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Socioeconomic Disparities in Health Behaviors

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Abstract

The inverse relationships between socioeconomic status (SES) and unhealthy behaviors such as tobacco use, physical inactivity, and poor nutrition have been well demonstrated empirically but encompass diverse underlying causal mechanisms. These mechanisms have special theoretical importance because disparities in health behaviors, unlike disparities in many other components of health, involve something more than the ability to use income to purchase good health. Based on a review of broad literatures in sociology, economics, and public health, we classify explanations of higher smoking, lower exercise, poorer diet, and excess weight among low-SES persons into nine broad groups that specify related but conceptually distinct mechanisms. The lack of clear support for any one explanation suggests that the literature on SES disparities in health and health behaviors can do more to design studies that better test for the importance of the varied mechanisms.

Keywords

smoking; exercise; diet; obesity; education; socioeconomic status

INTRODUCTION

Why do low–socioeconomic status (SES) groups more often act in ways that harm their health than high-SES groups? Health behaviors such as use of tobacco, lack of exercise, and poor diet contribute importantly to—though by no means completely explain (Lantz et al. 1998)—SES differences in health and mortality (Rogers et al. 2000). In addition, these behaviors have a characteristic that makes them of special interest: They involve more than the inability to purchase goods and services that promote good health. Smoking involves expenditure of money to purchase an unhealthy product, and some forms of exercise such as walking cost little. The tendency of low-SES groups to adopt unhealthy behaviors despite the monetary and health costs is a puzzle that many studies have examined but, with one very recent exception (Cutler & Lleras-Muney 2010), not addressed in a comprehensive way.

DISCLOSURE STATEMENT

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

We review explanations of the relationship between low SES and unhealthy behaviors and the empirical support they have received. In focusing on the mechanisms that account for the relationships between SES and health behaviors, we review studies from sociology, economics, and public health that go beyond description and that offer insight into the sources of health inequality. These studies recognize that SES disparities in health behavior involve more than freely chosen lifestyles. To the contrary, the explanations reviewed below suggest that unhealthy behaviors result from the vast differences in the social circumstances of low- and high-SES groups. Our attention to the social origins of health behavior runs counter to perspectives that ignore how SES structures social life.

For several reasons, we limit the health behaviors we examine. Avoidance of tobacco, participation in physical activity, and maintenance of proper weight and diet involve actions that, certainly for smoking and by most accounts for the others, promote health and extend longevity (Rogers et al. 2000). These behaviors also differ from others that depend more directly on having the financial resources to purchase health. It makes sense that the less well-off have fewer opportunities to undergo regular preventive medical checkups and screenings, to work at jobs with low physical danger or contact with hazardous materials, to live in well-built housing in safe neighborhoods with low pollution, and to drive safe cars. Although finances relate in some ways to tobacco cessation (paying for counseling), exercise (joining gyms and clubs), and good diet (buying fresh fruits and vegetables or lean meats), money nonetheless is not a requirement as it is for other health behaviors. Tobacco use, to the contrary, involves significant monetary costs—on average about $1638 per year for a pack-a-day smoker (Smith 2008).

Other behaviors involving use of illegal drugs and participation in criminal violence likewise create risks to health but raise issues different from legal behaviors. Reviews of these behaviors and of research on crime and deviance warrant separate study (although some theories posit a link between participation in legal but unhealthy behavior and participation in illegal behavior). Alcohol consumption has similarities to use of illegal substances (e.g., driving under the influence) and, except at extremely high levels that are relatively rare in the U.S. adult population, has an ambiguous relationship with health and mortality outcomes (Rogers et al. 2000, Thun et al. 1997). Another health behavior, sleep durations of shorter or longer than seven hours per night, is associated with increased mortality, but little research has systematically examined the relationship between SES and sleep duration (Krueger & Friedman 2009, Moore et al. 2002). Still further, health care consumption, adherence to treatment regimens, interaction with physicians, and acceptance of new medical technologies greatly influence health and mortality and are the subject of large literatures (Cutler & Lleras-Muney 2010, Glied & Lleras-Muney 2008, Hadley 2003, Lutfey & Freese 2005, Phelan et al. 2004, Ross & Mirowsky 2000). Because of space constraints, we give only minimal attention to these behaviors.

SES (or sometimes socioeconomic position) refers to standing in the stratification system and is usually measured by education, occupation, employment, income, and wealth. These components of SES are not interchangeable and have different kinds of influences on health behavior. SES can reflect diverse underlying theoretical concerns such as material well-being, human capital, prestige, and productive relations. Even so, it is convenient to refer to SES as a summary term (without assuming that it represents a unidimensional construct) when the particular measure does not have key importance.

IMPORTANCE OF HEALTH BEHAVIOR FOR SES HEALTH DISPARITIES

The focus on SES disparities in health behaviors has generated some dispute. Lantz et al. (1998) reject claims that elevated mortality risks among disadvantaged SES groups come

primarily from the higher prevalence of risky behaviors in these groups. In comparing mortality over a 7.5-year period, Lantz and colleagues find that the odds ratio for the lowest to the highest education group falls by only 14% with controls for smoking, drinking, sedentary lifestyle, and relative body weight. Similarly, a study of British civil servants over a 25-year period shows that smoking and other coronary risk factors account for 27% of the inverse social gradient in coronary heart disease (Marmot 2006). Studies that use different methods find stronger effects. Using indirect estimation techniques to attribute mortality to either smoking-related causes or other causes among men ages 36–69 in four nations, Jha et al. (2006) calculate that smoking accounts for nearly half of the excess mortality among the lowest stratum in each nation.

Regardless of the method used or conclusion reached, SES disparities clearly involve more than health behaviors such as smoking, exercise, and eating. Some suggest that even if differences in health behaviors across socioeconomic strata disappeared, the relationship between SES and health would change little, as other sources of disparities would grow in importance (Link & Phelan 1995). At the same time, health behaviors account for, on average, roughly one-quarter of SES disparities in health—an amount of some importance.

To present some numbers, Table 1 describes the disparities for several components of SES and smoking, exercise, and body mass using the 2006 National Health Interview Survey for persons ages 25–64 (National Center for Health Statistics 2008). The dichotomous outcomes assign values of one to survey participants who currently smoke, do not participate in vigorous or moderate physical activity, or have a body mass index (BMI) of 30 or more (obese). The SES predictors are treated categorically, with the highest category serving as the referent so that odds ratios compare lower SES groups to higher SES groups. The logistic regression estimates for SES control for gender, race-ethnicity, age, age squared, and foreign birth.

The results in Table 1 show large disparities for smoking and no exercise and more modest disparities for obesity. Of the SES variables, education generally has the strongest influence.[1] For example, without controls for other SES variables, high school dropouts have odds of smoking and not exercising that are, respectively, 3.7 and 4.9 times larger than for college graduates. The three columns on the right of the table show that controls for the other SES variables reduce the odds ratios to 2.9 and 2.8, respectively, but they remain substantial. The lowest occupation and income groups have net odds ratios for smoking and not exercising ranging from 1.2 to 1.9. Renting rather than owning and unemployment increase the odds of smoking but do not increase the odds of not exercising. Not surprisingly given evidence suggesting that SES disparities in obesity have lessened over the past three decades (Zhang & Wang 2004), the results for obesity show smaller SES differences. The odds ratios reach 1.8 in the gross models and 1.5 in the net models.

Socioeconomic conditions may produce an underlying health lifestyle that similarly affects smoking, exercise, and diet (Cockerham 2005). Vigorous exercise, for example, promotes weight control and nonsmoking. This clustering encourages prevention efforts on unhealthy behaviors in general and warrants drawing generalizations across multiple behaviors. However, health behaviors differ in important ways that may affect the potential for disparities. Smoking requires action to purchase cigarettes, whereas lack of exercise involves inaction; quitting smoking often produces unpleasant symptoms of withdrawal and increases weight, whereas starting to exercise often increases feelings of well-being and

[1]Although measures are seldom available and rarely studied, subjective status may influence health independent of objective status (Schnittker & McLeod 2005).

reduces weight. Given these differences, we treat literatures on smoking, exercise, and diet as separate but also attempt to draw some generalizations.

EXPLANATIONS

Link & Phelan (1995) point out that resources favoring high-SES groups are so extensive and wide-ranging as to make SES a fundamental cause of health. Because the underlying relationship between SES and health persists through historical changes in causes of death, advances in medical treatments, and new public health efforts, no single mechanism accounts for the observed relationship (Lutfey & Freese 2005). Rather, some diminish in importance in particular situations while others increase. To define the sources of enduring SES advantages more clearly, we consider nine broad mechanisms that underlie the relationship between SES and health behavior.

Deprivation, Inequality, and Stress

In the stress paradigm, disadvantaged social position is both a source of adversity and a drain on the capacity to cope (e.g., Pearlin 1989). Given these circumstances, smoking, overeating, and inactivity represent forms of pleasure and relaxation that help regulate mood among the disadvantaged (Lantz et al. 2005, Layte & Whelan 2009, Wilkinson 1996). The coping or self-medicating functions of these behaviors make the costs of giving them up particularly salient and limit the ability of low-SES individuals to adopt healthy but challenging behaviors (Lutfey & Freese 2005).

Those deprived economically and living in disadvantaged neighborhoods face a variety of chronic stressors in daily living: They struggle to make ends meet; have few opportunities to achieve positive goals; experience more negative life events such as unemployment, marital disruption, and financial loss; and must deal with discrimination, marginality, isolation, and powerlessness (Baum et al. 1999, Lantz et al. 2005, McEwen 1998). These stresses trigger a host of compulsive behaviors such as overeating, drinking, and smoking (Björntorp 2001, Marmot 2004). Studies give indirect support to stress arguments by showing higher smoking among persons in positions of high stress, including unemployed workers (Fagan et al. 2007), poor single women with childrearing duties (Graham 1995, Marsh & McKay 1994), those from disadvantaged backgrounds (Lynch et al. 1997), and residents of deprived neighborhoods (Duncan et al. 1999). In terms of diet, Miech et al. (2006) find that family poverty status is associated with increasing overweight prevalence for 15- to 17-year-olds.

Other studies do more than describe the association between stress and unhealthy behaviors. Johnson & Hoffman (2000) find that smoking increases among poor performing students in more competitive schools, a proxy for pressures faced by students. Colby et al. (1994) find that a stress index based on divorce, business failures, and natural disasters for U.S. states relates to state smoking prevalence. Several studies measuring perceived stress or biological stress markers find relationships with higher fat consumption and lower levels of mild, moderate, and strenuous physical activity (Burdette & Hill 2008, Dallman et al. 2003, Ng & Jeffery 2003). Grunberg et al. (1999) find evidence that workers who report higher job stress also report problem drinking and heavy drinking more frequently, but only if they also endorse the notion that drinking is an effective strategy for coping with stress.

The research on the relationship between SES, stress, and health behaviors faces at least two limitations, however. First, although low-SES individuals may experience more stressors, they also report lower levels of perceived stress than their high-SES counterparts (Krueger & Chang 2008, Schieman et al. 2006). Further, low-SES individuals report fewer but more severe daily stressors (Grzywacz et al. 2004). The inconsistent relationship between SES and various measures of stress (e.g., perceived stress, acute or chronic stressors, daily

hassles) suggests the need for research on whether some dimensions of stress are especially important mediators of the relationship between SES and health behaviors.

Second, prior research often assumes that stress precedes rather than follows unhealthy behavior, although the evidence on smoking and physical activity is less clear. Parrott (1999) argues that smoking worsens stress by creating nicotine dependency. Although cigarettes temporarily relieve withdrawal symptoms, greater exposure to nicotine withdrawal increases stress among smokers. Lang et al. (2007) similarly find that levels of pleasure differ little among low-SES smokers and nonsmokers. Exercise and stress may also have a bidirectional relationship. Although most individuals may respond to stress by becoming more sedentary, Salmon (2001) suggests that exercise may produce neurochemical changes in the body that reduce depression and anxiety and moderate sensitivity to stress. Although smoking or inactivity may alleviate stress in the short term, they might increase stress levels in the long term.

A related version of the stress argument focuses less on absolute than on relative deprivation. Because the SES gradient in health behavior is continuous, with each level showing quantitatively higher prevalence of health behaviors, something more than a threshold of economic and social deprivation must be involved (Adler et al. 1994, Marmot 2004). Rather, disadvantageous social comparisons among nearly all SES groups with those at higher levels weaken social cohesion across society in ways that motivate unhealthy behaviors to deal with the stress (Marmot 2004). High degrees of societal inequality thus worsen feelings of relative deprivation and contribute to disparities in health behavior (Wilkinson 1996).

Support for arguments about relative deprivation comes from studies showing a positive relationship between income in equality and mortality across nations, states, or metropolitan areas. However, a huge literature that has grown on the topic has led to negative evidence (e.g., Beckfield 2004) or at least failed to reach a consensus on whether the relationship is real (Schnittker & McLeod 2005). Although health behaviors have a prominent role in the relative deprivation arguments, few studies examine behaviors directly. Using individual-level data on smoking, Siahpush et al. (2006a) find that high perceived income inequality is associated with higher smoking, and Eibner & Evans (2005) find that deprivation measured relative to those in the same state, race, education, and age group increases the probability of taking health risks. In an aggregate-level study, however, Pampel (2002) finds that relative deprivation does not explain strong SES smoking disparities across egalitarian member nations of the European Union. Similarly, Chang & Christakis (2005) find no positive association between income inequality and the odds of being overweight or obese.

Fewer Benefits of Health Behaviors for Longevity

Claims that low-SES groups have less to gain from healthy behavior come from economics, epidemiology, and sociology. Economists argue that the lower lifetime earnings and wealth of low-SES groups give them less reason to invest in future longevity and more reason to focus on the present in making decisions about health behaviors (Cutler & Lleras-Muney 2008). In the language of economics, their risk or time preferences more heavily discount the future. For example, the declining cost of food in recent decades should increase the utility of all individuals, but some economists suggest that a subset of individuals have hyperbolic discount functions and benefit intensely from eating immediately, regardless of the medium- or long-term health costs (Cutler et al. 2003).

With regard to smoking, the rational addiction model of Gary Becker (Becker & Murphy 1988, Becker et al. 1994) predicts that, given their future orientation, the highly educated are little influenced by cigarette prices but that less educated persons make smoking decisions

based more on current cigarette prices. Evidence that cigarette prices reduce smoking is strong—a 10% increase in cigarette prices leads to a 4% decline in smoking (Gallet & List 2003). Consistent with the model, some argue further that prices more strongly reduce smoking among low-SES groups and therefore reduce disparities (Farrelly & Bray 1998, Thomas et al. 2008). However, skeptics claim that youth are more influenced by peers than by prices (DeCicca et al. 2002) and note that SES disparities have failed to decline as expected in the United States with increasing prices (Pampel 2009).

Physical activity, eating patterns, and sleep, although different from smoking in their requirement for substantial time commitments, also reflect different incentives by SES. Economists note that individuals with higher incomes face greater opportunity costs in exercising, preparing nutritious meals, or sleeping because their time is valued more highly in the labor force. Simultaneously, however, individuals with greater human capital or higher earnings gain more financially from exercise, nutrition, and sleep through improved productivity and longer lives (Biddle & Hamermesh 1990). High-SES groups therefore exercise more on weekends and holidays when the opportunity costs are lowest (Mullahy & Robert 2008), report shorter sleep hours on average (Biddle & Hamermesh 1990, Mullahy & Robert 2008), and avoid very short sleep hours (Krueger & Friedman 2009).

Technological advances in food processing and preparation lower the price and time costs of eating but may increase obesity, although those changes likely affect all SES groups equally (Cutler et al. 2003). Chou et al. (2004) find that the growth in fast-food restaurants and the simultaneous decline in the relative cost of a meal over time in the United States coincide with weight gain. The authors suggest that this may result from the “increasing scarcity and increasing value of household or nonmarket time” (Chou et al. 2004, p. 584). Because both high- and low-SES groups value their increasingly limited time outside of work and come to rely on fast food, such explanations may partially account for the declining SES gradient in obesity in the United States (Zhang & Wang 2004).

Epidemiological and sociological arguments also suggest that increased risks of premature death brought on by worse social conditions among low-SES persons make health behaviors less beneficial. Low-SES groups may believe they gain little in terms of longevity from healthy behavior (Lawlor et al. 2003) and feel fatalistic about their ability to act in ways that extend their lives (Niederdeppe et al. 2008). For example, smoking is more common among blue-collar workers who are exposed at work to dangerous dust, fumes, and toxic substances (Sterling & Weinkam 1990). Adams & White (2009) find that a strong concern with the future consequences of health decisions partially mediates the relationship between SES and body weight. Lynch et al. (1997) find that those having experienced socioeconomic disadvantage early in their lives feel a heightened sense of hopelessness throughout the life course that affects health behaviors, and Vangeli & West (2008) find that high-SES groups attempt to quit smoking because of future health concerns, whereas low-SES groups are more often motivated by cost and current health problems. Niederdeppe & Levy (2007) find that the less educated are more likely to agree with fatalistic statements about their ability to reduce their risks of cancer. Those agreeing with fatalistic statements are more likely to smoke and are less likely to exercise or eat fruits and vegetables.

Indulging in enjoyable but unhealthy behaviors may make sense given a shorter life expectancy and a limited payoff from healthier behavior. Interestingly, Blaxter (1990) offers empirical support for these beliefs. She finds that healthy lifestyles do less to lower mortality among low-SES groups than among high-SES groups. But recent evidence contradicts Blaxter’s hypothesis (Krueger & Chang 2008, Pampel & Rogers 2004). Even so, belief in the limited benefits of healthy behavior may obstruct action among low-SES groups.

Latent Traits

Some arguments suggest that latent traits determine both SES and health behavior. If traits determined early enough in life affect educational and occupational attainment as well as adult health behaviors, then SES has a spurious relationship with health rather than a direct or indirect causal effect (Fuchs 1982). Studies generally find a causal impact of education on health more generally (de Walque 2007, Mirowsky & Ross 2003). However, some arguments about self-control and intelligence fit a latent trait perspective.

One stream of literature notes that both crime and unhealthy behaviors such as cigarette use come from the same family, peer, and community influences (Jacobson et al. 2001). According to Gottfredson & Hirschi (1990), both crime and smoking involve low self-control, attraction to risk, and the propensity to choose short-term gain even in the face of long-term harm. The attraction to short-term gain emerges early in life, in large part through poor parental socialization, and in turn leads to poor performance in school, limited career options, and unhealthy behavior (Hirschi & Gottfredson 1994). Gottfredson (2004) suggests that general intelligence rather than self-control and attraction to risk is crucial to the relationship between SES and health. This latent trait not only affects educational and occupational attainment but also physical fitness, nonsmoking, preference for low-sugar, low-fat diets, and adherence to regimens to change unhealthy behaviors.

Few direct tests of the latent trait arguments appear in the literature, nearly all focused on smoking. Farrell & Fuchs (1982) show that the relationship between schooling and smoking at age 24 is accounted for by smoking at age 17— before education is completed. They do not measure the factor underlying the early emergence of the relationship between schooling and smoking, but their results are consistent with the latent trait argument. Other studies demonstrate that health lifestyles are related to crime and deviance among teens (Paternoster & Brame 1998) and that college students who smoke are involved in various risky activities (Emmons et al. 1998). Again, the findings provide only indirect evidence. Gottfredson (2004) cites much literature on the relationship between intelligence and health, but Link et al. (2008) find that controls for intelligence do little to change the relationship between SES and health. Also rejecting the latent trait argument, Cutler & Lleras-Muney (2008) cite findings of little relationship between risk preferences and smoking.

Class Distinctions

High-SES groups may use the adoption of healthy behaviors and lifestyles to set themselves apart from other SES groups (Cockerham 2005). Tobacco avoidance (Pampel 2006), exercise (Stempel 2005), and thinness (Hesse-Biber 2007, McLaren 2007) represent forms of SES-based social distinction as well as means to a longer life. Although applied to health behavior rather than consumer goods, such arguments stem from classical and modern theorists (Bourdieu 1984, Veblen 1992 [1899]) who emphasize lifestyle as a source of social differentiation and the adoption of innovative fashion as a way to reinforce those differences.

Smoking represented an innovative behavior early in the twentieth century that, despite early worries about its harm to health, was first adopted by high-SES groups, perhaps as a form of distinction, and later diffused to lower SES groups (Pampel 2005). In more recent decades, class distinction shows in the early adoption of the innovative idea that changing individual behavior can extend life (Link 2008). Today, smoking is stigmatized more among highly educated than among less educated groups (Stuber et al. 2008). If class distinction gives motives for high-SES groups to act in healthy ways, it may also motivate lower SES groups to set themselves apart with behavior like smoking that, in some contexts, symbolizes independence, toughness, and freedom from convention.

High-status groups also distinguish themselves from low-status groups by participating in activities such as strenuous aerobic sports, moderate levels of weight training, competitive sports that limit physical domination, or activities that require extensive training or other hidden entry requirements aside from simple economic costs (Bourdieu 1984, Stempel 2005). In contrast, low-status groups participate in activities that emphasize strength or the visible appearance of strength, physical domination, and direct physical violence. Wilson (2002) finds that higher levels of economic capital (as indicated by income) and cultural capital (as indicated by education) predict greater participation in sports in general, but attendance at automobile or motorcycle races is most common among those with low levels of cultural capital and is insensitive to levels of economic capital. Scheerder et al. (2002) show that high occupational status groups are more likely to play golf, low-status groups are more likely to participate in boxing or wrestling, and both high- and low-status groups participate in soccer.

The tastes for different sports across socioeconomic groups may result in SES differences in lifelong activity levels. First, high-status groups often embrace activities that can be maintained throughout middle and older age such as tennis or jogging. Second, Howell & McKenzie (1987) find that high-status individuals cultivate participation in any sport: Compared to students in vocational tracks in high school, students in college preparatory tracks have higher levels of sports participation in later life. Further, watching television is a sedentary activity that often displaces time for exercise and is stigmatized in higher SES households. College-educated parents are less likely than others to permit their children to have televisions in their bedrooms or to allow television viewing during meals (Berry 2007). Finally, high-status groups exhibit the characteristics of cultural omnivores—they have wide-ranging participation in both elite and middle-brow sports but avoid the low-brow sports favored by low-status individuals (Stempel 2005). Participation in a wide variety of sports among high-status groups facilitates continued activity even if injury, time constraints, or other barriers limit participating in any single activity.

Although the effects have possibly lessened over time, there is also evidence of class distinctions in diet and weight (McLaren 2007, Sobal & Stunkard 1989). Research suggests a socioeconomic gradient in diet for more developed countries that results in lower weights for the most well-off (McLaren 2007). The gradient is especially pronounced for women (McLaren & Kuh 2004), where thinness is viewed as a sign of beauty, fashion, and prestige. In less developed countries, a positive association between SES and weight predominates, where excess weight may signify success and well-being. Especially for men, larger body size is often viewed as a sign of physical dominance and prowess (McLaren 2007). Consistent with class-based norms in higher-income nations, however, an inverse gradient in obesity is emerging in lesser developed countries (Monteiro et al. 2004).

Lack of Knowledge and Access to Information about Health Risks

Less educated persons with jobs that offer few opportunities for learning may have limited knowledge of the harm of unhealthy behavior and therefore less motivation to adopt healthy behaviors. They are exposed less often to warnings about smoking, poor diet, and lack of exercise and may not grasp the potential long-term harm of these activities (Siahpush et al. 2006b). They instead may be exposed more to advertising that promotes the enjoyment of tobacco and unhealthy food and associates smoking, drinking, and eating with a glamorous lifestyle.

However, evidence suggests that knowledge of the risks of smoking is widespread and does little to account for SES disparities. Although differences in knowledge of risks of smoking played a more important role in the past (Link 2008), more recent antitobacco campaigns, public education, the nonsmokers rights movement, and comprehensive state programs to

raise prices, pass clean indoor air laws, and fund media campaigns have successfully publicized risks and reduced smoking (Warner 2005). In 1999, 92% of Americans linked smoking with cancer, and in 2006 84% agreed that smoking is very harmful for adults (Saad 2006). Although they may rationalize their habit by minimizing the harm, smokers in all SES groups likely know of the majority opinion about the harm of smoking. In support of this claim, the desire to quit differs little by SES (Barbeau et al. 2004, Link 2008). In fact, Viscusi& Hakes (2008) find that better educated persons perceive smoking as less dangerous than less educated persons. Layte & Whelan (2009) find that measures of knowledge about the risks do little to explain SES differences in smoking. Interestingly, many physicians in developing nations smoke, despite medical education and knowledge of the harm of smoking (Smith & Leggat 2007).

Knowledge about the importance of adequate exercise and sleep for good health is also widespread. In 2005, 86% of adults agreed with the statement that a lack of sleep is bad for their health and 63% said that regular exercise is a highly important activity for a healthy lifestyle (Lyons 2005).

But knowledge about the risks of obesity is less widespread and differs by SES. Only 36% of U.S. adults rate obesity as a very serious health problem—far behind AIDS, even though obesity contributes to more deaths each year (Bleich et al. 2007). Compared to those with less than a high school degree, those with more than a college degree are 3.6 times as likely to report that they pay a lot or a fair amount of attention to nutritional information from scientific experts. Similarly, higher educational attainment is related to an awareness of whether one is overweight (Paeratakul et al. 2002), and knowledge about the risks of obesity can contribute to attempts to control weight (Kan & Tsai 2004). Indeed, the effectiveness of educational programs for promoting proper diet among low-income adults (Howard-Pitney et al. 1997) suggests that poor knowledge about nutrition may partially account for SES differences in weight.

Efficacy and Agency

Schooling increases the efficacy, problem-solving skills, ability to process information, and locus of control needed to overcome obstacles to good health such as nicotine addiction, the inertia of inactivity, the discomfort of exercise, and the desire for unhealthy foods and excess calories. Mirowsky & Ross (2003, p. 1) make the case for the causal benefits of education:

> Education creates desirable outcomes because it trains individuals to acquire, evaluate, and use information. It teaches individuals to tap the power of knowledge. Education develops learned effectiveness that enables self-direction toward any and all values sought, including health.

The increase in human capital, effective agency, and a sense of personal control that comes with greater education (Mirowsky & Ross 2007) proves particularly important in dealing with the difficulties of adopting and maintaining healthy lifestyles.2 In fact, highly educated persons may induce short-term stress as a means for long-term gain (Thoits 2006)— a key to overcoming initial feelings of discomfort and deprivation that come from adopting healthy behaviors. Conversely, less educated persons in positions of powerlessness have more trouble overcoming the obstacles to healthy behavior. Thus, the ability to act on health knowledge rather than the knowledge itself affects health behavior.3

[2]Mirowsky & Ross (2003) in particular make causal arguments. They reject claims that latent traits or advantaged backgrounds produce a spurious relationship between educational attainment and health. Rather, those attaining advanced education learn new skills and gain new confidence for problem solving that make it easier to adopt healthy, though difficult, behaviors.

Efficacy and agency include the search for innovative means to help change behavior and relate to a long tradition of research on diffusion of innovations that identifies education as a key to early adoption (Rogers 2003). Consistent with diffusion research, high-SES groups are quickest to use new medical technologies, such as Pap smears and mammography for screening or coronary stents and statins for treatment (Glied & Lleras-Muney 2008, Link et al. 1998). High-SES groups not only seek out new health-promoting technologies, but they also are better able to overcome obstacles to using those new technologies effectively to promote health behavior. In relation to health behaviors, then, high-SES groups are open to new smoking cessation methods, diets, and exercise regimens.

Consistent with these arguments, studies of smoking find that education increases both the use of aids to help quit (Honjo et al. 2006) and the responsiveness to antismoking ad campaigns (Niederdeppe et al. 2008). The higher educated also learn more from negative health events. Wray et al. (1998) find that educated persons are more likely to quit smoking after a heart attack. Droomers et al. (1998) find that locus of control and active problem solving explain about half the relationship between education and physical activity. Cutler & Lleras-Muney (2010) attribute roughly 30% of the education gradient across a large number of health behaviors to cognitive ability but note that the influence of cognitive ability stems ultimately from higher education rather than from a latent trait determined earlier in life.

A weakness in the efficacy argument comes from SES disparities in health behaviors other than smoking, exercise, and weight control that require little in the way of effort, problem solving, or efficacy (Freese & Lutfey 2010). For example, seat belts require less than a second to buckle, but despite decades of publicity about the benefit, laws making seatbelts mandatory in many states, and dashboard warning lights, a SES disparity persists (Harper & Lynch 2007). This persistence suggests that disparities involve something more than problem solving or cognitive ability.

Aids for Healthy Behavior

Adopting many healthy behaviors does not require money, but paying for tobacco cessation aids, joining fitness clubs and weight loss programs, and buying more expensive fruits, vegetables, and lean meats can help realize desires for healthy behavior. Income and the ability to pay for these kinds of aids can help overcome low education, efficacy, and agency and thus represent an independent means to healthy behavior. Cutler&Lleras-Muney (2010) attribute roughly 20% of the education gradient in health behaviors to economic resources.

For smoking, individual counseling and medications to ease withdrawal symptoms can be costly, and low-SES groups tend to use low-cost and often less effective methods (Lillard et al. 2007). For exercise, since the 1960s the prices of sports equipment, bicycles, and sports club memberships have increased more quickly than the prices of televisions or movie tickets, whereas the income per hour of leisure time has fallen most among those with lower incomes (Berry 2007). Droomers et al. (1998) find that income accounts for up to 40% of the increased odds of physical inactivity among less educated individuals, even after adjusting for psychosocial factors. And for weight control, some researchers contend that the obesity epidemic is a relatively simple matter of changing economics—the drastic increase in obese persons in developed countries coincides with dropping prices of refined grains and added sugars and fats, making these cheap, high-calorie foods accessible to low-SES groups (Drewnowski 2004).

[3]This form of means-based knowledge differs conceptually from knowledge of the risks of unhealthy behavior discussed above. Although knowledge of both risks and ways to reduce risks overlaps, the more widespread access to knowledge of risk across SES groups makes it different from the less widespread knowledge and skills to adopt healthy behaviors.

Occupational resources overlap with financial ones. Those with good jobs and benefit packages gain access to aids for healthy behavior without having to purchase them. In regard to smoking, workers with better jobs may have employer-provided health insurance and better access to health care, which increasingly emphasizes the treatment of tobacco dependency (Manley et al. 2003). In addition, the worksites of higher prestige professional, managerial, and administrative employees more often have clean indoor air rules that make smoking more difficult, and they sometimes offer smoking cessation programs that help smokers quit (Bauer et al. 2005). Blue-collar and factory workers have less access to these benefits (Sorensen et al. 2004).

Working in some occupations can directly impact physical activity. Since the 1950s, many workers have moved into occupations that are traditionally sedentary, whereas strenuous occupations have become less so due to technological changes, leading to lower levels of physical activity and higher levels of obesity (Brownson et al. 2005, Ladkawalla & Philipson 2007). And although some have found that blue-collar workers who have more physically demanding jobs are more likely to undertake more vigorous activity in their spare time (Wu & Porell 2000), others have found that white-collar workers with the least strenuous jobs are more likely to participate in vigorous activity outside of the workplace and, as such, are more likely to retain their higher levels of activity even after retirement (Berger et al. 2005). Consistent with that perspective, leisure time has increased in recent decades, and low-status groups allocate a greater share of their time to sedentary activities than do high-status groups (Berry 2007).

Community Opportunities

Communities shape opportunities to adopt and maintain healthy behaviors. Low-income neighborhoods have more than their share of fast-food restaurants, liquor stores, and places to buy cigarettes and have less than their share of large grocery stores with a wide selection of healthy fresh foods. Some research finds that low-SES neighborhoods have greater or equal access to gyms, parks, or recreation centers than high-SES neighborhoods, although others find that high-SES neighborhoods have more attractive open spaces and free recreation facilities, and greater access to beaches, rivers, golf courses, tennis courts, and bike trails (Giles-Corti & Donovan 2002, Powell et al. 2006). Even when residents in low-SES neighborhoods have access to more recreational resources than residents in high-SES neighborhoods, they tend to report lower perceived access to recreational facilities (Giles-Corti & Donovan 2002). Poor communities and neighborhoods are targeted by tobacco companies for outdoor advertising (Barbeau et al. 2004) and have weaker enforcement of restrictions on sales of cigarettes to minors (Gemson et al. 1998). In contrast, affluent communities are more likely to pass clean air laws that tend to lower smoking among high-SES groups (Skeer et al. 2004).

Research from the United States and Canada (see Cummins & Macintyre 2006 for a review) finds associations between obesity and food quality, prices, and availability in a community. Persons in disadvantaged areas with less access to healthier foods also consume fewer fruits and vegetables and have higher body weight (Cummins & Macintyre 2006). Inagami et al. (2006) find a positive association between distance traveled to nearest grocery store and weight. Similarly, Morland et al. (2006) report a lower prevalence of obesity and overweight in neighborhoods with greater access to supermarkets.

But the effects of supermarket availability on SES differences in overweight and obesity are inconsistent across nations. Studies from the United Kingdom and Australia find no socioeconomic differences in food and supermarket availability, nor in fruit and vegetable consumption (Cummins & Macintyre 2002, Pearson et al. 2005, Winkler et al. 2006). The persistent relationship in the United States may result from high residential segregation in

cities and neighborhoods (Cummins & Macintyre 2006) and more pronounced inequalities in the availability of high-quality foods. Evidence for fast-food outlet density and increased weight is more consistent across countries. Studies from the United States, United Kingdom, and Australia show increased numbers of fast-food outlets in poorer areas and propose a link with the increased levels of obesity in disadvantaged neighborhoods (Cummins et al. 2005, Maddock 2004, Reidpath et al. 2002).

Nevertheless, selection effects may operate. To some extent, grocery stores and restaurants sell the food in most demand, cigarette companies market in neighborhoods with high smoking, and physically active people locate closer to parks and amenities for exercise than less active people. The literature has done more to demonstrate an association than to establish causal direction (Freese & Lutfey 2010).

Social Support, Social Cohesion, and Peer Influence

Group membership—and the characteristics of individuals within communities—can affect health behavior through two forms of social capital (Kawachi et al. 2008). First, networks of health-oriented family members, relatives, friends, and neighbors support healthy behavior, sanction unhealthy behavior, and exchange information on ways to change (Smith & Christakis 2008). Given that high-SES persons adopt healthy behaviors and associate with other high-SES persons, their networks of social support, influence, and engagement promote health and widen disparities. Freese & Lutfey (2010) refer to spillover effects as the influence that high-SES persons who care much about healthy behavior have on other high-SES individuals who otherwise would care little about healthy behavior.

The effects of network social support on SES disparities in smoking emerge in several studies. Cutler & Glaeser (2007) find a social multiplier impact of workplace smoking bans where by workers who change their smoking behavior influence family and friends outside the workplace to do the same. Such processes tend to occur more strongly among the highly educated. Christakis & Fowler (2008) find that among friends who both had at least one year of college, a decision by one friend to quit smoking decreased the chance of the other smoking by 61%. Among friends with a high school education or less, no such influence appeared. Interestingly, highly educated smokers who continue to smoke become less central to their network than do less educated smokers.

Using national data from the United States, Boardman et al. (2005) show that persons living in economically depressed areas and neighborhoods with high rates of obesity are more likely to be obese, regardless of their individual characteristics. This suggests a type of social contagion. Indeed, Christakis & Fowler's (2007) analyses show that obesity can follow social networking paths that influence persons and cement inequalities in obesity by SES.

Although not couched in terms of social capital, a huge literature on teen smoking highlights the importance of peer influences and group membership. The smoking of friends is perhaps the strongest predictor of smoking among adolescents (Jacobson et al. 2001, p. 85). Similarly, support from peers, parents, and siblings are important predictors of adolescents' physical activity and drinking behaviors, as are opportunities and access to recreation facilities or places to acquire alcohol (Jessor et al. 2006, Sallis et al. 2000). In terms of disparities, parental SES affects smoking among teens (Lindstrom 2008). However, teen disparities based on parental SES are weaker than adult disparities based on own SES (Jacobson et al. 2001, p. 93), suggesting that SES disparities in smoking crystallize and strengthen after adolescence when disparities in social capital widen (Glendinning et al. 1994).

Second, social capital based on social cohesion helps explain community differences in health behavior. Kawachi et al. (1999) define this form of social capital as encompassing trust between citizens, norms of reciprocity, and group membership that facilitate cooperation for mutual benefit. Social cohesion tends to be greater in high-SES neighborhoods and to promote healthy behavior (Lindstrom 2008).

Studies offer mixed evidence of neighborhood and community effects on smoking. Ross (2000) finds that neighborhood disadvantage increases the smoking of men but not of women. Miles (2006) finds in a study of seven European cities that indicators of neighborhood disorder such as litter, graffiti, and the lack of plants and flowers increase smoking, again more for men than for women. Brown et al. (2006) find that community social capital from religious groups reduces the number of cigarettes consumed, although not the overall prevalence.

The importance of social capital for understanding the relationship between neighborhood SES and exercise is ambiguous. Residents of disadvantaged neighborhoods are more likely to walk to shops or work but are less likely to walk, bicycle, or participate in other sports for leisure, even after adjusting for individual SES, in part because low-SES neighborhoods are less safe and attractive (Giles-Corti & Donovan 2002, Ross 2000). Wen et al. (2007a) find that an index of social capital is associated with regular exercise among neighborhood residents in Chicago until adjusting for neighborhood SES, which suggests that the relationship between neighborhood social capital and physical activity is either spurious or mediated by neighborhood SES. But Wen et al. (2007b) find that neighborhood SES in California is not associated with physical activity, although higher levels of neighborhood social cohesion persistently predict increased physical activity.

Social cohesion is also linked to neighborhood obesity levels. For example, examining adolescents in Los Angeles County, California, Cohen et al. (2006) find that neighborhood SES is not significant in models of body mass and overweight after adjusting for neighborhood collective efficacy. Burdette & Hill (2008) find in Texas that the relationship between neighborhood disorder and obesity is entirely mediated by the psychological distress associated with living in a disadvantaged neighborhood.

Although arguments about social capital and peer influence receive much attention, they are incomplete. They do not explain the origins of SES differences in norms that support healthy behavior or why social capital supports healthy behavior. If cohesive groups of high-SES family members, friends, and neighbors who adopt healthy behaviors help others do the same, then additional arguments are needed to account for the initial adoption of healthy behaviors by high-SES groups. Other theories relating to motives and problem solving thus remain crucial to arguments about social influence.

DISCUSSION

The literature has done little to systematically compare and contrast the mechanisms reviewed here. This makes it difficult to offer an overarching framework that integrates or adjudicates between the various approaches. We instead aimed more modestly to present interrelated arguments in a way that helps organize previous work on health behaviors and sets the stage for future research.

The very recent study by Cutler & Lleras-Muney (2010) represents a notable exception to the lack of comparative research on mechanisms and evaluates numerous explanations of the relationship of education and a variety of health behaviors using several data sets. Cutler & Lleras-Muney (2010, p. 1) conclude that

> income, health insurance, and family background can account for about 30 percent of the gradient. Knowledge and measures of cognitive ability explain an additional 30 percent. Social networks account for another 10 percent. Our proxies for discounting, risk aversion, or the value of future do not account for any of the education gradient, and neither do personality factors such as a sense of control of oneself or over one's life.

Although their findings need replication with other data sets and measures, these conclusions help organize and evaluate the diversity of causes and represent a valuable starting point for future empirical research on SES disparities in health behaviors.

In addition, we can offer some thoughts on improvements in theory and method that go beyond the current state of the field. In terms of theory, it may help to organize these mechanisms by distinguishing between motives and means for health behavior (Freese & Lutfey 2010). First, SES can affect the incentives or motivations for healthy behavior. Low-SES groups may have less reason than high-SES groups to want to forego the short-term pleasures of unhealthy behavior for long-term gain in longevity. Arguments related to stress, limited benefits, class distinctions, and knowledge of risk each emphasize how SES shapes motives for healthy behavior. High-SES groups face less stress that might encourage coping through unhealthy behavior; they gain more longevity benefits from healthy behavior; they accrue prestige by setting themselves apart with healthy behavior; and, although less clearly, they have greater knowledge of risks to motivate healthy behavior.

Second, SES can affect the means to reach health goals. All SES groups may have similar desires for healthy behavior, but low-SES groups have more difficulty in realizing their goals. Arguments about efficacy in reaching goals for healthy behavior, access to aids for healthy behavior, and community opportunities for healthy behavior focus more on SES differences in resources for goal attainment. The distinction between motives and means tends to blur at the edges, as strong motives increase efforts to find effective means, and possessing scant means tends to sap motivation to change. Indeed, arguments about social support and social capital tend to mix motives rather than emphasize one over the other. However, motives and means are analytically distinct, and distinguishing among them may aid in the study of disparities in health behaviors.

In terms of methods, the literature has done better in describing associations than in testing specific causes. Designs that distinguish among the various mechanisms are not straightforward. Creative efforts to measure stress, control for latent traits, and examine the psychosocial benefits of schooling move in this direction, but studies can do more to explicitly match mechanisms with measures. Future research could also do more to help isolate the causal influence of education and related components of SES. Progress toward these goals requires longitudinal studies with adequate controls for underlying heterogeneity, well-measured mediators, and attention to the emergence of health behaviors that begin early in life and accumulate over the life course. For example, with detailed data on genetic, family, and school characteristics, the National Longitudinal Study of Adolescent Health (http://www.cpc.unc.edu/projects/addhealth) offers opportunities to evaluate the mechanisms that link education to health behaviors early in life. Alternatively, qualitative designs such as used by Lutfey & Freese (2005) in their study of diabetes clinics can help us understand how the motives and means for healthy behavior differ by education and SES.

Some insights may come from designs that compare health behaviors as well as the determinants. Our review emphasizes the similarities among health behaviors, but each behavior also has unique dimensions in terms of the time and effort required, the pleasure it provides, and its social meanings. Whereas physical activity, sleep, and preparing nutritious

meals take a considerable amount of time, smoking and drinking practices seem less constrained by temporal concerns. Modeling the different dimensions of health behaviors has received the most sustained attention in the literature on physical activity—SES appears to have different relationships with walking out of necessity (to work or to shops) than walking for leisure. But the method of tobacco consumption (e.g., cigarettes, pipes, cigars), the kinds of alcohol consumed (e.g., wine, beer, or spirits), the ingredients and food preparation methods employed, or the contexts where food, tobacco, or alcohol is consumed may also provide important insight into how the behaviors are linked to SES. Research that compares measures from multiple theoretical perspectives across multiple health behaviors could clarify when specific mechanisms are most important for shaping SES disparities in health behaviors.

The approach of comparing health behaviors also applies to health care consumption. High-SES groups may see adoption of healthy behaviors and effective use of medical care as closely linked in the pursuit of health (Ross & Mirowsky 2000). Medical care, which depends greatly on access to insurance and relates directly to income and affluence, has some similarities to lifestyle behaviors. Much as they affect smoking, exercise, and diet, SES differences in knowledge, efficacy, and opportunities affect the willingness to use new medical technologies (Glied & Lleras-Muney 2008) and follow treatment regimens laid out by medical personnel (Lutfey & Freese 2005). Commitment to a healthy lifestyle could encompass efforts to take full advantage of medical care resources and to avoid unhealthy behaviors, and comparisons of the determinants of medical care usage and other behaviors may offer new insights.

Focusing on historical trends in health behaviors may also illuminate the mechanisms that link SES to health behaviors. First, the salience of mechanisms may change over time. For example, high-SES individuals accumulate the most benefit from their knowledge, efficacy, and resources in adopting innovative health-related behaviors and using emerging medical technologies (Glied & Lleras-Muney 2008, Link 2008). In contrast, more widespread publicity about and agreement on established risks (e.g., smoking) or common medical treatments (e.g., cholesterol tests) tend to reduce the importance of SES differences in knowledge. Second, the direction of the relationship between SES and health behaviors can change over time. For example, high-status groups once had higher rates of tobacco use (Pampel 2005), cocaine use (Miech 2008), and cholesterol (Chang & Lauderdale 2009). Changes in the social meanings and circumstances affected the motives and means of high-SES groups to reject these behaviors. However, changes can occur in the opposite direction. Goldman & Lakdawalla (2005) find that the introduction of beta-blockers to treat hypertension led to reduced disparities in hypertensive heart disease. In these cases, other influences such as the ease of using new medicines and the willingness of clinicians to prescribe them may overwhelm forces of stratification in health behaviors. Historical trends can thus offer leverage in understanding changes in the mechanisms that link SES to health behaviors and reversals in the relationship between SES and some health behaviors.

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Table 1

Odds ratios from logistic regression of health behaviors on SES variables (Ns range from 14,129 to 14,608)[a]

	No controls for other SES variables			Controls for other SES variables		
SES Variables	**Currently smokes**	**No exercise**	**BMI obese**	**Currently smokes**	**No exercise**	**BMI obese**
Education (years)						
0–11	3.7*	4.9*	1.8*	2.9*	2.8*	1.5*
12	2.7*	3.2*	1.8*	2.4*	2.1*	1.5*
13–15	2.3*	1.8*	1.6*	2.1*	1.4*	1.5*
16+	1.0	1.0	1.0	1.0	1.0	1.0
Occupation						
Labor-Farm	2.2*	3.1*	1.5*	1.2	1.7*	1.2
Protect-Service	1.9*	2.0*	1.7*	1.1	1.2	1.4*
Admin-Sales	1.6*	1.7*	1.4*	1.1	1.2	1.2
Prof-Manager	1.0	1.0	1.0	1.0	1.0	1.0
Income						
Low	2.6*	3.4*	1.5*	1.5*	1.9*	1.2
Middle low	1.5*	2.3*	1.2	1.1	1.6*	1.0
Middle high	1.4*	1.6*	1.3*	1.0	1.2	1.1
High	1.0	1.0	1.0	1.0	1.0	1.0
Unemployed						
Yes	1.6*	0.7*	0.2*	1.6*	0.7*	1.0
No	1.0	1.0	1.0	1.0	1.0	1.0
Housing						
Rent	1.9*	1.5*	1.1	1.5*	1.1	0.9
Own	1.0	1.0	1.0	1.0	1.0	1.0

[a] Controlling for age, age squared, gender, race, and foreign birth.

* $p < 0.001$.