heart, Lung, and Blood Institute. We thank the John D. and Catherine T. MacArthur Foundation's Working Groups on SES and Health for the discussions that aided the development of this article.

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