The distribution of wealth in the United States reflects more than “have vs. have nots.” It represents a reliable barometer of health and life expectancy. A half century of contemporary research documents a graded association between one’s relative economic position and physical and mental health vulnerability risk. Greater financial wealth, along with proxies of ability to generate wealth such as income, education, job classification, and social status, are associated with better quality and quantity of life. These determinants, commonly conceptualized as socioeconomic status (SES) represent one of the basic tenants of health psychology: wealth equals health. Like traditional health risk factors including sex and age, the associations between SES and health are large, robust, replicated, and reliable. As the accumulating science matures, the science of SES has moved from questions about the nature of the relationship to intervention efforts including national programs and policies to ameliorate the effects of poverty and pursue health equity for all.

The aims of this chapter are to review the science of SES as a barometer and determinant of physical health. Specifically, we 1) review a model for conceptualizing SES and a framework for understanding its relationship to health, 2) discuss major approaches to measurement and associated pros and cons, 3) review evidence regarding SES and physical disease, 4) discuss key moderating and mediating pathways, and 5) and discuss emerging areas of inquiry.

**Wealth Distribution in the United States**

Wealth distribution in the U.S. is neither equal nor linear (see Figure 21.1). Currently, nearly 40% of the country’s wealth is owned by just 1% of the population with over 75% of the aggregate wealth owned by 10% of the population. This distribution inequality commonly known as the wealth gap is a growing public concern and a common topic in political discourse. A child born in the U.S. today has a 41% chance of being born near or below the federal poverty line with rates higher among racial/ethnic minorities (FPL; Koball & Jiang, 2018). Wealth circumstances afford not only access to resources but control over opportunity to generate wealth. As such, wealth and the interrelated factors facilitate opportunity to create it are conceptualized as socioeconomic status and represent a contemporary index of relative social standing.
The SES-Health Relationship

Socioeconomic status is amongst the most robust psychosocial determinants of physical and mental health and well-being. Importantly, this relationship is graded such that as SES decreases so does health, including risk of early mortality. Contemporary research on this relationship between SES and health largely began with the landmark “Whitehall” studies of 18,000+ British civil servant men (Marmot et al., 1991). Data collection moved beyond simple epidemiological relationships to explore mediating psychological, social/environmental, and biological pathways. Today, the graded relationship between SES and health is demonstrated not only in outcomes but also in these mediating pathways with implications for research, interventions, health policy, and the pursuit of health equity.

What Is Socioeconomic Status and What Is It Not?

Socioeconomic status is conceptualized as an amalgam of multiple interrelated yet unique factors that together reflect resources and status. Relevant factors or measurement domains commonly include but are not limited to economics (income, wealth, resources), education and occupation, which reflect earning potential, and social status (see Figure 21.2).

Functionally, SES is a sociological ranking index meant to facilitate comparisons between groups in terms of resources and status. Importantly, SES is not synonymous with race or ethnicity. Although these factors are generally correlated, substantial evidence demonstrates that they have unique effects on health. For example, Bucholz, Ma, Normand, and Krumholz (2015) examined life expectancy after acute myocardial infarction (MI) among 141,095 black and white patients living in a range of SES neighborhoods. In addition to race and SES main effects, significant race disparities were observed within SES categories with blacks having the greatest survival disparity in high SES neighborhoods. These and similar findings demonstrate that SES and race exert substantial independent influences on health (Braveman et al., 2015). SES is a reliable population-level predictor, but more
Measurement

A multitude of approaches are available for assessing SES ranging in specificity, objectivity, unit of analysis, and time (American Psychological Association, 2007). Most research is based on single construct measurement, particularly income, education level, or occupation (as in the Whitehall I study). There are several reasons for this single-index approach including availability of data, high correlations between measures, and sufficiency of data relative to analytic strategy.

Broad Construct Measures

Because SES is conceptualized as an amalgam of interrelated constructs, there is significant interest in multifactorial indexes (American Psychological Association, 2007). The classic measure attempting to capture the broader SES construct is the Index of Social Position (ISP) developed by Hollingshead and Redlich (1958); colloquially referred to as the “Hollingshead index.” The ISP is a composite index of either two or four key domains: marital status, employment status, educational attainment, and a weighting of occupational prestige (Hollingshead, 1971). A more recent tool is the MacArthur Scale of Subjective Social Status (SSS; Adler, Epel, Castellazzo, & Ickovics, 2000; MacArthur Foundation, 2009). The single item measure includes a figure of a ladder. Participants are instructed to rank their perceived social status by choosing a rung on the ladder that represents their location relative to others’, from low to high. Modifications in the wording of the instrument are used to reflect social status within different contexts (i.e., neighborhood, community, country). In spite of its simplicity, the SSS represents an exciting advance in the assessment of SES.

Income

Income refers to the flow of revenue or monetary resources assessed objectively through pay records, income tax forms or other documents, or through census data which can yield neighborhood-level...
income. Several related concepts are also used as financial markers of SES. For example, wealth refers to the sum of acquired resources such as monetary savings, property, and investments that have monetary value and may be crucial to overcoming disruptions in income flow or emergencies. Likewise, indicators such as use of food stamps or Medicaid may reflect some relative economic status based on a financial demarcation (e.g., income level indicating poverty). Despite the relevance of these various indices, current income is the most commonly.

**Education**

Education is a multidimensional SES construct which facilitates ability and opportunity to generate resources and thus is often conceptualized as reflecting status and income. The relatively standard approach to quantifying education (in years) facilitates meta-analysis and cross-study comparisons (Liberatos, Link, & Kelsey, 1988). These qualities have made education one of the most popular approaches to SES measurement used in the United States (American Psychological Association, 2007). For example, a simple search of PubMed records for 2018 reveals nearly six times as many hits for “education AND health” compared to “income AND health (626,740 vs. 100,224).

**Occupation**

Occupation is the original SES indicator from Whitehall I and remains a popular and relevant index today (Sritharan et al., 2018). Occupation is a complex SES indicator reflecting both social status and resource generating potential. In order to capture the general social status aspect of an occupation, ranking systems are commonly used to code occupations into a score. These scores are based on subjective hierarchical ordering of the relative status of occupations (i.e., occupational prestige), either by investigators or survey. For example, the Socioeconomic Index (SEI; Duncan, 1961) ranks 446 occupations and is amongst the most commonly used measures of SES in the United States. Despite their wide usage, some scholars have noted that indices such as occupation struggle to estimate social status for women and minorities (Hauser & Warren, 1997).

**Census Data**

One of the most reliable methods for objectively assessing community-based socioeconomic characteristics is through the use of census tracking. Although census tracking yields little individual-level data, it is an excellent approach for assessing broader neighborhood and community factors ranging from median family income to percent unemployed as well as the number of hospitals and other environmental resources for a given area. The gold-standard approach begins with obtaining participants’ street addresses, which are then entered into a census database. Zip or postal codes are an alternative tracking code useful for obtaining neighborhood information, particularly when specific street address information is unavailable (Geronimus & Bound, 1998). The U.S. Bureau of Census has national data collected decennially with more focused and frequent data available from many regional (e.g., city, state) sources.

Studies typically use neighborhood divisions as defined by the U.S. Bureau of Census in regions of increasing specificity: Census tracts representing the largest grouping variable followed by census block-groups and census blocks. Although census blocks represent the most homogenous group, with about 85 residents in each region, less socioeconomic data tends to be available (Kaplan & Van Valey, 1980). Block-groups, consisting of about 1,000 residents, tend to be more homogenous than census tracts, with about 4,000 residents, and thus more accurately represent demarcations in the socioeconomic characteristics of a given area (Krieger, 1992). It's important to note that evidence suggests that census blocks-groups and census tracts appear to perform equally well (Diez Roux et al., 2001;
Krieger et al., 2002). Census-estimates of SES based on block-groups have been shown to correlate with individual-level indicators from 0.5 to 0.8, with census tracts correlating slightly higher (Diez Roux et al., 2001).

Physical Disease Outcomes

Although SES is amongst the most reliable psychosocial determinants of physical health can also drive SES (see Figure 21.3). For example, significant disease events such as cancer can have enormous financial costs, particularly for individuals and families with no or limited health insurance. Although we acknowledge these reciprocal pathways, we will focus most of the next section of SES as a determinant of health.

All-Cause Mortality

The relationship between SES and early mortality is perhaps the most reliable and well-documented of all health effects. From Whitehall to current national vital statistics data, the association between lower SES, and earlier mortality is significant and reliable (American Psychological Association, 2007; Murphy, Xu, Kochanek, Curtin, & Arias, 2017). Importantly, these relationships hold regardless of the SES indicator used (American Psychological Association, 2007). Classic examples of this relationship come from the Whitehall studies and the use of individual and neighborhood markers in the Alameda County Study (Turrell, Lynch, Leite, Raghunathan, & Kaplan, 2007). However, these relationships between SES and mortality are evident in nearly every longitudinal study and vital statistics document reporting the relevant variables.

Infectious Diseases

Infectious diseases refer to conditions caused by bacteria, viruses, parasites, or fungi and can be spread directly or indirectly from one person to another (World Health Organization, 2018). Substantial evidence links lower SES to higher incidence rates of a range of infectious conditions, ranging from tuberculosis to the common cold (Cohen et al., 2008; Oren, Narita, Nolan, & Mayer, 2014). Such findings are important given that infectious diseases may influence mortality directly, enable secondary infections, or exacerbate preexisting conditions leading to worse outcomes.

Human immunodeficiency virus (HIV) is amongst the most studied infectious disease conditions (Centers for Disease Control and Prevention, 2018; see Chapter 30 this volume). Several studies have demonstrated an inverse relationship between SES and HIV incidence. In addition to greater risk,

**Figure 21.3** Transactional Relationship Between SES and Health (Although SES is often viewed as a determinant of future health, poor health can negatively impact financial aspects of SES, including the ability to work.)

294
lower SES is associated with worse survival outcomes. For example, Cunningham and colleagues (2005) reported that individuals with no accumulated wealth and those with less than a high school education were significantly more likely than their counterparts to have died over the follow-up (RR = 1.89 and RR = 1.53, respectively). Similarly, community-level SES indicators such as neighborhood poverty are also critical to survival risk (McDavid Harrison, Ling, Song, & Hall, 2008).

**Cardiovascular Disease**

Cardiovascular diseases (CVDs) are the leading cause of death in the U.S. and the world (World Health Organization, 2017; see Chapter 28 this volume). Within higher-income countries such as the U.S., a substantial body of research documents consistent socioeconomic disparities in heart disease risk, particularly coronary heart disease (CHD; Allen et al., 2017). These gradient effects in risk are observable across the disease course and are amongst the most reliable in psychosocial health in America.

Cross-sectional and longitudinal research document socioeconomic disparities in disease development. For example, a growing body of research demonstrates SES disparities in subclinical atherosclerosis and atherosclerotic progression (Ranjit et al., 2006). These data show that SES effects are evident in the early phases of disease characterized by lipid buildup prior to plaque formation. A complementary body of work further documents disparities in plaque formation. For example, Yan and colleagues (2006) estimated the relative risk for the presence of significant plaque in the coronary arteries was 4.14 (95% CI: 2.33–7.35) for individuals with less than a high school education compared to those with more than a college education. Building upon this finding, Dragano and colleagues (2007) found that the rate of increase in CAC, reflecting atherosclerotic progression, was 70% greater in men and 80% greater in women with less than 10 years of education compared to their more educated counterparts. Finally, lower SES is reliably associated with disease incidence. A meta-analysis of nine studies found that lower SES was associated with significantly greater odds of CAD, hypertension, diabetes, and dyslipidaemia (Tang, Rashid, Godley, & Ghali, 2016). In addition, a meta-analysis of longitudinal cohort studies within low, medium, and high-income countries found that the SES gradient effects of several CVD incidence and associated risk factors was most evident within high-income countries (de Mastral & Stringhini, 2017).

With respect to disease morbidity and mortality, SES is reliably associated with a full range of clinical indicators. A recent meta-analysis of 70 studies found that the three most common SES indicators (income, occupation, education) were all comparably associated with variations in risk for incident MI; ranging from RR 1.35 to 1.71 (Manrique-Garcia, Sidorchuk, Hallqvist, & Moradi, 2011). Notably, these associations are more evident in higher-income countries presumably where there is greater wealth variation. In addition, evidence suggests that SES markers may work synergistically to increase risk (Gerber, Goldbourt, Frory, & the Israel Study Group on First Acute Myocardial Infarction, 2008). Socioeconomic indicators also predict recurrent events. A 10-year follow-up of 2,132 consecutive acute coronary syndrome (ACS) patients found that recurrent ACS events (fatal and non-fatal) were more common among patients with lower education attainment relative to intermediate or higher education categories (Notara et al., 2016).

Interventions such as percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass grafting (CABG) are critical intervention strategies for more advanced atherosclerotic disease. Substantial evidence documents SES disparities in access to these procedures as well as greater risk of complications following them (Jakobsen et al., 2012; Koren, Steinberg, Drory, & Gerber, 2012). Finally, lower SES is predictive of lower post-MI survival with substantial evidence documenting a relationship between not only individual-level factors but area deprivation as well (Gerber, Benyamini, Goldbourt, & Drory, 2010; Tonne et al., 2005).
In summary, these findings contribute to an emerging picture where SES influences CHD at multiple stages of the disease from development to its clinical endpoints. Most of the available data focuses on atherosclerotic disease.

Cancer

Cancer accounts for nearly one-quarter of all deaths in the United States, exceeded only by diseases of the heart (Siegel, Miller, & Jemal, 2018). Population-level data from the National Longitudinal Mortality Study (NLMS) and the National Cancer Institute’s Surveillance, Epidemiology, and End Results (SEER) cancer registry database are critical to understanding relationships between SES and cancer in the U.S. The NLMS is a longitudinal data set for examining factors associated with all-cause and cause-specific mortality in the U.S., including socioeconomic and demographic factors. SEER is a population-based cancer registry covering approximately 26% of the U.S. population and serving as a significant database for U.S. cancer statistics. Together, these databases capture a substantial portion of the U.S. population and allow researchers to examine individual-level demographic and socioeconomic trends in cancer incidence, mortality, and survival.

In a recent study, Singh and Jemal (2017) examined associations between varying levels of SES and cancer incidence and five-year survival. Findings were especially pronounced for men and racial/ethnic minorities. For example, men below the poverty level had 80% higher cancer mortality than those in the highest income group (≥200% of the poverty level). Excess incidence and mortality risk was especially pronounced for lung, colorectal, cervical, stomach, and liver cancers. In addition, blacks had higher mortality rates compared to whites and Asian/Pacific Islanders and Hispanics showing lower mortality rates compared to whites. In a similar study by Gorey and Vena (1994), blacks were four times more likely to be low in SES compared to whites (52.8% vs. 12.3%, respectively), but the aggregate effect of low SES on cancer incidence was similar across race (e.g., stomach cancer: RR_{black} = 2.14, RR_{white} = 2.12), suggesting that the effect of low SES on cancer risk may be independent of race.

Incidence data reflect new diagnoses of cancer, which may be influenced by the frequency and quality of screening. Thus, the relationship between SES and cancer incidence is more complicated than that of SES and mortality or survival. Higher incidence rates for cancers identified through routine screening procedures (e.g., mammograms, PSA/prostate exams) are typically associated with higher as opposed to lower SES, particularly as indexed by area or neighborhood SES (Hastert, Beresford, Sheppard, & White, 2015; Lundqvist, Andersson, Ahlberg, Nilbert, & Gerdtz, 2016). Moreover, poverty is associated with not only a lower frequency of diagnosis but also with diagnoses of more advanced cancers at numerous sites (Booth, Li, Zhang-Salomons, & Mackillop, 2010; Ellis et al., 2018) with these stage differences contributing to differential mortality rates (Ellis et al., 2018; Tawk, Abner, Ashford, & Brown, 2015; Zhang et al., 2017).

Regardless of the mechanism, lower SES is broadly associated with reduced survival time following diagnosis and treatment for a range of cancer types. The literature supports the association between lower SES and higher cancer risk, reduced chance of early detection, and lower survival. Individual-level factors (income, education) are most often documented as determinants of incidence and mortality whereas infrastructure disparities appear to be key to early detection and associated survival.

Mediating Pathways

In this section we address healthcare and health behavior, physical and social environments, and psychological and physiological functioning as potential factors in the relationship between SES and
Socioeconomic Status and Health

health. Each of these constructs has been related to both SES and health and may potentially mediate that relationship.

Health Behaviors

Health risk behaviors are one of the more studied pathways in the relationship between SES and health. Decades of research document the relationship between lower SES and higher rates of smoking, poor dietary habits, and obesity (Drewnowski, 2009; Schaap & Kunst, 2009). Recent research indicates that SES disparities have increased in recent years (Valero-Elizondo et al., 2018). In addition to these negative health behaviors, lower individual and community SES indicators are associated with less engagement in potentially health-promoting behaviors such as physical activity (Makinen et al., 2009). Lower SES individuals also appear to have more difficulty changing negative health behaviors (Hernandez, Margolis, & Hummer, 2018). Although research psychologists rarely “conclude” anything, the magnitude, reliability, and strength of the evidence leads these authors to conclude that SES is a significant determinant of health behaviors.

Access

A major barrier to better health and disease management is access to health resources, including healthy food choices and quality healthcare. Lower SES neighborhoods generally have fewer healthy food options and higher numbers of fast-food restaurants and convenience stores, which impact critical health behavior pathways (Cummins, McKay, & MacIntyre, 2005). In addition, SES is associated with healthcare with implications for well-being maintenance and the identification and treatment of illness. Substantial evidence suggests that lower SES individuals are less likely to receive preventive care or receive health screening (Blackwell, Martinez, Gentleman, Sanmartin, & Berthelot, 2009) and are more likely to be diagnosed at later stages of disease, which impacts prognosis and survival (Sakhuja, Yun, Pisu, & Akinyemiju, 2017). Importantly, healthcare access is a modifiable factor. Regardless of its politics, the Affordable Care Act and Medicare expansion have had a demonstrable impact on access with significant health benefits (Sommers et al., 2016).

Environmental Exposure

Exposure to unhealthy environments appears to play an important role in the relationship between SES and health (Evans & Kantrowitz, 2002). Lower SES individuals are more likely to be exposed to a wide variety of environmental contaminants, including hazardous waste, air and water pollution, and household toxins such as mold (Cho et al., 2008). As a result, lower SES children have been found to have higher blood levels of lead (Pb) (Gump et al., 2007). In addition, lower SES neighborhoods are also associated with noise pollution and overcrowding (Casey et al., 2017; Evans & Kantrowitz, 2002).

In addition to the direct toxic effects, these environmental conditions may also affect health through stress (Boylan, Cundiff, & Matthews, 2018). For example, crowding is associated with higher behavioral problems and poor academic achievement as well as negative health outcomes among children (Evans, Lepore, Shejwal, & Palbane, 1998).

Psychological and Physiological Functioning

Compelling evidence documents a graded relationship between lower SES and risk of stress, negative affect, mood, and psychopathology. Some of these associations appear to be stronger among ethnic minorities and some studies suggest that the relationship begins in childhood (Uddin, Jansen,
These psychological conditions may impact health through exaggerated changes in acute physiological parameters, such as blood pressure, neuroendocrine, and immune functioning (Uchino, Ruiz, & Holt-Lunstad, 2009). In general, low SES appears to be related to increased cardiovascular reactivity to stressful situations coupled with slower recovery (Boylan et al., 2018). Additional work documents a relationship between lower SES and greater neuroendocrine reactivity to stressful situations (Cohen, Doyle, & Baum, 2006). Lower SES is associated with higher basal cortisol levels and a flattened cortisol rhythm from day to night, which is typically associated with increased stress (Cohen et al., 2006). Cortisol is also related to low SES measured across the life span which may be indicative of having to cope with adversity over long periods of time. Changes in SES are also predictive of neuroendocrine functioning, with improved financial situation being related to decreased cortisol response upon awakening (Steptoe, Brydon, & Kunz-Ebrecht, 2005).

**Emerging Issues**

In this last section, we focus on three emerging issues in the relation between SES and health. First, we address the effects of SES on health over the life course, examining the relative contributions of childhood SES and adult SES to health outcomes. Second, we address exceptions to the social gradient, situations where a reversed social gradient has been observed with those with low SES actually having better health outcomes. Third, we address the concepts of social capital, income inequality, and relative deprivation, which may partially explain the reversed social gradient. These three new emerging issues in the research on SES and health provide unique perspectives from which to consider how SES and health are related.

**Time in the Life Course**

Are the health effects of SES acute or pervasive? Research has begun to focus on the effects of childhood and adolescent SES on health over time. A number of studies have found that both childhood and adult SES have significant effects on health (Galobardes, Davey Smith, & Lynch, 2006). Such findings have led to the development of various life course models to explain how SES is related to health over time (Berkman, 2009). There are three key hypotheses. The first model suggests that early life conditions experienced during latency/sensitive periods become embodied and then influence adult health outcomes directly (Hertzman, 1999). This perspective suggests that childhood SES experiences should determine adult health somewhat regardless of adult SES. In contrast, the second perspective argues that adult health is determined by the cumulative life experience including both childhood and adult experiences (Beach, Dogan, Brody, & Philibert, 2014). The third model, social trajectory, assumes that all of the effects of early childhood conditions are mediated by adult social conditions (Ben-Shlomo & Kuh, 2002). These models are guiding contemporary research with the promise of identifying key risk periods with intervention potential.

**Exceptions to the Social Gradient**

We opened this chapter by strongly stating that the effects of SES on health are reliable and robust. Yet, emerging evidence suggests there are exceptions to this rule. For example, studies conducted in Africa, Asia, Polynesia, and South America have documented an “inverse” gradient suggesting those of lower SES may actually having better health outcomes (Steffen, Smith, Larsen, & Butler, 2006). In addition, recent work examining the epidemiological phenomenon referred to as the Hispanic/Latino health paradox document similar SES gradient exceptions, particularly among less acculturated Latinos (Ruiz, Steffen, & Smith, 2013; Vega et al., 1998). The effects of acculturation on health can occur in a relatively short time frame (Dixon, Sundquist, & Winkelby, 2000).
Socioeconomic Status and Health

Meta-analysis of 125 studies on acculturation and blood pressure reported that the largest effect sizes were found within the first three years of acculturation (Steffen et al., 2006). More research is needed to determine the reliability of these effects and whether they are true exceptions or whether the effects of SES are offset by some third variable.

Relative Deprivation

Relative deprivation focuses on the emotions resulting from social comparisons involving inequality. Invidious social comparisons can lead to increased stress, maladaptive coping responses, and negative health behaviors as an attempt to deal with the negative emotions resulting from negative social comparisons (Subramanyam & Kawachi, 2006). Studies have found that relative deprivation is related to worse self-reported mental and physical health (Subramanyam, Kawachi, Berkman, & Subramanian, 2009). The increasing use of the MacArthur SES ladder and Yitzhaki index of relative deprivation should further this line of inquiry.

Conclusions

Convincing evidence strongly supports an association between SES and health, broadly defined. This relationship tends to be graded though non-linear, with greater risk at the low end of the SES spectrum. Moreover, the effects of SES are mediated through multiple pathways with emerging evidence suggesting that early life SES moderates subsequent health trajectories into adulthood. SES can itself be modulated by the financial and physical costs of disease. Four decades after the original Whitehall study, the basic relationship between SES and health is widely regarded as fact with efforts now concentrated on mediating processes. It will be important to see how these efforts translate into interventions that benefit all.

References


299
John M. Ruiz et al.


Sommer, B. D., Blendon, R. J., Orav, J., et al. (2016). Changes in utilization and health among low income adults after Medicaid expansion or expanded private insurance. JAMA Internal Medicine, 176, 1501–1509.


