

Measurement and Model Building in Studying the Influence of Socioeconomic Status on Child Development

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The process of child development is shaped by experience, and children who live in different socioeconomic strata have **difference** experiences. Thus, it should not be surprising that socioeconomic status (SES) is a pervasive predictor of child development. Children from higher SES families reliably fare better than children from lower SES families on a wide range of developmental outcomes from infancy to adulthood. Although some of the predictive power of SES may derive from its correlation with properties that are genetically transmitted from parents to their children (Rowe & Rodgers, 1997), a substantial literature argues that SES indexes properties of children's environments that affect development. Recent reviews of this substantial literature argue also that the processes by which SES exerts its well-attested effects are not adequately understood (Bradley & Corwyn, 2002; Bornstein & Bradley, 2003; Conger & Donnellan, 2007; National Research Council and Institute of Medicine, 2000).

Progress in understanding the mechanisms of SES influence requires measures that capture what about SES is relevant to

children's experience and models that capture how SES exerts its influence. The questions of how to measure SES and to model its influence are the topics of this chapter. In the sections that follow, we lay out the issues involved and illustrate the approaches that have been taken with selected research examples.

Issues in Measuring Socioeconomic Status

Deciding how to measure SES requires deciding how to define SES. The traditional definition of SES is that it is an individual's or household's relative position in a social hierarchy based on access to, or control over, wealth, prestige, and power (Mueller & Parcel, 1981; Willms, 2003). A more recent conceptualization that has influenced work on child development comes from Coleman (1988), who identified financial capital, human capital, and social capital as the components of SES. Financial capital is the source of material resources – food, clothing, housing, and everything else that depends

on money. Human capital is the source of nonmaterial resources such as knowledge and skills. Social capital is a less transparent concept; it is an individual's or household's connections to a larger social group, in the form of access to the expectations of that group, the norms of that group, and the channels of information that group provides (Coleman, 1988).

Measures of SES, both before and since Coleman's work, have typically included some index of household income, education level, and occupational prestige. Recent work guided by Coleman's theory is predicated on the argument that income indexes financial capital, education indexes human capital, and occupational status indexes social capital (Conger & Donnellan, 2007; Entwisle & Astone, 1994). Where poverty and its consequences are the focus of research, the predictors may also include other indicators such as measures of employment instability (Parke, Coltrane, Duffy et al., 2004) or material hardship (e.g., Gershoff, Aber, Raver, & Lennon, 2007).

In addition to selecting indicators, measuring SES requires also deciding whether to form a composite index from multiple indicators or to use the indicators separately and, for either the composite or multiple separate indicators, whether to treat them as continuous variables or as a basis for creating categories. The use of multiple separate indicators is consistent with the definition of SES as access to resources and with the view that indicators of access (albeit imperfect ones) can be directly measured (Entwisle & Antone, 1994). The use of a composite index is more consistent with the view that SES is greater than the sum of its parts and that the index serves as a proxy for an unmeasured underlying construct (Willms, 2003). The question of continuous or categorical treatment of SES arises for both individual and composite indices. With respect to individual indicators, the question is whether some junctures on the scale constitute category boundaries. For example, equal differences in years of education (as in the difference between leaving school one year before

high school graduation or finishing high school) may not map onto equal-size differences in human capital or the access to social capital that education affords. When the continuous or categorical variable question is asked with respect to combined indicators or a composite scale, the measurement question again meets the conceptual question of whether SES is truly a continuum in terms of the experiences it indexes, or whether different positions in the social hierarchy correspond to qualitatively different circumstances of living. The argument for categories is the argument that the combination of low levels of education, low income, and low occupational prestige (or, alternatively, limited access to multiple types of resources) creates an environment that is qualitatively different from the environment of a household in which the parents have high levels of education, income, and occupational prestige. This conceptualization tends to be associated with the use of the term *social class* more than with the term *socioeconomic status*. As the sociologist Melvin Kohn put it in his classic work on social class and parent-child relationships,

social class has proved to be so useful a concept because it refers to more than simply educational level, or occupation, or any of the large number of correlated variables. It is so useful because it captures the reality that the intricate interplay of all these variables creates different basic conditions of life at different levels of the social order. (Kohn, 1963, p. 471)

It can also be argued that the underlying differences, while multiply determined, are nonetheless continuously distributed. If, however, continuous scales of measurement are used, then the question of whether SES is more than the sum of its parts cannot be adequately addressed. That is, so long as multiple indicators are combined in a regression analysis rather than used to create nonoverlapping groups, the variance accounted for by three linear predictors and their interactions will differ little from the variance accounted for by a composite of those indicators.

Approaches to Measuring Socioeconomic Status

The literature on the relation of SES to child development includes examples of each possible combination of the measurement decisions outlined earlier, but different approaches characterize the research of different periods and research with different goals.

Measuring SES Using a Composite Index

Much of the early literature makes use of a composite indicator (Hess, 1970; Hoff, Laursen, & Tardif, 2002) or, alternatively, a single indicator considered as a proxy for the correlated variables that define SES. The best known and most widely used composite measures of SES in the United States are the Hollingshead Four-Factor Index of Social Status and the Socioeconomic Index of Occupations (SEI) (Bornstein, Hahn, Suwalsky & Haynes, 2003). The Hollingshead is based on the education and occupation of each employed householder in the home; the SEI is a measure of occupational prestige that makes use of data on the educational requirements and income associated with occupations (see Bornstein et al. 2003, for a more complete discussion). Other composite indices that make use of these components and, sometimes, measures of wealth and educational and culturally related possessions, also exist (e.g., Willms, 1999, 2006).

Measuring SES Using Multiple Separate Indicators

The argument that SES is best understood as a composite variable has not won the day in studies of SES and child development. Ensminger and Fothergill (2003) found that the use of aggregate measures of SES was rare in studies of U.S. children and youth appearing in three major journals from 1991 to 2000. Current work frequently employs several separate indicators and makes use of more sophisticated statistical procedures than used in the early work to investigate the individual and combined predictive

power of the indicators used. The dominant view in this recent work is that even when there is value to a composite index, separate effects of the constituent components of SES should also be examined (Bornstein & Bradley, 2003; Willms, 2003). Different components of SES have been argued to affect different outcomes (Duncan & Magnuson, 2003). Also, different components may affect the same outcome *via* different paths. For example, among 6- to 9-year-old sons of divorced mothers both maternal education and maternal occupation predicted children's school achievement, but the effect of education was mediated by the home skill-building activities mothers provided whereas the effect of occupation was not mediated by any measures of the home environment (DeGarmo, Forgatch, & Martinez, 1999).

Measuring SES Using a Single Scale

Often, however, SES has been measured using just one of the components of SES, and that component is typically maternal education. The same survey that found use of any composite index to be rare found that education (typically maternal education) alone was the most commonly used indicator of SES in recent child development research (Ensminger & Fothergill, 2003). One argument for this practice refers to ease of data collection and reliability of information. In particular, participants may be reluctant to provide income information, they may be less than entirely truthful when they do, and they may complain to the source providing participants thereby jeopardizing the whole research enterprise (Hoffman, 2003). Other arguments for using maternal education have to do with the instability of some components of SES. Whereas parental occupation and income may fluctuate widely over the course of an individual's childhood, parental education levels tend to be relatively stable (Duncan & Magnuson, 2003).

Empirical findings have also been the basis for arguments that maternal education is the best single indicator of SES in studies of child development (Bornstein et al., 2003; Hoffman, 2003). To illustrate, Bornstein

et al. (2003) compared the predictive value of both composites, the Hollingshead and the SEI, with the predictive value of their components and found that maternal education was the most robust predictor of infant behavior at 5 months. DeGarmo et al. (1999) employed both the Hollingshead and measures of individual components of SES and found that maternal education was the strongest predictor of 8-year-old boys' school behavior and achievement.

The evidence that maternal education is the single best indicator of SES for predicting child outcomes is frequently interpreted as reflecting a process in which parenting behavior mediates the effect of SES on development and in which parenting behavior is more influenced by education than by income or occupation. For example, in the Canadian National Longitudinal Study of Children and Youth (NLSCY) data, maternal education was the best sociodemographic predictor of children's vocabulary because, Willms (1999) argued, maternal education is related to the nature of maternal speech, which affected children's vocabulary growth. Other findings support this proposed path of influence (Hoff, 2003a, 2003b, 2006). Similarly, Bornstein et al. (2003) found that the effect of maternal education on infant outcomes was related to several parenting behaviors, which mediated the effect of maternal education on child outcome, and Davis-Kean (2005) found that parents' education predicted parental expectations, which, *via* home activities, predicted 8- to 12-year-old children's academic knowledge.

Other outcomes at other ages are, however, predicted by parents' occupation or income. For example, parents' occupational status predicted their children's occupational attainment in adulthood both Finnish and U.S. samples (Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006), and consistent poverty in childhood was found to predict aggression in 12-year-olds, holding maternal education constant (Tremblay, 1999). Such findings are consistent with arguments that depending on the outcome of interest, some components of SES are better

indicators of the real source of the effect of SES than others because different components of SES influence different aspects of children's experience and thus influence different developmental outcomes (Conger & Donnellan, 2007).

Measuring SES as a Categorical Variable

Studies in which SES is a categorical variable come in at least three varieties. In one, subjects are selected to span a range of levels of SES and then are grouped using natural or statistically identified junctures. For example, Dollaghan et al. (1999) found statistically significant linear trends for several measures of children's language across three levels of maternal education: less than high school graduate, high school graduate, and college graduate. Wadsworth and Achenbach (2005) found a significant effect of SES on childhood psychopathology, treating SES as 3-level categorical variable that was created by first using a continuous composite index of SES and then dividing their sample into low-, middle-, and high-SES groups.

In a second, conceptually similar approach, subjects are selected from discontinuous regions on the SES continuum, thus creating, by subject selection, discrete categories. The latter option is characteristic of small-scale studies in which the aim is to ask whether SES has an effect, without attempting to specify the function that relates SES to outcome across its range. This approach of selecting narrowly defined groups that represent nonadjacent positions on a continuum maximizes between group variance and minimizes within-group variance. For example, Hoff (2003b) identified SES-related differences in maternal speech and in child language development comparing households in which both parents had completed college and, if employed, worked in occupations that required a college education to households in which both parents had completed high school but had never attended any college and, if employed, worked in occupations consistent with that level of education. In this case, nonoverlapping and internally homogeneous groups in

terms of parents' education and occupation were created.

In a third categorical approach, groups of interest are defined by the sociological landscape. In a great deal of research, the group of interest is those living in poverty. In much of the poverty research, income and other indices of poverty such as receiving government benefits are used to define a group, which is then compared to a group not living in poverty. Studies of the effects of poverty most frequently make use of large, longitudinal data bases (Ripke & Huston, 2006), but there are also examples of smaller-scale and more anthropological approaches to identifying groups. Heath (1983) found different styles of parent-child communication and different patterns of child language development in three distinct groups in the southeastern United States: a poor, African-American community; a nearby working-class white rural community; and the mainstream community that lived in town. Hart and Risley (1995) described language use and language development in three groups in the mid-western United States whom they labeled professional families, working-class families, and welfare families. The compelling findings in these latter studies are not in the form of regression coefficients for individual predictors but in the description of group differences. In both these studies, the groups that were compared no doubt differed on the standard measures of income, occupation, and education, but what is more salient in the results is the overwhelming picture of the qualitatively different environments in which children live. To echo Kohn (1963), the "basic conditions of life" are different for children living in a household supported by welfare payments, in which the adults are unemployed and have not graduated from high school, compared to children whose parents have professional degrees, occupations, and commensurate incomes.

In sum, the literature on the relation of SES to child development does not suggest a single best way to operationally define and measure SES. Rather, any measure that is selected entails a definition of SES; different measures entail different definitions.

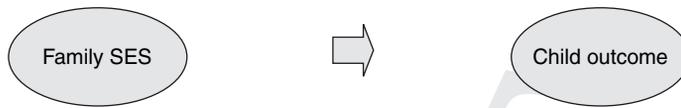
In other words, the measurement question is not one that can be resolved in study design and then forgotten. Any findings with respect to the relation of SES to child development are actually findings of a relation of SES, defined and measured in a particular way, to the developmental outcome of interest.

Issues in Modeling the Influence of Socioeconomic Status

Describing how SES is related to child development requires not only operationalizing SES, but also making explicit and testable the hypothesized links between SES and child outcomes. Theories tend to be written in terms of the concepts and processes posited, using the vocabulary of ordinary language. Tests of hypotheses require, in contrast, models of the links among variables written in analytic terms. Although analytic models are inherent in theoretical models, achieving statistical formulation requires some translation from one vocabulary to another.

In the most frequently proposed and tested models, SES is a predictor variable. Conceptually, such models are social causation models; SES is posited as the cause of the child outcomes with which it is associated. Within this category of model, multiple types can be distinguished. The hypothesized causal path can be direct or mediated. In current work, models are more frequently models of mediated effects in which SES is linked to proximal variables such as parent behavior or household characteristics that, in turn, have consequences for children (e.g., Gershoff et al., 2007; Parke et al., 2004) (see Figure 28.1). Both direct and mediated effect models may posit linear or nonlinear relations between SES and child development. In linear models, incremental changes in SES are associated with incremental changes in child outcomes (see Figure 28.2). In nonlinear models, the posited effects of SES are not constant across its range. Often, the relation posited is one in which SES has linear (or even exponential)

Direct effects of family SES on child outcomes



Mediated effects of family SES on child outcomes



Figure 28.1. Direct and mediated social causation models.

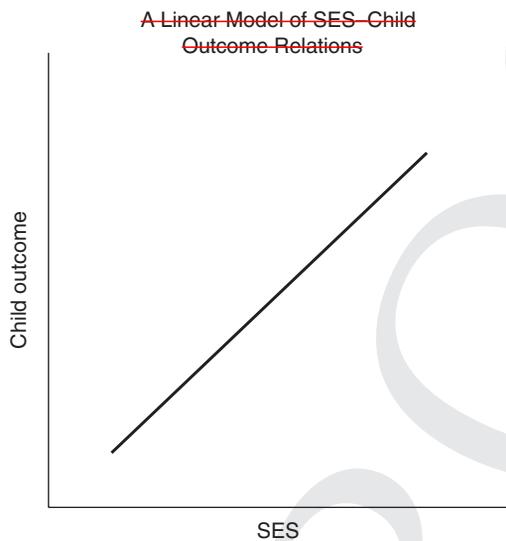


Figure 28.2. A model of linear effects of SES.

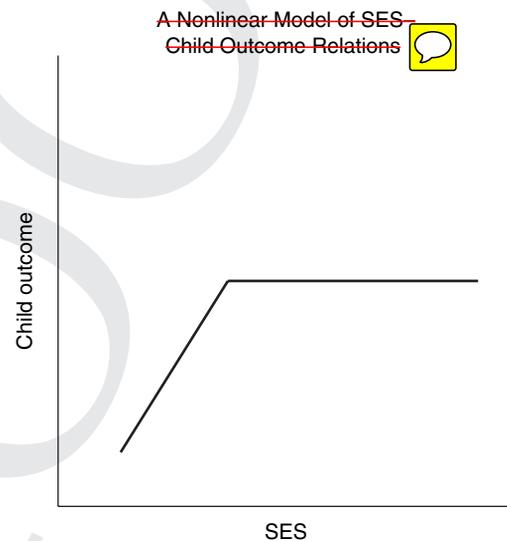


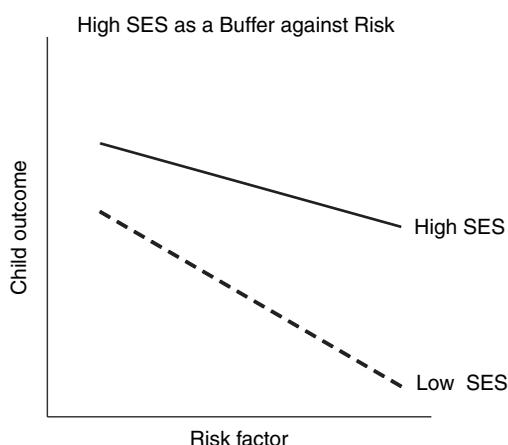
Figure 28.3. A model of nonlinear effects of SES.

effects below a certain threshold, but above that threshold, effects of SES are weak or nonexistent (see Figure 28.3).

The frequently cited family stress model is an example of such a model (Conger & Donnellan, 2007; Conger & Elder, 1994), although not all work in this vein labels itself as tests of a family stress model. What we propose here is that, labeling aside, all work that focuses on one part of the range of SES, usually on poverty, and ignores differences outside that range can be similarly described as testing a model of nonlinear or threshold effects (Laursen & Collins, 2009).

In another type of model, SES functions as a moderating variable. Such models typically

start from the premise that there are qualitative differences among SES groups. As a consequence, associations between predictor variables and outcome variables differ for those who occupy different social strata. SES may enhance risk, or it may buffer against adversity (see Figure 28.4). In some models, SES is not a predictor but an outcome or mediating variable. Again, within this category several models can be distinguished. In what are typically referred to as social selection models, the hypothesized direction of causation is from characteristics of individuals to SES – in which case SES in adulthood is the developmental outcome of interest. SES becomes a mediator



Figures 28.4. SES as a moderator variable.

when other behaviors or characteristics are the outcome of interest and the hypothesis under test is that one's SES in adulthood is an influence on behavior – separate from whatever caused that SES (see Figure 28.5). SES also functions as a mediator in models that posit that SES is part of a larger causal sequence in which characteristics of parents are responsible for family SES and family SES, in turn, shapes child outcomes (see Figure 28.6).

The final set of models is transactional, treating SES as both a predictor variable and a mediating variable. These are lifespan models and intergenerational transmission models in which there are bidirectional influences that unfold over time between characteristics of the child and characteristics and the environment that the child experiences. The SES of the household in which a child lives, via [CE: should “via” be in italics? See elsewhere as well]parent behavior, predicts child outcomes; these characteristics of the child in turn predict the child's SES as an adult, which then predicts behavioral outcomes in adulthood (see Figure 28.7). We will review each of these models in more detail in the section that follows, providing research examples of each.

All of the foregoing models involve SES as a real influence or meaningful outcome at some point in a causal sequence. In the social causation models, SES in childhood causes, directly or indirectly, subsequent

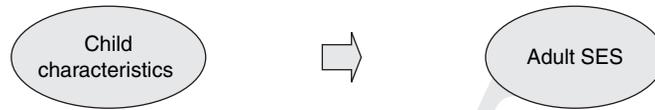
developmental outcomes. In models in which SES is a mediator, SES also causes adult outcomes, either via childhood experiences associated with SES or via influences of adult SES on behavior. In the social selection models the direction of causation is reversed; childhood characteristics and behaviors are the cause and SES in adulthood is the consequence. There is a third possibility, that SES is only a spurious correlate of related parent and child characteristics (which are themselves related to SES), and the real vehicle of transmission is genetic. Some research has begun to directly test this hypothesis, seeking to identify environmental effects that operate over and above genetically transmitted effects (see summaries in Caspi, 2002; Duncan & Magnuson, 2003).

Approaches to Modeling the Influence of Socioeconomic Status

SES as a Linear Predictor throughout Its Range

Continuous, linear models of the influence of SES posit that SES predicts child development across the entire range of socioeconomic strata and child outcomes. Put simply, the SES score of a child's family of origin should correspond with measures of social and cognitive functioning. Tests of models of direct effects of SES on child development may treat SES as a categorical variable and compare groups. This approach is characteristic of the many studies that use the social class terminology and compare development among children from lower class, working class, and middle class families (see Hess, 1970). The large body of research conducted in the 1960s on “the disadvantaged child” is also in this mold (Ginsburg, 1972; Williams, 1970). The findings from such work are typically in the form of a description of group differences. This approach is more characteristic of earlier work than of current work, it is more characteristic of work done outside the United States where notions of class do not elicit the same discomfort that they do in the United States

Direct effects of child characteristics on adult SES



SES as a mediator of effects of child characteristics on adult behavioral outcomes



Figure 28.5. Direct and mediated social selection models.

~~SES as a mediator of effects of parent characteristics on child behavioral outcomes~~

Figure 28.6. A model of SES as a mediating variable.

A transactional model in which SES is both a predictor and a mediator

Figure 28.7. A transactional model of the intergenerational influence of SES. 

(Hoff-Ginsberg & Tardif, 1995), and it is more characteristic of work done within the field of sociology than of work done in developmental psychology (Argyle, 1994). In current work, even where groups are compared, the social class terminology has been supplanted and groups are referred to using vocabulary such as low, middle, or high SES (e.g., Hoff, 2003b; Wadsworth & Achenbach, 2006).

There are also tests of direct effects of SES in which SES is treated as a continuous variable. For example, Willms (1999) described the gradient or slope of association between SES and early vocabulary development in a large, nationwide sample of Canadian preschool children (Willms, 1999). The

findings from this sort of work are typically in the form of a function that maps SES to the associated outcome. In Willms (1999), the data indicated that 1 standard deviation increases in family SES are accompanied by one-third of a standard deviation increase in children's vocabulary scores.

Even where direct effects are tested and are of interest, current work almost always posits that SES exerts its influence indirectly. A central aim of much current research is to identify those indirect or mediated paths (Fernald & Marchman, 2011; Hoff, in press). Indirect or mediated effects can be tested within the approach that treats SES as a categorical variable. For example, Hoff (2003b)

found that a sample of 2-year-old children of college-educated mothers used larger vocabularies in speaking than did the 2-year-old children of high school-educated mothers and that this association between SES and children's vocabulary size was fully mediated by differences between the two groups of mothers in properties of the speech they addressed to their children.

Indirect effects models are more often tested in large samples using structural equation modeling to determine whether intervening variables reduce or eliminate associations between SES and child outcomes. For example, results from a representative sample of U.S. grade school children indicated that associations between socioeconomic status and child behavior problems were partially mediated by a host of socialization variables including maternal warmth, values, and disciplinary practices (Dodge, Pettit, & Bates, 1994).

Both direct and mediated effects of SES may be moderated by other variables such that the magnitude or pattern of indirect associations from SES to child outcomes varies across categories of individuals. For example, country moderates the effect of SES on literacy: the socioeconomic gradients that relate SES to adolescents' literacy skills have different slopes in different countries (Willms, 1999). Age or developmental stage moderates the effect of SES on language development: there are SES-related differences in children's development of complex sentence structures but there are not SES-related differences in these same children's earlier development of simple sentence structure (Vasilyeva, Waterfall, & Huttenlocher, 2008). Ethnic group moderates the mediators of the effect of SES on literacy: associations between parent education and preadolescent school literacy were fully mediated by parental educational expectations among African Americans but only partially mediated among European Americans (Davis-Kean, 2005). Findings from the National Longitudinal Study of Youth also revealed ethnic group differences in patterns of mediation, specifically in links from SES, through home environment

measures, to school achievement and behavior problems (Bradley & Corwyn, 2003). In this case, home environment measures were more apt to emerge as mediators of effects of SES among European Americans than among African Americans and Hispanic Americans.

SES as a Predictor across a Partial Range (threshold Effects)

Truncated or discontinuous models of influence posit that SES predicts child development only within a restricted range. These models describe threshold effects. Within the literature there are different views regarding what determines the threshold below which differences have consequences for children. Some argue that associations between SES and child outcomes are limited to populations characterized by poverty and hardship. In this view, resource scarcity has a detrimental impact on child development, both directly and indirectly through its association with other proximal indicators (McLoyd, 1998). Others argue that resource scarcity, in and of itself, does not fully account for developmental difficulties, but rather the perception of need and the stress that accumulates with these perceptions. In this view, resource scarcity adversely influences child outcomes only when accompanied by perceptions of difficulty and hardship. Some analytic designs explicitly acknowledge the discontinuity assumption. Comparisons of families that lack resources and families that do not lack resources designate a threshold at which hardships are assumed to accrue and impact children. The threshold is typically defined in terms of a specific level of family income or a family-income-to-needs ratio, with children grouped according to whether and how often they have lived below this threshold. The National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network (2005) adopted this approach to identify group differences in trajectories of child outcomes from age 2 to age 8. Children never living in poverty differed from children always

living in poverty in terms of the intercept and sometimes also in terms of the slope of change in their cognitive skills and in their internalizing and externalizing behaviors; those experiencing poverty during some but not all of their lives typically had outcomes that fell in between these extremes. Despite the tremendous variability in affluence that exists above the poverty threshold, this approach makes no attempt to distinguish among nonpoverty groups. Thus, a discontinuous association is presumed such that family income predicts child outcomes only among the impoverished.

In some analytic models, the presumptions of nonlinearity can be difficult to discern. Tests of the family stress model, for example, typically make use of only a truncated range of responses on some of the predictor variables, that are, in principle continuous. For example, a model may include a measure of family income that represents the full spectrum of family finances, and a measure of negative financial events, which represents only the negative end – but not the positive end – of the potential range of financial changes. Mediator variables usually include family economic pressure, a parent-report measure describing financial hardships and unmet material needs, which also represents only the negative end of the potential range of perceived financial security. The finding that family income predicts perceptions of economic pressure, which, in turn, predicts parent mental health, parent marital quality, and parenting quality, which, in turn, predict child adjustment has been replicated in diverse samples (e.g., Conger, Wallace, Sun, Simons, McLoyd, & Brody, 2002; Solantaus, Leinonen, & Punamäki, 2004). Because the mediator variable is defined in terms of the presence of a specific condition or circumstance (e.g., financial cutbacks), the full model implies that family income has effects only when family income triggers perceptions of hardship. Thus, by virtue of the measures employed, these tests of the family stress model are tests of a threshold model of SES effects.

Threshold effects of SES are also sometimes moderated by other variables. Among

children growing up during the depression of the 1930s, the effects of family economic hardship on long-term developmental outcomes varied according to the child's gender and the child's age when financial difficulties began (Elder, 1974). Boys who were older at the onset of the depression fared better than boys who were young, whereas the reverse was true for girls. Older boys were able to take on jobs outside the home to assist their families, reducing their exposure to family stress. Girls, in contrast, were forced to stay home, and older girls were less likely to be shielded from family difficulties than younger girls. One test of the family stress model indicates that adverse child outcomes are differentially linked to parent reactions to perceived economic pressures, depending on parent gender. In this study, child adjustment was linked to maternal, but not paternal, reports of depression and to paternal, but not maternal, reports of anxiety and social problems (Leinonen, Solantaus, & Punamäki, 2002). Ethnicity also may moderate parental reactions to perceived economic pressures. Hostile parenting has been found to be linked to child adjustment outcomes among European Americans, whereas marital problems were linked to child adjustment among Mexican Americans (Parke et al., 2004).

SES as a Moderator

SES functions as a moderator variable when the relations among other variables differ depending on SES. Models that incorporate SES as a moderator may use SES as a grouping variable or a measure of SES may be crossed with a predictor variable as an interaction term. One group of studies that includes SES as a potential moderator examines developmental risk and resilience. Considerable attention has focused on the possibility that lower levels of SES may increase detrimental outcomes (or inhibit positive outcomes) and that higher levels of SES may buffer against detrimental outcomes (or promote positive outcomes) (Masten & Coatsworth, 1998). These studies make explicit the notion that SES can

function as both a developmental asset and a developmental liability.

SES also emerges as a robust moderator of development in studies not explicitly designed to focus on socioeconomic influences. For example, a study of the heritability of cognitive skills using a sample of siblings drawn from the National Longitudinal Study of Adolescent Health⁷ found the heritability of vocabulary was higher among adolescents with more educated parents and the heritability of vocabulary was lower among adolescents with less educated parents (Rowe, Jacobson, Van den Oord, 1999). A longitudinal study of Canadian youth indicated that parent education also moderates changes in young adult depressive symptoms (Galambos, Barker, & Krahn, 2006). Across young adulthood, depressive symptoms declined at a sharper rate among youth with highly educated parents than among youth with less educated parents. Finally, a large study of British youth indicated that parent occupation moderated changes in mental abilities scores during middle childhood (Feinstein & Bynner, 2004). Almost two-thirds of high SES children in the top quartile of cognitive performance at age 5 remained in the top quartile at age 10, compared with slightly more than one-quarter of low SES children; conversely, two-thirds of low SES children in the bottom quartile of cognitive performance at age 5 remained in the bottom quartile at age 10, compared with only one-third of high SES children. These studies provide converging evidence that trajectories of change in child outcomes vary as a function of SES.

The accumulating evidence for moderator effects of SES is an empirical argument for the position that different social classes constitute different environments such that the relations among other variables may be quite different in different socioeconomic groups (Hoffman, 2003). To capture the influence of such qualitative differences, scholars may need to reconsider variable-centered efforts to disaggregate sources of influence in favor of the person-centered practice of identifying clusters of individuals who share similar SES related traits (see Laursen & Hoff, 2006).

Identifying average relations between early and later cognitive performance may be neither scientifically interesting nor of practical use if the relations are different depending on SES. Similarly, distinguishing direct from indirect effects may be largely irrelevant if subgroups differ dramatically in terms of the constellation of SES-related components that predict child outcomes. Put another way, to capture how SES influences child development it may be necessary to identify the constellation of SES indicators that determine how other variables will operate. For example, parent education, neighborhood distress, and household chaos may be relevant only when more than one of these factors accompanies low income. Care must also be taken to ensure that SES is not used as a proxy for a correlated explanatory variable. For instance, data suggesting education and maternal employment are responsible for rates of mother-child conflict overlook the causal role played by single parenthood (Laursen, 1995, 2005a).

SES as an Outcome or Mediator

In the previously discussed models, SES was included as a predictor and the hypotheses under test have been some form of the hypothesis that SES exerts a causal influence on a developmental outcome of interest. SES can also be an outcome. The fact that an individual's SES is not perfectly predicted by his or her parents' SES, means that other factors must come into play. Child traits unrelated to family SES may, for example, determine the child's ability to succeed in school and on the job, which, in turn, are responsible for later SES. The argument that individual characteristics cause SES was first developed to explain the fact that individuals with mental illness or very low intelligence tend to be socioeconomically disadvantaged as adults, regardless of the SES of their family of origin. This movement of such individuals down the SES scale was termed social drift (Dohrenwend & Dohrenwend, 1969). The hypothesis of social drift or social selection also applies to other individual characteristics such as

temperament, personality, and intelligence that have sources other than SES but may contribute to the SES achieved in adulthood (Rowe & Rodgers, 1997).

In many models in which SES is posited to be the consequence of preceding individual characteristics, it is not just SES that is of interest as the outcome, but also the maladaptive behaviors associated with low SES. In this case SES functions as a mediator, linking the individual characteristics that caused SES to the behaviors that are caused by SES. For example, difficult, uncooperative children and those who lack intellectual capabilities may do poorly in school and fail to secure gainful employment, this may result in low SES, and that low SES in adulthood may increase stress and risks for maladaptive behaviors. Another model in which adult SES serves as a mediator is actually a social causation model in which the causal path has its origins in the SES experienced in childhood. For example, children who experience poverty, with its associated poor nutrition, chaotic living conditions, and deviant associates, are more likely than others to become low SES adults. Living in a low SES environment in adulthood may, in turn, be a cause of maladaptive behaviors.

Tests of models in which SES is the outcome or mediator ideally include measures for each individual of childhood characteristics, parent characteristics and family SES during childhood, SES as an adult, and outcomes as an adult. Long-term longitudinal studies are necessary to test such models. Caspi (2002) describes research strategies that can, in combination, untangle social selection from social causation effects. Three studies are mentioned here by way of example. Longitudinal studies in Finland and New Zealand indicate that ill-tempered, aggressive children tend to do poorly in school, which leads to dysfunctional, antisocial behavior and employment difficulties as an adult (Caspi, Elder, & Bem, 1987; Kokko & Pulkkinen, 2000). Both studies found that childhood behavior problems accounted for most of the variance in adulthood behavior problems, even after controlling for adult unemployment, suggesting that adult SES

is, at best, only a partial mediator of longitudinal associations. Similar findings emerged from analyses of the National Longitudinal Surveys of Youth (McLeod & Kaiser, 2004). Childhood externalizing problems predicted the likelihood of high school completion and college enrollment, an association that was mediated by childhood experiences of academic failure but not by childhood socioeconomic disadvantage. The findings are consistent with social selection effects in which childhood characteristics – but not childhood SES – predict adult educational attainment. Taken together, the results of these and other studies suggest that SES may be as much a product as a cause of individual traits and behaviors.

An alternative to both social causation models and social selection models is that adult SES is merely a spurious covariate of associations between characteristics of the parent or child and the child's adult outcomes. In this view, attributes shared by parents and children determine later adult outcomes and also dictate adult SES. The latter argument is typically advanced in the context of a genetically informed model in which heritability is argued to account for most of the variance in adult outcomes and adult SES. To address this, it is necessary to assess the roles of both SES and genetics in a single sample. Caspi and colleagues (Caspi, Taylor, Moffitt, & Plomin, 2000) have done this, employing the twin design that is standard in research on heritability and including neighborhood SES as one environmental variable. They found a strong genetic influence on mental health, and they also found that growing up in deprived neighborhoods affects mental health, above and beyond the effect of genetic liability.

A Transactional Approach to Modeling the Influence of SES

It is well accepted that transactional influences operate between parents and children such that parents' behaviors shape children's behaviors, which, in turn, influence parent behaviors. Those who hold strong environmental or genetic positions might disagree,

but it seems reasonable to us to assume that similar transactional process occur between SES and child development such that SES both shapes and is shaped by child outcomes. Thus, SES may function as predictor, mediator, and outcome in individual development over the lifespan. The best fitting models will capture this transactional nature of SES influences over time. Such analytic models will necessarily be quite complex, and testing such models will require longitudinal data from large samples. Concurrent assessments of both SES and individual developmental outcomes should be available during childhood and during adulthood. Data from and about multiple members of an individual's social network are needed (Laursen, 2005b). Three time points, at a minimum, are necessary to capture transactional processes. This is a tall order and few studies measure up completely.

We describe two studies that approach this ideal; each ends in young adulthood, when SES is fairly unstable, but they nevertheless demonstrate how SES may be both a cause and a consequence of individual traits and behaviors. In the first example, data from two studies of Iowa youth examined associations between family economic adversity during early adolescence, well-being during late adolescence, and individual economic adversity during young adulthood (Wickrama, Conger, & Abraham, 2005). Transactional patterns of influence were found such that greater economic adversity during adolescence predicted more problems during late adolescence, which, in turn, predicted economic difficulties during young adulthood. In the second example, two waves of data from the Dunedin Study examine associations between mental health data at ages 15 and 21, family SES at age 15, and individual educational attainment at age 21 (Miech, Caspi, Moffitt, Wright, & Silva, 1999). Controlling for concurrent associations at each time point, family SES during adolescence predicted subsequent young adult anxiety and antisocial behavior. Across this same period, conduct disorder and attention deficit disorder during adolescence predicted subsequent young adult educational

attainment. This latter study demonstrates social selection and social causation processes operating concurrently. Identifying transactional effects would require three or more time points. An example of a hypothesized transactional influence that could be tested against such longitudinal data is one in which the anxiety and antisocial behavior in young adulthood that was predicted by childhood SES in turn predicts (negatively) later occupational success, independent of the effects of educational achievement.

Even with long-term longitudinal data bases, there are limits to what variable-centered approaches can reveal about the multiple and complex transactional relations among SES and outcomes over time. Ultimately, apportioning variance among variables does little to inform us about individual developmental trajectories. Person-centered approaches are needed to demonstrate how changes in social class shape and are shaped by changes in other aspects of individual outcomes (Laursen & Hoff, 2006). Pattern-driven approaches pioneered by Elder (1974) and Block (1971) can be updated with new methods described by Nagin (2002) to model groups of individuals who share similar developmental and socioeconomic pathways. This is a strategy whose potential remains unfulfilled in this area of study. A growth mixture modeling approach could identify different lifespan trajectories of educational achievement or maladjustment, to identify those who share similar troubles. SES, or specific attributes of SES, could be similarly modeled, and SES group membership could be mapped onto adjustment trajectories.

Conclusion

This chapter has been an exercise in laying out the measures of socioeconomic status that have been employed and the causal models that have been tested in research on the relation of SES to child development. We reiterate some major points here: The most frequent approach to studying the influence of SES on child development

in the current literature is to measure multiple components of family SES, typically parents' education, occupation, and income, and sometimes also indicators of poverty and to use variable-centered statistical techniques such as structural equation modeling to examine the unique and combined effects of these predictors on child outcomes. Also, most current work seeks to identify the mechanisms by which SES exerts its influence. Thus, most research on SES and child development includes an intermediate layer of variables, those hypothesized to carry the effects of SES. The findings yielded by this approach make it clear that the multiple facets of SES are associated with different proximal variables, with different functions relating these predictors to their associated mediating variables, and, in fact, with different developmental outcomes. The multiple potential indicators of SES are not interchangeable; there is no single best indicator; and the most appropriate indicator to use depends on the hypothesized outcome and path of influence.

Recent research has most frequently tested one of two models of the relation between SES and child outcome: a linear model in which increments in SES are associated with increments in child outcome throughout its range, or a threshold model in which increments, typically in income, are associated with increments in child outcome only below a certain threshold, typically poverty. Both approaches have revealed important effects on children, but, just as measures of SES are not equivalent, models of SES influences are not equivalent. For the purpose of interpretation, it should be remembered that effects of poverty are not effects of income throughout its range. For the purpose of research design, it should be remembered that like measurement decisions, data analytic decisions have inherent in them commitments to theories about how SES operates as an influence on child development.

The causal paths underlying the well-documented relations between SES and developmental outcomes are complex. The literature makes it clear that SES shapes

parents' behavior and other aspects of children's environment, which, in turn, shape child outcomes. There is also evidence that SES can also function as a mediator of correlations between parent characteristics and child outcomes. Furthermore, there is evidence, when SES is studied as a developmental outcome, that individual characteristics of children lead some to be more successful and achieve higher socioeconomic status than others. And, it is clear that some of the correlations between parent SES and child outcome reflect genetic transmission of parent characteristics to their children. Large-scale longitudinal data bases, combined with sophisticated modeling techniques are beginning to untangle these intertwined and bidirectional influences. The use of sophisticated linear modeling techniques has substantially advanced scientific understanding of how SES exerts its influence on child development. With the increased use of this approach, however, the notion of social classes as qualitatively different groups and the corollary hypothesis that developmental processes may operate differently in these groups has largely been lost. The substantial evidence of moderator effects of SES suggests that this may be a mistake. There are person-centered data analytic techniques that might be applied to the question of whether there exist groups that differ in terms of the convergence of socioeconomic measures and patterns of relations among properties of children's experience and their development.

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