

Title:

How people make their own environments: Implications for parents and policy makers. By: Scarr, Sandra, Psychology, Public Policy, and Law, 10768971, 19960601, Vol. 2, Issue 2

Database:

PsycARTICLES

**HOW PEOPLE MAKE THEIR OWN ENVIRONMENTS : Implications
for Parents and Policy Makers**

Contents

[Genetic Influences on "Environments"](#)
[Theories About Individuality and Experience](#)
[Constructing Experiences](#)
[Competing Theories](#)
[Opportunity Differences](#)
[Theoretical Predictions](#)
[Observations From Opportunity Studies](#)
[Social Structure, Opportunities, and Achievements](#)
[Observations to Be Explained](#)
[Differential Opportunities Versus Making One's Own Environment](#)
[Observations From Socialization Studies](#)
[Observations to Be Explained](#)
[Observations From Behavior Genetic Studies](#)
[Correlations of Relatives: IQ and Achievement](#)
[Younger and Older Adoptees](#)
[Genetic Effects on Environments](#)
[Implications of Behavior Genetic Studies for Parents and Policy Makers](#)
[Good Enough Parents](#)
[Challenge to Policy Makers](#)
[Summary](#)
[Footnotes](#)
[References](#)

By: Sandra Scarr

Department of Psychology, University of Virginia

Correspondence concerning this article should be addressed to: Sandra Scarr, Kindercare Learning Centers Inc., 2400 Presidents Drive, Montgomery, Alabama 36116

Equality of opportunity does not mean that everyone can use, or will benefit from, the same opportunities. Rather, children need a wide array of opportunities from which to select those they find most compatible with their own interests, talents, and personalities. Nor will identical opportunities produce the same outcomes for different individuals. Each child is genetically unique and brings different cognitive, emotional, and personality

characteristics to available opportunities for experience. Individual outcomes are conditioned by both environmental and genetic variability, *which are correlated*. Substantial correlations between people and their environments lead to false inferences about the efficacy of deliberate interventions. Policy makers need to be aware that people are not randomly assorted into the environments in which they are found; rather, to a considerable extent, people make their own environments.

Parents of two or more children seem to know more than developmental psychologists or policy makers about the topic I discuss in this article: Children are individually different in all measurable behaviors, but parents' different rearing practices did not make them different from one another. Rather, children's talents, interests, personalities, and other characteristics *evoke* different reactions from parents. Some children, who are habitually grumpy and difficult to manage, challenge their parents' patience, whereas others who are cheerfully compliant consistently evoke parental gratitude and joy. Children use opportunities afforded by their families in different ways. Some children share parents' interests in mechanics or bird-watching; others do not. Some children catch on quickly in new learning opportunities; others are slow to acquire new information.

Parents of two or more children also know that, regardless of how irritated or pleasant their interactions with their children generally are, children interpret their parents' behaviors in idiosyncratic ways. Whereas one offspring may accept parental discipline as a justified response to the child's misbehavior, a brother or sister sees the same discipline as unjust and as evidence of parental rejection. Children, like adults, *interpret* others' behaviors within the cognitive understandings and emotional reactions they bring to interactions. Older children largely control how they experience their environments; people who have influence (often parents, teachers, coaches, etc.) are *selected* by the child, who chooses to be influenced by certain adults and not others. Family members may be inherited but peers are chosen. Different children in the same family make different choices and give different meanings to their environments.

The more general principle is that *people are not randomly assorted into their environments*. Social science research finds ubiquitous correlations between people and the environments in which they are found. The typical, usually unspoken, assumption is that some people are just unlucky and wake up one day to find themselves poor and ill-educated, whereas others are just lucky to have had opportunities for higher education and well-paying jobs. The unspoken implication of most "environmentally" motivated research is that merely providing have-nots with the same opportunities as the haves will equalize their outcomes. I will show that this assumption leads to false predictions about interventions to improve the lot of the have-nots, because

people are not randomly thrust into their environments; rather, to a large extent, they make their own environments by expressions of genetic variability. This is not to say that morally or ethically people deserve their fates—only that their personal characteristics are correlated with them.

Genetic Influences on “Environments”

Over the past 40 years, behavior genetic research has shown convincingly that genetic variability is far more important in determining individual differences in intelligence, talents, and personality than are environmental differences among families, unless the rearing conditions provided by parents are very deprived of opportunities or support. Further, observed environmental differences are largely the result of genetic differences, except at the very worst end of the environmental scale. Environmental differences that do contribute to individual differences are largely *not shared* by siblings; that is, environments within the family are unique to each child.

Why are developmental psychologists and laypersons with one or no offspring so surprised that, to a large extent, children make their own environments? First, the idea that people make their own environments runs counter to the mainstream of developmental theory. A large research literature interprets the *correlations* between familial, parental, and child characteristics as evidence that the rearing conditions parents provide for their children make significant differences in the children's life chances and eventual adult statuses, both socioeconomic achievements and mental health. Thus, although some developmentalists have suggested that children may affect the ways their parents treat them, as well as vice versa ([Bell, 1968](#); [Chess & Thomas, 1984](#); [Chess, Thomas, & Birch, 1968](#); [Hunt, 1961](#); [Thomas & Chess, 1980](#)), the theory that children actually construct their own environments from available resources challenges the basic tenets of mainstream developmental psychology.

Second, it is commonly observed that children in the same family resemble each other *to some extent* in intelligence, talents, personality, and interests. The standard interpretation of these sibling *correlations* is that they are caused by rearing provided by the same parents ([Baumrind, 1993](#); [Wachs & Gruen, 1982](#)). Two mistaken inferences from sibling correlations are made: that siblings are very similar in the first place and that parents' rearing practices *cause* siblings' similarity.

The actual degree of similarity between biological siblings is quite modest, unless they are identical twins. The average IQ difference between ordinary siblings is about 12 IQ points, compared to randomly paired members of the population, who differ on average by 17 points (the standard deviation of IQ tests is 15; [Jensen, 1980](#); [Plomin & DeFries, 1980](#)). On personality measures, siblings correlate about .20, which means on average they are only slightly

more similar than random pairs of people ([Scarr & Grajek, 1982](#)).

Nonetheless, degree of siblings' similarity follows genetic relatedness, not whether they were reared by the same parents (environmental relatedness). Identical twins are very similar on all behavioral measures, much more similar than fraternal twins or siblings in the same family. Identical twins reared in different homes are nearly as similar in intelligence and personality as identical pairs reared in the same home, whereas adopted children reared in the same home hardly resemble each other at all ([Loehlin, 1993](#); [Plomin, 1994](#); [Scarr, 1992, 1993](#); [Scarr & Weinberg, 1978](#)).

The child's role in the kind of parenting she or he evokes and reinforces has been underestimated ([Scarr & McCartney, 1983](#)). Genetic differences in how children react to and understand their environments has been neglected in developmental research. In addition, the fact that older children and adolescents *select* activities and people with whom to spend their time has enormous implications for understanding genetic and environmental effects. Third, the importance of *nonshared* family environments has not been understood.

[Theories About Individuality and Experience](#) **Constructing Experiences**

The theory of how people make their own environments ([Scarr & McCartney, 1983](#)) proposes three ways by which genotypes and environments become correlated. First, one must take into account the fact that most biological parents provide their children with both genes and many features of their environments. The fact that parents provide both genes and environments means that the child's genes and environments necessarily will be positively correlated. For example, parents who read well and who like to read will be likely to subscribe to magazines and papers, buy and borrow books, take books from the local library, and read to the child. Parents who have reading problems are less likely to expose themselves to this world of literacy, so their children are likely to be reared in a less literate environment. Those same children are also more likely to have reading problems themselves and to prefer nonreading activities. Thus, the reading abilities of parents are likely to be correlated with the reading abilities of their children and with the environments parents provide for their children—a positive genotype–environment effect. Of course, parents can provide interventions, such as tutoring for reading disabilities, that will result in a negative genotype–environment correlation for the duration of the treatment. It is, however, unlikely that such interventions last long enough or have sufficient effects to alter the generally positive $g \rightarrow e$ effect for most children, most of the time ([Scarr, 1985](#)). Without professional intervention, most difficult children, for

example, are likely to receive irritable parenting most of the time ([Lytton, 1990](#)).

Second, each person at each developmental stage evokes responses from others that positively or negatively reinforce that person's behaviors. Evocative effects have profound influences on a person's self-image and self-esteem throughout the lifespan. Smiling, cheerful infants who evoke positive social responses from parents and other adults ([Wachs & Gruen, 1982](#)) seem likely to form positive impressions of the social world and its attractions. Infants who are fussy, irritable, and who evoke negative or neutral responses with their caregivers and others would seem less likely to form the impression that social interactions are a wonderful source of reinforcement. Young children who exceed their parents' patience for hyperactive behaviors can evoke environments that are punitive or that reward misbehaviors ([Anderson, Lytton, & Romney, 1986](#); [Lytton, 1990](#)). Schoolage children from disadvantaged families who are more intelligent and more spunky ([Garmezy, Masten, & Tellegen, 1984](#)) are more likely to be given positive attention and encouragement by teachers than less intelligent or less spunky children. And it is well known that adults considered to be physically attractive by others evoke positive responses in dating and mating rituals and in employment situations that less attractive people do not enjoy ([Bersheid & Walster, 1974](#)). Thus, people's own characteristics evoke responses from others that are correlated with that person's developmental status and individual differences—for better and for worse.

Third, each person makes choices about what environments to experience. Past infancy, people who are in a varied environment ¹ choose what to attend to and what to ignore. Depending on their personal interests, talents, and personalities, people choose pursuits, whether educational, occupational, or leisure activities. Children who are athletic but not scholarly gravitate toward playing fields and read less than children who are less athletic but more skillful readers. Musical children are attracted to opportunities to play instruments and participate in musical activities. There are no surprises here; only commonly observed correlations that this theory makes explicit and explains.

Fourth, as cognitive psychology (e.g., [Piaget, 1954](#)) has shown repeatedly, people *construct* their own experiences from available environmental opportunities, in accord with their developmental levels and their individual differences in intelligence, personality, and interests ([Scarr, 1992](#)). People who differ in personal characteristics do not see the world in the same ways and do not process information or react emotionally in ways that are similar.

Competing Theories

Two kinds of social environmental explanations have been offered to account for variation in child development: opportunity and socialization. Each explanation appeals to a different level of environmental organization; the opportunity hypothesis usually refers to social class differences and more recently has been used to refer to the effects of poverty ([Houston, McLoyd, & Garcia Coll, 1994](#)). *Socialization* refers to parenting practices by individual families that enhance or deter development.

Opportunity Differences

Differences in development are hypothesized to arise from differences in *opportunities* to learn that are afforded by different social classes and from differences in the support that poor families offer to their children, compared to middle-class families. In this view, social classes are environmentally different rearing environments. Because in theory they are less stressed and more competent socioeconomically advantaged parents can provide their children with better opportunities and support, not only in the home but in the community, neighborhood, and schools, as well as other advantages that are associated with higher social status. This hypothesis does not address individual variability among children reared in the same social class groups.

Socialization hypotheses propose that differences in development arise from differences in parenting practices ([Darling & Steinberg, 1992](#); [Steinberg, Dornbusch, & Brown, 1992](#)). Social class differences in children's development arise not so much from differences in opportunities as from average differences in parental behaviors. The opportunity hypothesis is compatible with the socialization hypothesis, because parents in different social classes are said to behave differently toward their children, as well as provide different opportunities. Melvin Kohn's ([Kohn, 1969](#); [Kohn, Naoi, Schoenbach, & Schooler, 1990](#)) theory of social class differences in socialization bridges the theoretical gap between social-class-as-opportunity and social-class-as-socialization by asserting that parents at different locations in the social structure value different outcomes for their children and socialize them for different roles in the society. Working-class parents favor obedience and conformity; middle-class parents socialize their children for independence and achievement. The *conflict perspective* in sociology makes similar assumptions: that groups in different social strata value different outcomes and socialize children differently. Thus, on average, social class groups are said to vary in socialization practices. [Marjoribanks \(1987\)](#) proposed that social status and socialization concepts should be kept separate, because social status groups do not provide homogeneous family environments; for example, he cited [Kahl's \(1961\)](#) distinction between "getting by" and "getting ahead" families within lower social class groups, the effects on intellectual and academic achievements of which may be quite different.

For the past 50 years, thousands of articles and books have been written in psychology about the effects of parents as socializing agents on their children (see [Bandura, 1977](#); [Baumrind, 1993](#)). Parents are, of course, not the only socializing influence on children, because other adults in the family, siblings, peers, teachers, and religious leaders all transmit cultural knowledge to developing persons. Socialization can be thought of as a lifelong learning experience, as people continue to be socialized into new niches throughout life. However, socialization theories assert that parents of young children have special status as socializing agents ([Maccoby, 1992](#)) because of their superior status and competencies relative to their children and because early experiences are believed to be especially powerful in determining later behaviors (e.g., [Hunt, 1961](#); [Wachs & Gruen, 1982](#)).

Behavior genetic theory is focused on both genetic and environmental causes of individual variation in intelligence and other characteristics in populations (see [Scarr, 1993](#)). Behavior genetics is not the study of species invariants or of gene-action pathways that affect behaviors. Rather, behavior genetics studies sources of variation in populations. It makes predictions about parental influences on children from both genetic and environmental (both biological and social) transmission (see [Rowe, 1994](#); [Segal, 1993](#)). Environmental transmission includes both social environmental differences *between families* in opportunities and parental styles and other, often unknown environmental differences *between siblings* in the same family. Behavior genetic studies aim to sort out what influences have what effects in what populations.

Behavior genetic theory includes four sources of potential intellectual variation: within-and between-family genetic variations and within-and between-environmental variations. To make the contrast with social environmental theories clear, I will stress the role of *genetic transmission* to account for individual differences. It is on the issue of genetic transmission that behavior genetic theory is most distinguishable from social environmental theories.

Theoretical Predictions

At the general theoretical level, social environmental theory states that opportunity differences by social class and parental child-rearing styles are powerful determinants of children's development. Brighter, better adjusted children come from more affluent, better educated families in which the parents' occupations have more self-determined activities ([Kohn et al., 1990](#)) and in which parents provide more developmental support. For example, computer programmers work on projects in which they structure the tasks, whereas data entry clerks must follow a predetermined sequence of work and are probably timed for efficiency. Parents of a higher social class value their

children's independence, whereas parents of a lower class value obedience and conformity more. Thus, there is a tie between social class opportunity theory and socialization theory through parental rearing styles. *Authoritative* parents set limits and negotiate with their children in a democratic fashion; *authoritarian* parents issue orders, expect obedience, and enforce parental wishes. In socialization theory, authoritative rearing styles are hypothesized to create higher achieving, more socially competent children than authoritarian, permissive, or uninvolved styles, but parental styles are not necessarily tied to social class groupings.

From theoretical statements about social environmental theory, more specific hypotheses are generated. Baumrind summarized this set of hypotheses:

Among the well-researched mediating processes invoked . . . to explain how parental influence “works” to produce competent children are the following: high-level distancing behaviors; scaffolding; minimum sufficiency principle; induction; elaborated and person-centered communication; effective behavior management, including consistent discipline and careful monitoring; high level of commitment and investment; and modeling reciprocity and prosocial, agenic behavior by balancing what is demanded of, and what is offered to, the child. (1993, p. 1311)

From these statements, specific predictions can be made about what will be observed in family studies; by family studies, I do not mean the study of ordinary biological families only, because, taken alone, they are not at all informative about the putative effects of opportunity differences or socialization practices (see [Rowe, 1994](#); [Scarr, 1993](#)). A requirement for theory-relevant observations is that they must allow a critical test of the theory: If socialization practices are critical to children's intellectual and academic development, then genetic transmission of intelligence from parent to child must be controlled or varied to rule out the major competing hypotheses from behavior genetic theory. If social class differences are crucial to opportunities for intellectual and academic attainments, then we must look at genetically unrelated children reared in different social class groups or at twins and biological siblings reared in different social class families.

Thus, the specific predictions that differentiate social environmental theories from behavior genetic theory are that (a) children reared in different social classes will differ in IQ and academic achievement, even if they are

genetically related; (b) children reared in different homes will not resemble each other in intelligence or academic achievement, even if they are genetically related, unless their parents use similar rearing practices; (c) adopted children reared by the same parents will be similar in intelligence and academic achievement because their parents use similar rearing practices, and (d) authoritarian rearing style causes children to have lower intelligence and poorer academic achievement than authoritative rearing style, regardless of parents' intelligence.

Behavior genetic theory, at a general level, states that genetic differences are a major source of intellectual differences among children, regardless of parental rearing styles, unless parents are abusive or seriously neglectful ([Scarr, 1992, 1993](#)). The theory proposes that in societies such as Western democracies in which most children's opportunities for learning intellectual skills and knowledge are many and varied, individual difference in intelligence will result more from genetic differences than from differences in opportunities. A second proposition is that, given a variety of opportunities, people construct their own experiences ([Scarr & McCartney, 1983](#); [Scarr & Weinberg, 1983](#)), and those constructions are to a large extent expressions of their individual personalities, interests, and talents.

Specific predictions from behavior genetic theory focus on the extent that parents, children, and siblings are genetically related, with little similarity when family members are genetically unrelated even though reared in the same homes. Parental rearing styles, short of abuse and neglect, are predicted to be unimportant as a determinant of developmental differences among children. Rather, parental rearing style is predicted to be a manifestation of parental intelligence, personality, and adjustment that are transmitted to children, in part, genetically. Observations of families with different degrees of genetic and environmental relatedness provide critical tests of socialization and behavior genetic theories by testing specific predictions made from the theories.

Observations From Opportunity Studies

Social Structure, Opportunities, and Achievements

Observations of social class differences in intelligence and achievement are as old as Plato, and their origins are still being debated. Social environmental and behavior genetic theories make very different predictions about the effects of historical and social-demographic change on the socioeconomic-IQ connection. Regardless of theoretical motivation, however, studies of the phenomenon abound and produce remarkably consistent observations (see [Jensen, 1980](#), for a review), not just in the United States but in other free enterprise nations such as Great Britain (e.g., [Essen, Fogelman, & Ghodsian,](#)

1978), Australia (e.g., [Marjoribanks, 1987](#)) and Israel (e.g., [Zeidner, 1988](#)); in socialist countries such as Sweden (e.g., [Harnquist, 1989](#)) and Denmark (e.g., [Teasdale & Owen, 1984a, 1986](#)), and in developing countries such as Thailand and Malawi ([Lockheed, Fuller, & Nyirongo, 1989](#)). In all these diverse settings, higher socioeconomic status is observed to be associated with higher levels of intelligence and academic achievement for adults and for their children. At issue are the competing theories to explain such ubiquitous observations.

Socioeconomic status must be differentiated from race and ethnicity ([Houston et al., 1994](#); [Jensen, 1980](#); [Scarr, 1981](#); [Scarr-Salapatek, 1971](#)), because of the critical difference between populations defined by ethnicity and groups defined by social class: That difference is *individual socialmobility*. Individuals do not migrate between ethnic and racial groups by virtue of individual characteristics, such as intelligence and academic achievement. For that reason, genetic variability remains largely within ethnic and racial groups but flows among social classes, especially across generations ([Waller, 1971](#)). Opportunities to acquire the dominant culture may be less available to racial and ethnic minorities than to majority- or dominant-group members (Ogbu, 1988; [Scarr, 1993](#); [Scarr & Weinberg, 1976](#); [Scarr-Salapatek, 1971](#)); this hypothesis is not further considered in this review because there are no definitive data to test competing hypotheses about between-race differences ([Herrnstein & Murray, 1994](#); [Levin, 1994](#); [Lynn, 1994](#); [Waldman, Weinberg, & Scarr, 1994](#)). Whether *opportunities* to acquire the skills and knowledge sampled on tests and rewarded in schools varies by socioeconomic status *within* racial and ethnic groups is the hypothesis to be tested.

Observations to Be Explained

In the United States, IQ test scores among adult Euro Americans typically vary by more than a standard deviation from the lowest socioeconomic status group to the highest ([Astone & McLanahan, 1991](#); [Herrnstein & Murray, 1994](#); [Jensen, 1980](#); [Lamborn, Mounts, Steinberg, & Dornbusch, 1991](#)). IQ and achievement test score differences among children born into these socioeconomic status groups are typically less—about one half to three quarters of a standard deviation—a phenomenon called *regression toward the genetic mean of the population*. Whereas adults who have achieved the highest occupational statuses average IQ 120, unskilled workers average about IQ 90. Professional-status parents have children who average about IQ 115, whereas lower socioeconomic-status parents have children who average about IQ 95. Correlations between adult IQ and socioeconomic status average about .40; correlations for children's IQ with parental socioeconomic status average about .33 ([White, 1982](#)).

From a longitudinal survey of national school achievements in Great Britain,

[Essen and colleagues \(1978\)](#) reported on mathematical and reading achievements by social class from primary grades to age 16. Both levels of achievement and patterns of improving and deteriorating performance were analyzed. Children of nonmanual (white-collar) families were far more likely to have high than middle or low scores on both reading and math achievement at all grade levels. Furthermore, students from nonmanual families were more likely to show improving scores, whereas students from manual families were more likely to show decreasing achievements across the school years. Children from families in which fathers and mothers stayed in school beyond the minimum school-leaving age were much more likely to have high math and reading scores (76%) than low scores (10%); children whose parents left school at age 16 years showed the opposite pattern (37% high achievers and 40% low achievers).

Achievement data were reported from Australia on a sample of 11-year-olds ($N = 1,000$; [Marjoribanks, 1993](#)). A difference of one half to three fourths standard deviation was reported between ability and achievement test scores of children from working- and middle-class families. In another report on the same sample ([Marjoribanks, 1987](#)), correlations of parents' social status were .34 with children's ability, .33 with reading comprehension, and .28 with word knowledge. [Zeidner \(1988\)](#) reported similar differences between seventh-year Israeli students on scholastic ability tests. Middle-class children scored .55 standard deviation above working-class children on the verbal test and .46 standard deviation above working-class children on the nonverbal test.

In all studies motivated by opportunity theory, the observed correlations between socioeconomic status and IQ—achievement or the mean difference in IQ—achievement by socioeconomic status is explained as evidence of differential opportunity afforded children reared in higher and lower social class families, with their associated differences in neighborhoods, schools, peer groups, and the like. Opportunity theory has gone unchallenged and has been pronounced the “obvious” explanation *sui generis* of these ubiquitous observations.

Differential Opportunities Versus Making One's Own Environment

A truism about sources of variability in intelligence or any other trait is worth pondering. In a completely fair, equitable world, all individual differences would have a genetic origin, because there would be no arbitrary environmental differences [2](#) to create phenotypic variability. In an unfair world, arbitrary environmental differences in opportunity give some individuals better chances than others to acquire the skills and knowledge sampled by IQ tests

and rewarded in schools ([Scarr & Weinberg, 1976](#)). Such environmental unfairness also reduces the heritability of a trait in that population by preventing phenotypic expression of genetic variability ([Fischbein, 1980, 1990](#); [Scarr-Salapatek, 1971](#)). When heritability of a trait in a population is high, it necessarily follows that observed differences in environments have little impact on observed variability. When heritability is low, environmental differences (of some kind) must be implicated.

Behavior genetic theory predicts that the effects of more equal opportunities are (a) to increase the correlation between IQ–achievement and social class by increasing social mobility by IQ–achievements, thereby increasing the association between IQ–achievements and social class, and (b) to increase the heritability of IQ–achievements by reducing arbitrary sources of environmental variance. Genetically informative studies of twins and adoptees in Denmark ([Teasdale, 1979](#); [Teasdale & Owen, 1981](#); [1984a](#); [1984b](#); [1986](#); [Teasdale, Owen, & Sorensen, 1988](#); [Teasdale, Sorensen, & Owen, 1984](#)), Norway ([Perusse, Neale, Heath, & Eaves, 1994](#)) and Sweden ([Lichtenstein, 1993](#); [Lichtenstein et al., 1992](#); [Sundet, Tambs, Magnus, & Berg, 1988](#)) show historical increases in the heritability of IQ and educational attainments with increasing educational opportunities, especially after World War II, and increasing correlations of abilities–attainments with social class across this century. In the least controversial section of *The Bell Curve*, [Herrnstein and Murray \(1994\)](#) reviewed U.S. data on the increasing correlation of IQ with selection into higher education and prestigious occupations across this century, as individual merit replaced privileged family background as the primary determinant of adult achievements. Higher heritability and greater association between socioeconomic status and IQ–achievement result from more equitable opportunities and more equal environments.

Gender differences in educational attainments were also used to test the effects of more equal opportunities in Sweden, where women who are now 60 years of age or older had fewer educational opportunities by ability than younger women, and women had fewer opportunities than men throughout the century until quite recently ([Lichtenstein, Pedersen, & McClearn, 1992](#)). Results showed higher heritabilities for educational achievement among the younger than older men, among younger than older women, and among men than women. Among younger cohorts in societies that currently have excellent universal educational opportunities, studies in Sweden ([Fischbein, 1980, 1990](#); [Fischbein & Guttman, 1992](#)), Denmark ([Teasdale & Owen, 1981, 1984a](#); [Teasdale, Sorensen, & Owen, 1984](#)) and Norway ([Heath, Eaves, Nance, & Corey, 1987](#); [Sundet et al., 1988](#)) show a secular trend toward higher heritabilities as more equal opportunities have prevailed and increasing associations between social class and genetic differences in ability and achievement. In contrast, correlations between ability–achievement with family background measures declined for genetically unrelated persons.

Within the United States, correlations between social class and IQ–academic achievement are consistently higher in the Euro American than in the African American population ([Brown, Mounts, Lamborn, & Steinberg, 1993](#); [Durbin, Darling, Steinberg, & Brown, 1993](#); [Scarr, 1981](#)). The degree to which social class is correlated with differences in intelligence and achievement seems to depend on the recent history of equal opportunities across classes. *The more equal the opportunities to learn and achieve, the higher the correlations between IQ–academic achievement and social class.* How is this observation explained? If opportunity differences among social classes determined differences in intelligence and achievement, more equal opportunities across classes should generate the *opposite* result; that is, more equal outcomes and lower correlations between abilities–achievements and social class.

Do opportunity differences explain the socioeconomic status-to-IQ–achievement connection in children’s outcomes in European and North American populations today? Because studies generated by opportunity theory have not used genetically informative designs, most studies of the socioeconomic status-to-IQ–achievement connection do not reject either one or another competing theory. Data generated by behavior genetic theory address the competing predictions and provide results that challenge the opportunity hypothesis. Data to be presented later in this article will show that opportunity theory is unable to account for critical observations from adoptive families.

Observations From Socialization Studies

Observations to Be Explained

Parental rearing styles, observed and reported by family members, have often been found to correlate with child outcomes, including intelligence and school achievement. A recent study serves as an exemplar of the genre ([DeBaryshe, Patterson, & Capaldi, 1993](#)). This well-designed study demonstrates problems with causal inference, in the face of competently conducted, causal analyses, because issues of genetic transmission are not addressed.

This study predicted academic achievement among 206 boys at risk for conduct disorder from parental rearing styles, parental Wechsler Adult Intelligence Scale—Revised (WAIS–R) IQ and education, and earlier measurements of the youths’ own behavior problems and academic achievement. The authors proposed seven latent variable models to be tested for best fit. The report made clear that the preferred a priori model, which focused on parental discipline and conduct disorder, was not the best model fit to predict academic achievement differences among these boys. *The best model was the only one that included a direct path from parents’ IQ and education to youths’ academic achievements.* I suspected that an even better

fit would be obtained with the very simple causal model of the transmission of parental achievements (IQ, education) to adolescents' academic engagement and academic achievement, ignoring the socialization variables. This proved correct. One direct effect and one indirect effect (via academic engagement) of parental intelligence and education on offspring academic achievement fit the data better than any model with socialization variables. The observation the authors ultimately could not avoid, which they included in just one of the seven models, was that the highest correlate of youths' academic test scores was parental WAIS-R IQ ($r = .424$).

Observations from studies inspired by social environmental theories are accounted for as well or better by behavior genetic theory, especially when additional facts about genetic variability in achievements are considered. By testing for both environmental and genetic effects, for distal as well as proximal causes of variation, behavior genetic theory more fully accounts for the observations generated by socialization and social class research than does social environmental theory itself.

Observations From Behavior Genetic Studies

Behavior genetic studies are characterized by designs that allow inferences about both environmental and genetic sources of variation. If the ecology of rearing environments (including home environments, neighborhoods, communities, and social classes, all of which are shared by family members) are important determinants of variation, then people reared together will resemble each other, to some extent, regardless of genetic relatedness. If, in addition, genetic resemblance plays a role in determining phenotypic resemblance, then genetic relatives will resemble each other, regardless of whether they were reared in the same environment or not. If family members are individually variable apart from environmental differences between their families and in addition to genetic variability, then unique or nonshared environments (including biological as well as social environments) and measurement error are implicated.

As described earlier, adoptive and biologically related families, identical (MZ) and fraternal (DZ) twins reared in the same and different homes, and more recently step-families with full-, half-, and unrelated sibling have been studied. [Table 1](#) shows a summary of analyses of nine studies of the Big Five personality traits. Contrary to social environmental hypotheses, genetic variability and within-family environmental differences account for nearly all differences in personality. Growing up in one family versus another had little effect on personality variability. [Table 2](#) provides a summary of family correlations on IQ tests and the first principal component from batteries of tests of cognitive abilities.

Parameter Estimates for the Big Five Personality Dimensions

Intelligence Test Correlations of Siblings From Behavior Genetic Studies of Biological and Adoptive Families and Twins (Adolescents and Adults)

Correlations of Relatives: IQ and Achievement

Relatives resemble each other intellectually to the extent they are genetically related, and genetic relatives reared in different homes are somewhat less similar intellectually than those reared in the same homes. Adopted adolescent and adult siblings, reared together since early infancy, are no more similar in intelligence than randomly chosen people in the same populations. In North American and Western European populations, the heritability of IQ past childhood is quite high (about 70%), with small effects of differences between families, which would include opportunity differences by social class and most parental socialization differences. ³ The unexpected finding is that most of the environmental variation is found in unique, individual experiences that siblings do not share (that is, environments that make siblings dissimilar). Analyses of these family data in simple heritability and in multivariate models can be found in many sources (e.g., Bouchard, Lykken, Tellegen, & McGue, 1996; [Plomin, 1990](#); [Scarr, 1992](#)) and will not be undertaken here. Heritability of IQ test scores has been repeatedly estimated to be between 60% and 80% of the variation in Western European and North American White populations.

Socialization theory, focused on parental rearing practices, which presumably vary mostly *between* families, accounts for less than 10% of the variation in intelligence in these populations. Studies of MZ twins reared in different homes (MZAs) illustrate this point most remarkably. Five studies that span 60 years all point to the same conclusion: Being reared in most homes provides equivalent opportunities for development. Thus, the high correlations between IQ scores of MZAs, as shown in [Table 3](#), is not surprising.

Sample Sizes and Intraclass Correlations for all IQ Measures and Weighted Averages for Six Studies of Monozygotic Twins Reared Apart

Note that each of the five studies included more than one set of cognitive tests or IQ tests, which further reinforce the overall consistency of the results. The general intelligence correlations of MZ twins reared in different homes range from .74 to .78, with a median value of .75. Rarely can one find such consistency in social science data across time, history, and cultures. The implications of these results are that the heritability of general intelligence in these European and North American populations over this half-century accounts for approximately three fourths of the IQ variance and nonshared environments plus measurement error account for about one fourth.

Critics of the studies of separated twins often focus on alleged similarities in the twins' rearing experiences, on the fact that most pairs have met in adulthood, and on other contact and environmental correlations in their backgrounds. The investigators of the Minnesota Study of Twins Reared Apart ([Bouchard, Lykken, McGue, Segal, & Tellegen, 1990](#)) and the Swedish Adult Twin Study of Aging (SATSA; [Pedersen, Plomin, Nesselroade, & McClearn, 1992](#)) have dealt systematically with such criticisms and have shown them to have little or no effect on the IQ and personality test results. In addition to gathering data about the objective circumstances of the twins' rearing environments (e.g., parental educational and occupational levels, material possessions in the homes), these investigators also gathered *perceptions* of the twins about their rearing environments, using instruments such as the Family Environment Scales ([Moos & Moos, 1981](#)).

[Jensen \(1996\)](#) has argued that "environmental" effects may not be the psychosocial variables psychologists primarily think of when they consider sources of nongenetic variance. Rather, various biological pre- and postnatal insults may account for a large part of the nonshared environmental effects on intelligence in populations studied. For example, studies of birth weight differences between MZ twins have shown that the lighter twin more often scores lower on later IQ tests than the heavier twin, thereby implicating prenatal developmental environments to account for intrapair IQ variability ([Guttman, 1994](#); [Scarr, 1983](#)).

Younger and Older Adoptees

Early studies of adopted children, which examined their similarities to their rearing family members, compared to biological offspring and their family members, included only young children with an average age of 8 years (e.g., [Burks, 1928](#); [Leahy, 1935](#); [Horn, Loehlin, & Willerman, 1980](#); [Scarr & Weinberg, 1976](#)). Studies of young adoptees found that genetically unrelated children's IQ scores correlated .24 on average with that of their adoptive parents and .34 with that of their unrelated siblings. Although biological relatives had correlations in the .40 to .55 range, heritability estimates based on adopted children were much lower (.4 to .6) than those based on (adult) twins reared together and apart. Further, the correlation of unrelated siblings is a direct estimate of the magnitude of shared environmental effects, which were found to be negligible in twin studies but which accounted for about 25% of the variation in adoption studies. The mystery of inconsistent results was solved when [Scarr and Weinberg's \(1978, 1983\)](#) study of older adolescent and young adult adoptees found IQ correlations of $\sim .03$ for older, unrelated sibling pairs and adoptive parent-child correlations of $< .10$. Shared environmental effects for young adults match the null to small effects estimated from twin studies. With biological siblings' IQ correlations at .35 and biological parent-child correlations at .40, heritability estimates for WAIS IQ in the older samples approached those of the twin studies (.76 and .70).

Results of the Minnesota Adolescent Adoption Study have been replicated by three other adoption studies of older adolescents and adults adopted in infancy ([Loehlin, Horn, & Willerman, 1989](#); [Kent, 1985](#); [Loehlin, 1996](#); [Teasdale & Owen, 1984a](#)). Two adoption studies have reported longitudinal data from childhood to adulthood. The Texas Adoption Project ([Horn et al., 1989](#); [Loehlin, in press](#)) found that genetically unrelated siblings' IQ correlations declined from .17 at age 8 years to -.02 at the average age of 18 years. The Minnesota Transracial Adoption Study ([Scarr, Weinberg, & Waldman, 1993](#)), which included adoptive families with at least one African American child, found that adopted siblings' IQ correlations decline from .34 to .13. Although .13 was significantly different from 0, the IQ correlation of the transracial adoptees at age 18 years was also significantly lower than their IQ correlation at the average age of 7 years.

The original finding ([Scarr & Weinberg, 1978](#)) of null resemblance between adopted siblings in late adolescence and early adulthood inspired the theory of genotype → environment effects ([Scarr & McCartney, 1983](#) : [Scarr & Weinberg, 1983](#)). The theory predicts increasing heritability and declining effects of shared environments as people increasingly choose and make their own environments, rather than being strongly influenced by the home environment provided by parents. To test the theory, [McCartney, Harris, and Bernieri \(1990\)](#) conducted a meta-analysis of twin studies on IQ and personality to evaluate the effects of research participants' age on heritability estimates. They found a correlation of .30 between increasing age and increasing heritabilities and evidence for declining effects of shared environments consistent with our theory ([Scarr, 1992](#); [Scarr & McCartney, 1983](#)). Differences in socialization history have apparently negligible effects on the development of intelligence and personality past childhood in European and North American individuals who are not deprived of opportunities to acquire developmentally appropriate experiences.

Thus, opportunity theory, which relies on correlations in biologically related families to make inferences about social class differences in opportunities, fails to account for the data from behavior genetic studies of twins and adoptive families. Observed differences in intelligence by social class in European and Euro American populations are not primarily results of differences in opportunities to acquire the skills and knowledge valued by the dominant culture. In the same way, socialization theory, which focuses on shared rearing environments, fails to account for the lack of such effects on intelligence or personality past childhood. Behavior genetic research offers strong evidence that differences in intelligence by social class arise, in large part, from genetic variability and not from differences in opportunities to learn in families that are not abusive, neglectful, or culturally different.

The unpalatable fact, generated by behavior genetic theory from the

observation of parent–child IQ correlations in adoptive and biologically related families, is that adults in different social class groups are not genetically equal, nor do children from different social class groups, on average, have equal intellectual potential ([Herrnstein, 1973](#); [Herrnstein & Murray, 1994](#); [Scarr & Weinberg, 1978, 1983, 1994](#); [Weinberg, Scarr, & Waldman, 1992](#)). Because between-family environmental effects have been shown over and over again to be quite small, social class differences must be largely genetic and to some extent heritable.

Genetic Effects on Environments

Socialization theory has ignored the confounding of genetic and environmental variability reported for the most common measures of family “environment.” Because family members report *perceptions* of the family environment, and because individual differences in social perception are partly genetic, measures of family environments such as the Family Environment Scales (FES; [Moos & Moos, 1981](#)) and the HOME scales ([Caldwell & Bradley, 1984](#)) are partly heritable. In fact, there is considerable evidence that popular measures of family environments such as the HOME Scale and the FES are confounded by genetic differences among parents ([Bouchard & McGue, 1990](#); [Chipuer, Plomin, Pedersen, McClearn, & Nesselroade, 1993](#); [Deal, Halverson, & Wampler, 1994](#); [Hetherington, Reiss, & Plomin, 1994](#); [Jang, 1993](#); [Plomin, 1994](#); [Plomin & Bergeman, 1991](#); [Plomin & Daniels, 1987](#); [Plomin, Loehlin, & DeFries, 1985](#); [Plomin, McClearn, Pedersen, Nesselroade, & Bergeman, 1988, 1989](#); [Plomin & Neiderhiser, 1992](#); [Plomin, Reiss, Hetherington, & Howe, 1994](#); [Rowe, 1981, 1983, 1994](#); [Rowe & Plomin, 1981](#)). By comparing the similarities in perceptions of the family environment among families with identical twins, first-degree relatives, and adopted relatives, behavior genetic analyses show that genetic similarities affect the similarity of perceptions of relationships in the family on major dimensions of parenting (warmth and control) and on intellectual stimulation in the home. Most striking is the finding that, as adults, identical twins reared apart (MZAs) perceived their rearing families to have been as similar as those of fraternal twins reared together, even though the MZAs were reporting on *different* families! The different families recalled by MZAs were not as similar as the same family reported by MZs reared together but were considerably more similar than the memories of DZs reared apart. Thus, the heritability estimates for various FES scales for the adult twins' rearing environments ranged from .15 to .35 ([Plomin et al., 1988](#)). When reporting on rearing practices with their own children, the adult MZAs were as similar as adult MZTs (those pairs reared together), and both MZ groups reported more similar child-rearing practices than DZ twins ([Plomin et al., 1989](#)). Heritabilities of the FES scales for adult twins rating their offspring families ranged from .12 to .40 ($Mdn = .26$). Both parents' and offsprings' perceptions, measured when the offspring were adolescents to older adults, show that 25% to 50% of the variability in measures of perceived family environments

are a result of genetic variability.

Perhaps one could dismiss these results as *perceptions* of the family environment that show merely that genetic differences affect people's perceptions of relationships and emotional climates in their homes. It is fortunate that there are four observational studies of parent-child interactions that provide similar evidence of genetic effects on family environment. In the largest study ever done of genetic contributions to family environments, [Plomin, Reiss, Hetherington, and Howe \(1994\)](#); also reported in [Plomin \(1994\)](#) found large effects for genetic differences (52% to 64% of the variance) and nonshared environments (25% to 37%) in adolescents' positivity and negativity in interactions with family members, scored from videotaped observations. It is strange to note that the shared environment (all of the sibling and twin pairs in this study were reared in the same homes) accounted for only 0% to 23% of the variance in adolescents' interactions. Parental positivity and negativity in interactions with their adolescent children showed more shared environmental effects (34% to 63%) and lesser effects of genetic differences among the children (0% to 38%) and nonshared environments (19% to 34%).

Additional data about genetic effects on other aspects of children's rearing environments are also revealing. Peer relationships and the choice of peers have been shown to be genetically variable ([Plomin, 1994](#); [Rowe, 1981, 1983](#)), undercutting some rather convoluted environmental arguments (e.g., [Brown, et al., Durbin, et al., 1993](#)). Perhaps this result is not surprising, because children do choose their peers, but they cannot choose their family members. Whereas genotype-environment correlations in biologically related families may be of the passive type, peer relations may show the active and evocative types ([Plomin, 1994](#)). Adolescents' ratings of positive peer and teacher relationships were moderately heritable (.31 and .38), but parents' ratings of their adolescents' popularity with peers and the delinquent, drug abusing, or college-bound orientation of peers showed more heritability than parent ratings of the family environment. For separate mother and father ratings, the heritabilities of peer popularity were .62 and .73, respectively; for peer college orientation, .73 and .85; for peer delinquency, .70 and .49, and for peer substance abuse, .72 and .74 ([Plomin, 1994](#), Table 3.5 p. 86). Effects of shared environments on adolescents' peer relationships, based on the correlations of genetically unrelated siblings in the same family, were small to moderate (.00 to .42; $Mdn = .13$). Finally, evidence of genetic effects emerges from four observational studies of parenting and sibling behavior using child-based genetic designs. The results from these observation studies suggest that the genetic contribution to measures of the family environment is not limited to subjective processes involved in questionnaires. Genetic effects appear to be not just in the eye of the beholder but also in the behavior of the individual.

Implications of Behavior Genetic Studies for Parents and Policy Makers

Similarity in intelligence among biological family members does *not* arise from growing up or living in the same household (Plomin & Daniels, 1987; Scarr & Grajek, 1982; Scarr & Ricciuti, 1991). Parents' child-rearing styles, such as Baumrind's *authoritative*, *authoritarian*, *permissive*, and *uninvolved* classifications are certainly genetically variable. *Permissive* parents fail to set limits or to enforce behavioral standards; *uninvolved* parents ignore their children's needs for socialization. Parental styles are, after all, parental behaviors, for which there is a great deal of evidence for moderate heritability (Perusse, Neale, Heath, & Eaves, 1994). Parent behaviors reflect intellectual and other personal differences among people, and the proportion of genetic variance in those characteristics repeatedly has been found to be 50% to 90%, with much of the remaining nongenetic variance a result of individual experiences.

Attention of behavioral scientists has been focused on differences among families in the opportunities and support they provide for their children. Beginning with family differences in social class, it has been assumed that observations of ubiquitous correlations between family education, occupational status, and income and children's outcomes were caused by differences among families' *environments* (Scarr, 1985). It is clear that there are family differences, but it is also clear that most of those differences are not environmental. Among families in the mainstream of Western European and North American societies, differences in family environments seem to have little effect on intellectual and personality differences among their children, *unless they are seriously deprived of opportunities and support*.

This point is worth pondering. How can it be that parents have little effect on the intellectual or personality development of their children? To parents who care, it seems impossible that this could be the case. Parents may have effects on children's self-esteem, ambitiousness, and other important characteristics, but parental *differences* in rearing styles, social class, and income have only small effects on the measurable *differences* in intelligence, interests, and personality among their children.

Family differences have been assumed to be *environmental* differences. Research on adoptive families and on twins suggest, however, that a large proportion of the differences between children from different families is related to genetic differences among parents, whose genetic variability is transmitted to their children. Thus, their children have different assortments of interests, talents, and personalities. Those differences among the children cause them to evoke different parenting and to take advantage of different opportunities inside and outside of the family.

The same body of behavioral genetic literature that illustrates the importance

of genetic variation also highlights the importance of environmental variation. One of the most striking findings from behavior genetic research is that, for a variety of traits, most of the environmental variance is contributed by nonshared environmental influences. *Nonshared environmental influences* are those that are not shared by members of a family; that is, they act to make members of a family different from one another. As [Plomin and Thompson \(1987\)](#) highlighted, this finding "implies that the unit of environmental transmission is not the family, but rather micro-environments within families" (p. 20).

Good Enough Parents

Good enough, ordinary parents probably have the same effects on their children's development as culturally defined super-parents. This gives parents a lot more freedom to care for their children in ways they find comfortable for them, and it gives them more freedom from guilt when they deviate (within the normal range) from culturally prescribed norms about parenting. There are children whose outcomes will not be desirable, regardless of the efforts of patient, nondemanding parents. There are children whose outcomes could be better if they had patient, supportive, nondemanding parents. However, most individual differences among children seem to be a result of their genetic differences and to the environments they evoke and select.

If I were to advise parents, I would say that the research supports the idea that parents need to provide *opportunities*, *not prescriptions* for their children. A rich and varied environment of opportunities afforded by the family will provide every child with the possibility of becoming the best he or she can be. For some parents with fixed ideas about their offspring's outcomes, this will be anxiety-provoking advice, but given that nearly all parents want their children to grow up to be well-functioning and happy adults, this is good advice, based on behavior genetic research.

Challenge to Policy Makers

Policy makers should be aware that the reinterpretation of opportunity and socialization theories, in light of behavior genetic theory and research, explains why educational interventions, such as Head Start ([Ramey & Ramey, 1990](#)) have disappointingly small effects on children's intellectual and educational development. Unless the children are being reared in abusive or neglectful homes, they probably have good-enough opportunities to acquire skills and knowledge without intervention. Early intervention programs may have other benefits for most poor children, but raising IQ and ensuring academic skills are not among them.

The reasons that interventions have disappointing results are genetic differences and genotype–environment correlations: Poorly educated, low-income parents are not a random sample of the population for intelligence or other achievement-related characteristics ([Herrnstein & Murray, 1994](#)). Such parents are likely to have below-average IQ scores, which are transmitted genetically to their children. Offspring of lower IQ parents score, on average, below children from higher IQ parents. Naturally occurring differences in environments between high- and low-income families reflect differences in parents' and children's abilities and achievements, which are best described as genotype–environment correlations. Thus, predictions of the effects of interventions, based on observed differences between poor and not-poor families, are unrealistic, because they ignore genetic transmission and correlations of environments with parents' and children's abilities.

A remarkably detailed, longitudinal study of low-income, working-class, and professional-class families ([Hart & Risley, 1995](#)) illustrates these points. Predictably, preschool children from low-income families did not develop language or cognitive skills at the same rate as working-class children, who lagged behind children from professional families. Voluminous samples of adult speech to children showed that professional parents used *three times* as much language (actual numbers of words spoken) in everyday interactions with their children as do low-income parents. Working-class parents' language use was twice as frequent as that of poor parents. Needless to say, more parental language was associated with children's better language and cognitive development.

What can be inferred from these naturally occurring correlations between parents' behaviors and children's outcomes? [Hart and Risley \(1995\)](#) calculated that, *even if parental language use were the effective difference, and if poor parents could be taught to behave like professional parents*, there would not be enough waking hours in a child's life to bring the language and cognitive levels of poor children to the levels naturally achieved by professional-class children. *If language environments were the effective intervention*, a program to bring poor children up to language and cognitive levels of working-class children would require 43 hours of programmed language intervention per week! The authors recognized that genetic difference may play a role in the enormous differences in language and cognitive development among poor, working- and professional-class children and that interventions of this magnitude are not feasible.

More intelligent parents naturally provide more stimulating rearing environments, which are correlated with their children's abilities, and more intelligent children naturally evoke and select more intellectually stimulating environments than less able children. Intervention programs that merely recreate environments that intelligent parents provide for their children, and

deliver them to less able children, cannot have the magnitude of effects that naturally occurring correlations would seem to predict. These unpopular, even unpalatable, conclusions follow from the recognition of genetic variability in abilities and achievements and genotype–environment correlations, but they do not deter us from providing good-enough environments for children who currently do not have them.

All children benefit from supportive environments with varied opportunities to learn. Adoptive studies show that most nonminority children in North American and Western European nations currently have environments that meet those criteria. Supportive environments with varied opportunities to learn do not produce the same intellectual and academic outcomes for all children who experience them, because children are genetically variable and because children produce their own experiences from the environments to which they are exposed. Merely redistributing environments that *appear* to be better, because they are correlated with better outcomes, to children whose environments *appear* to be worse will have only small effects on the current distributions of abilities and achievements.

Venturing advice to policy makers, I believe the most beneficial policies ensure that all children have supportive environments with plentiful opportunities to learn and to feel appreciated as individuals. Some families do not afford their children support and opportunities, so that the larger society must make these available. Unless children have opportunities and support, their development will not be optimal. Individual differences among most children, however, who grow up in supportive environments, arise primarily from genetic variability and correlated experiences that people make for themselves.

Summary

The traditional, widely held belief that observed resemblances between parents' social class and socialization practices and children's outcomes indicate environmental effects is highly questionable. Neither parents, nor their children, are randomly associated with the environments in which they are observed. It is now quite evident that children can and do influence their own environments. Unless children have seriously deprived and unsupportive environments, differences in their outcomes are caused more by children's own characteristics, which are moderately to highly heritable, than by differences in opportunities in their environments. Given objectively "similar" environments, not all individuals respond in the same ways. Such responses vary, based on characteristics that the child brings to the situation. Finally, I do not claim that differences in environments cannot influence differences among individuals in deficient and unsupportive situations. Every child deserves varied learning opportunities and emotional support for development. When parents do not or cannot provide these essential ingredients, others must step

in and do so.

Footnotes

1 The entire theory depends on people having varied environments from which to choose and construct experiences. The theory does not apply, therefore, to people with few choices or few opportunities for experiences that match their genotypes. This caveat applies particularly to children reared in very disadvantaged circumstances and to adults with little or no choice about work and leisure activities.

2 “Environmental” differences would still be observed, because different people would elect to spend their time and energy in different pursuits, in different locations, with different associates. Thus, one would still find a correlation between individuals’ abilities and achievements and their “environments,” because of genotype–environment correlations. But the environmental differences observed would result from their different genotypes and not be a cause of their variability.

3 Parental goals, styles, and practices are primarily characteristics of the parents ([Darling & Steinberg, 1992](#)), but they can vary between siblings in the same family and thus be a source of nonshared environmental variation ([Deater-Deckard, 1994](#); [Hetherington, Reiss, & Plomin, 1994](#)).

References

- Anderson, E. R., Hetherington, E. M., Reiss, D., & Plomin, R. (1994). *Parent’s nonshared treatment of siblings and the development of social competence during adolescence*. Manuscript submitted for publication, University of Virginia.
- Anderson, K. E., Lytton, H., & Romney, D. M. (1986). Mothers’ interactions with normal and conduct-disordered boys: Who affects whom? *Developmental Psychology*, 22, 604–609.
- Astone, N. M., & McLanahan, S. S. (1991). Family structure, parental practices and high school completion. *American Sociological Review*, 56, 309–320.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Baumrind, D. (1993). The average expectable environment is not good enough: A response to Scarr. *Child Development*, 64, 1299–1317.
- Bell, R. Q. (1968). A reinterpretation of the direction of effects in studies of socialization. *Psychological Review*, 75, 81–95.
- Bersheid, E., & Walster, E. (1974). Physical attractiveness. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 157–215). New York: Academic Press. .
- Bouchard, T. J., Jr., Lykken, D. T., Tellegen, A., & McGue, M. Genes, drives, environment and experience: EPD theory—revised. In C. Benbow & D.

Lubinski (Eds.), *Intellectual talent: Psychometric and social issues*. Baltimore: Johns Hopkins University Press. (in press)

Bouchard, T. J., Jr., Lykken, D. T., McGue, M., Segal, N. L., & Tellegen, A. (1990). Sources of human psychological difference: The Minnesota study of twins reared apart. *Science*, 250, 223–228.

Bouchard, T. J., Jr., & McGue, M. (1990). Genetic and rearing environmental influences on adult personality: An analysis of adopted twins reared apart. *Journal of Personality*, 58, 263–292.

Brown, B. B., Mounts, N. S., Lamborn, S. D., & Steinberg, L. (1993). Parenting practices and peer group affiliation in adolescence. *Child Development*, 64, 467–482.

Burks, B. S. (1928). Genetics and intelligence. *Twenty-seventh annual yearbook of the Society for the Experimental Study of Education*, 27, 212–347.

Caldwell, B. M., & Bradley, R. H. (1984). *Home observation for the measurement of the environment*. Little Rock: University of Arkansas Press.

Chess, S., & Thomas, A. (1984). *Origins and Evolution of Behavior Disorders for Infancy to Early Adult Life*. New York: Brunner/Mazel.

Chess, S., Thomas, A., Birch, H. G. (1968). *Temperament and Behavior Disorders in Children*. New York: New York University Press.

Chipuer, H. M., Plomin, R., Pederson, N. L., McClearn, G. E., & Nesselroade, J. R. (1993). Genetic influence on family environment: The role of personality. *Developmental Psychology*, 29, 110–118.

Darling, N., & Steinberg, L. (1992). Parenting style as context: An integrative model. *Psychological Bulletin*, 113, 487–496.

Deal, J. E., Halverson, C. F., Jr., & Wampler, K. S. (1994). Sibling similarity as an individual difference variable: Within-family measures of shared environment. In E. M. Hetherington, D. Reiss, & R. Plomin (Eds.), *Separate social worlds of siblings*. (pp. 205–218). Hillsdale, NJ: Erlbaum.

Deater-Deckard, K. (1994). *Differential discipline and parent perceptions of siblings' characteristics: Comparing between-and within-family analyses*. Unpublished doctoral dissertation University of Virginia, Charlottesville, VA.

DeBaryshe, B. D., Patterson, G. R., & Capaldi, D. M. (1993). A Performance model for academic achievement in early adolescent boys. *Developmental Psychology*, 29, 795–804.

Durbin, D. L., Darling, N., Steinberg, L., & Brown, B. B. (1993). Parenting style and peer group membership among European-American adolescents. *Journal of Research on Adolescence*, 3, 87–100.

Essen, J., Fogelman, K., & Ghodsian, M. (1978). Long-term changes in the school attainment of a national sample of children. *Educational Research*, 20, 143–151.

Fischbein, S. (1980). IQ and social class. *Intelligence*, 4, 51–63.

Fischbein, S. (1990). Biosocial influences on sex differences for ability and achievement test results as well as marks in school. *Intelligence*, 14, , 127–139.

Fischbein, S., & Guttman, R. (1992). *Twins' perceptions of their environment:*

A cross-cultural comparison of changes over time. Acta Genetica Medica e Gemellogica, 41, 275–286.

Garnezy, N., Masten, A., & Tellegen, A. (1984). *The study of stress and competence in children: A building block for developmental psychopathology. Child Development*, 55, 97–111.

Guttman, R. (1994, June). *Twin differences in birth weight and later cognitive performance. Postersession presented at the biennial meeting of the International Society for the Study of Behavioral Development, Amsterdam.*

Harnquist, K. (1989). *Background, education and work as predictors of adult skills (Report. No. 1989:01). Gothenburg, Sweden: Gothenburg University, Department of Education and Educational Research.*

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young american children. Baltimore: Paul H. Brookes.*

Heath, A. C., Eaves, L. J., Nance, W. E., & Corey, L. A. (1987). *Social inequality and assortative mating: Cause or consequence? Behavior Genetics*, 17(1), 9–17.

Herrnstein, R. (1973). *IQ in the meritocracy. Boston: Atlantic Monthly Press.*

Herrnstein, R., & Murray, C. (1994). *The bell curve. New York: Free Press.*

Hetherington, E. M., Reiss, D., Plomin, R. (Ed.), Hetherington, E. M., Reiss, D., Plomin, R. (Ed.). Hetherington, E. M., Reiss, D., & Plomin, R. (Ed.). (1994). *Separate social worlds of siblings. Hillsdale, NJ: Erlbaum.*

Hoffman, L. W. (1991). *The influence of family environments on personality: Accounting for sibling differences. Psychological Bulletin*, 110, 187–203.

Horn, J., Loehlin, J. C., & Willerman, L. (1980). *Genetic variation in development: The Texas Adoption Project. Behavior Genetics*, 13, 212–225.

Houston, A. C., McLoyd, V. C., & Garcia Coll, C. (1994). *Children and poverty: Issues in contemporary research. Child Development*, 65, 275–282.

Hunt, J. M. (1961). *Intelligence and experience. New. York: Ronald Press.*

Jang, K. L. (1993). *A behavioral genetic analysis of personality, personality disorder, the environment, and the search for sources of nonshared environmental influences. Unpublished doctoral dissertation University of*

Western Ontario, London, Ontario.

Jensen, A. R. (1980). *Bias in mental testing*. San Francisco: Freeman.

Jensen, A. R. (1996). *The puzzle of nonshared environment*. In R. J. Sternberg and E. Grigorenko (Eds.), *Intelligence: Heredity and environment* New York: Cambridge University Press.

Juel-Nielsen, N. (1965). *Individual and environment: A psychiatric-psychological investigation of MZ twins reared apart*. *Acta Psychiatrica Scandinavica*. (Suppl.), 183.

Kahl, J. A. (1961). "Common man" boys. In A. H. Halsey, J. Floud, & C. A. Anderson (Eds.), *Education, economy, and society*. New York: Free Press.

Kent, J. (1985). *Genetic and environmental contributions to cognitive abilities as assessed by a telephone test battery*. Unpublished doctoral dissertation University of Colorado, Boulder.

Kohn, M. L. (1969). *Class and Conformity*. Chicago: Chicago University Press.

Kohn, M. L., Naoi, A., Schoenbach, S., & Schooler, C. (1990). *Position in the class structure and psychological functioning in the United States, Japan, and Poland*. *American Journal of Sociology*, 95, 964–1008.

Lamborn, S. D., Mounts, N. S., Steinberg, L., & Dornbusch, S. M. (1991). *Patterns of competence and adjustment among adolescents from authoritative, authoritarian, indulgent, and neglectful families*. *Child Development*, 62, 1049–1065.

Leahy, A. (1935). *Genetics and intelligence*. *Genetic Psychology Monographs*, 52, 313–347.

Levin, M. (1994). *Comment on the Minnesota Transracial Adoption Study*. *Intelligence*, 19, 13–20.

Lichtenstein, P. (1993). *Genetic and environmental mediation of the association between psychosocial factors and health*. Stockholm: Gotab Tryckeri.

Lichtenstein, Pedersen, N. L., & McClearn, G. E. (1992). *Genetic and environmental predictors of socioeconomic status*. *Behavior Genetics*, 22, 731–732.

Lockheed, M. E., Fuller, B., & Nyirongo, R. (1989). Family effects on students' achievement in Thailand and Malawi. *Sociology of Education*, 62, 239–256.

Loehlin, J. C. (1993). *Genetics and personality*. Thousand Oaks, CA: Sage.

Loehlin, J. C. (1996). *Heredity, environment, and IQ in the Texas Adoption Project*. In R. J. Sternberg and E. Grigorenko (Eds.) *Intelligence: Heredity and environment*. New York: Cambridge University Press.

Loehlin, J. C., Horn, J. M., & Willerman, L. (1989). Modeling IQ change: Evidence from the Texas Adoption Project. *Child Development*, 60, 993–1004.

Lynn, R. (1994). Some reinterpretations of the Minnesota Transracial Adoption Study. *Intelligence*, 19, 21–27.

Lytton, H. (1990). Child and parent effects on boys' conduct disorder: A reinterpretation. *Developmental Psychology*, 26, 683–697.

Maccoby, E. E. (1992). The role of parents in the socialization of children: An historical overview. *Developmental Psychology*, 28, 1006–1017.

Marjoribanks, K. (1987). Ability and attitude correlates of academic achievement: Family-group differences. *Journal of Educational Psychology*, 79, 171–178.

Marjoribanks, K. (1993). The predictive validity of a family environment schedule in relation to children's cognitive performance. *Educational and Psychological Measurement*, 53, 565–570.

McCartney, K., Harris, M. J., & Bernieri, F. (1990). Growing up and growing apart: A developmental meta-analysis of twin studies. *Psychological Bulletin*, 107, 226–237.

Moos, R. H., & Moos, B. S. (1981). *Family Environment Scales Manual*. Palo Alto, CA: Consulting Psychologists Press.

Newman, H. G., Freeman, F. N., & Holzinger, K. J. (1937). *Twins: A study of heredity and environment*. Chicago: University of Chicago Press. Ogbu, J. (1988). Cultural diversity and human development. *New Directions for Child Development*, 42, 11–28.

Pedersen, N. L., Plomin, R., Nesselroade, J. R., & McClearn, G. E. (1992). A quantitative genetic analysis of cognitive abilities during the second half of the lifespan. *Psychological Science*, 3, 346–353.

Perusse, D., Neale, M. C., Heath, A. C., & Eaves, L. J. (1994). Human parental behavior: Evidence for genetic influence and potential implications for gene-culture transmission. *Behavior Genetics*, 24, 327–336.

Piaget, J. (1954). *The construction of reality in the child*. New York: Basic Books.

Plomin, R. (1990). *The role of inheritance in behavior*. *Science*, 248, 183–188.

Plomin, R. (1994). *Genetics and experience: The interplay between nature and nurture*. Thousand Oaks, CA: Sage.

Plomin, R., & Bergeman, C. S. (1991). *The nature of nurture: Perspective and prospective*. In R. Plomin & G. E. McClearn (Eds.) *Nature, nurture, and psychology*. (pp. 457–493). Washington, DC: American Psychological Association.

Plomin, R., & Daniels, D. (1987). *Why are children in the same family so different from one another?* *Behavioral and Brain Sciences*, 10, 1–60.

Plomin, R., & DeFries, J. (1980). *Genetics and intelligence: Recent data*. *Intelligence*, 4, 15–24.

Plomin, R., Loehlin, J. C., & DeFries, J. C. (1985). *Genetic and environmental components of "environmental" influences*. *Developmental Psychology*, 21, 391–402.

Plomin, R., McClearn, G. E., Pederson, N. L., Nesselroade, J. R., & Bergeman, C. S. (1988). *Genetic influence on childhood family environment perceived retrospectively from the last half of the lifespan*. *Developmental Psychology*, 24, 738–745.

Plomin, R., McClearn, G. E., Pederson, N. L., Nesselroade, J. R., & Bergeman, C. S. (1989). *Genetic influences on adults' ratings of their current environment*. *Journal of Marriage and the Family*, 51, 791–803.

Plomin, R., & Neiderhiser, J. M. (1992). *Genetics and experience*. *Current Directions in Psychological Science*, 1, 160–164.

Plomin, R., Reiss, D., Hetherington, E. M., & Howe, G. W. (1994). *Nature and nurture: Genetic contributions to measures of the family environment*. *Developmental Psychology*, 30, 32–43.

Plomin, R., & Thompson, R. (1987). Life-span developmental behavioral genetics. In P. B. Baltes, D. L. Featherman, & R. M. Lerner (Eds.), *Life-span development and behavior*. (Vol. 8). Hillsdale, NJ: Erlbaum. Reiss, D., Plomin, R., Hetherington, E. M., Howe, G. W., Rovine, M., Tryon, A., & Stanley Hagan, M. (1993). *The separate worlds of teenage siblings: An introduction to the study of nonshared environment and adolescent development*. In E. M. Hetherington, D. Reiss, & R. Plomin (Eds.), *Separate social worlds of siblings: The impact of nonshared environment on development*. Hillsdale, NJ: Erlbaum.

Ramey, C. T., & Ramey, S. L. (1990). Intensive educational intervention for children of poverty. *Intelligence*, 14, 1–9.

Rowe, D. C. (1981). Environmental and genetic influences on dimensions of perceived parenting: A Twin study. *Developmental Psychology*, 17, 203–208.

Rowe, D. C. (1983). A biometrical analysis of perceptions of family environment: A study of twin and singleton sibling kinships. *Child Development*, 54, 416–423.

Rowe, D. (1994). *The limits of family influence*. New York: Guilford Press.

Rowe, D., & Plomin, R. (1981). The importance of nonshared environmental influences in Scarr, S. (1981). *Race, social class and individual differences in IQ: New studies of old issues*. Hillsdale, NJ: Erlbaum.

Scarr, S. (1985). Constructing psychology: Making facts and fables for our times. *American Psychologist*, 40, 499–512.

Scarr, S. (1992). Developmental theories for the 1990's: Development and individual differences. *Child Development*, 63, 1–19.

Scarr, S. (1993). Biological and cultural diversity: The legacy of Darwin for development. *Child Development*, 64, 1333–1353.

Scarr, S., & Grajek, S. (1982). Similarities and differences among siblings. In M. E. Lamb & B. Sutton-Smith (Eds.), *Sibling relationships*. (pp. 43–69). Hillsdale, NJ: Erlbaum.

Scarr, S., & McCartney, K. (1983). How people make their own environments: A Theory of genotype→environment effects. *Child Development*, 54, 424–435.

Scarr, S., & Ricciuti, A. (1991). What effects do parents have on their children.

In L. Okagaki & J. Sternberg (Eds.), *Directors of development: Influences on the development of children's thinking*. (pp. 3–23). Hillsdale, NJ: Erlbaum.

Scarr, S., & Weinberg, R. A. (1976). IQ test performance of black children adopted by white families. *American Psychologist*, 31, 726–739.

Scarr, S., & Weinberg, R. A. (1978). The influence of “family background” on intellectual attainment. *American Sociological Review*, 43, 674–692.

Scarr, S., & Weinberg, R. A. (1983). The Minnesota adoption studies: Genetic differences and malleability. *Child Development*, 54, 260–267.

Scarr, S., & Weinberg, R. A. (1994). Educational and occupational achievements of brothers and sisters in adoptive and biologically related families. *Behavior Genetics*, 24(4), 301–325.

Scarr, S., Weinberg, R. A., & Waldman, I. D. (1993). IQ correlations in transracial adoptive families. *Intelligence*, 17, 541–555.

Scarr-Salapatek, S. (1971). Race, social class and IQ. *Science*, 174, 1285–1295.

Segal, N. L. (1993). Twin, sibling, and adoption methods: Tests of evolutionary hypotheses. *American Psychologist*, 48, 943–956.

Shields, J. (1962). *Monozygotic twins brought up apart and brought up together*. London: Oxford University Press. Steinberg, L., Dornbusch, S. M., & Brown, B. B. (1992). Ethnic differences in adolescent achievement. *American Psychologist*, 47, 723–729.

Sundet, J. M., Tambs, K., Magnus, P., & Berg, K. (1988). On the question of secular trends in the heritability of intelligence: A study of Norwegian twins. *Intelligence*, 12, 47–59.

Teasdale, T. W. (1979). Social class correlations among adoptees and their biological and adoptive parents. *Behavior Genetics*, 9, 103–114.

Teasdale, T. W., & Owen, D. R. (1981). Social class correlations among separately adopted siblings and unrelated individuals adopted together. *Behavior Genetics*, 11, 577–588.

Teasdale, T. W., & Owen, D. R. (1984a). Heredity and familial environment in intelligence and educational level—A sibling study. *Nature*, 309, 620–622.

Teasdale, T. W., & Owen, D. R. (1984b). Social class and mobility in male adoptees and non-adoptees. *Journal of Biosocial Science*, 16, 521–530.

Teasdale, T. W., & Owen, D. R. (1986). The influence of paternal social class on intelligence and educational level in male adoptees and non-adoptees. *The British Journal of Educational Psychology*, 56, 3–12.

Teasdale, T. W., Owen, D. R., & Sorensen, T. I. A. (1988). Regional differences in intelligence and educational level in Denmark. *The British Journal of Educational Psychology*, 58, 307–314.

Teasdale, T. W., Sorensen, T. I. A., & Owen, D. R. (1984). Social class in adopted and nonadopted siblings. *Behavior Genetics*, 14, 587–593.

Thomas, A., & Chess, S. (1980). *The dynamics of psychological development*. New York: Brunner/Mazel.

Wachs, T. D., & Gruen, G. (1982). *Early experience and human development*. New York: Plenum Press.

Waldman, I. D., Weinberg, R. A., & Scarr, S. (1994). Racial group differences in the Minnesota Transracial Adoption Study: A Reply to Levin and Lynn. *Intelligence*, 19, 29–44.

Waller, J. H. (1971). Achievement and social mobility: Relationship among IQ score, education, and occupation in two generations. *Social Biology*, 18, 252–259.

Weinberg, R., Scarr, S., & Waldman, I. (1992). The Minnesota Transracial Adoption Study: A follow-up of IQ test performance in adolescence. *Intelligence*, 16, 117–135.

White, R. K. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin*, 91, 461–481.

Zeidner, M. (1988). Sociocultural differences in examinees' attitudes toward scholastic ability exams. *Journal of Educational Measurement*, 25, 67–76.

Copyright 1996 American Psychological Association

This publication is protected by US and international copyright laws and its content may not be copied without the copyright holders express written permission except for the print or download capabilities of the retrieval software used for access. This content is intended solely for the use of the

individual user.

Source: Psychology, Public Policy, and Law. Vol.2 (2) pp. 204-228.

Accession Number: law-2-2-204 **Digital Object**

Identifier: 10.1037/1076-8971.2.2.204

View: [Citation](#) [HTML Full Text](#) [PDF Full Text](#) (1992K)

3 of 22 [Result List](#) | [Refine Search](#)

Delivery Options:

[Print E-mail](#) [Save Export](#) [Add to folder](#)

[Top of Page](#)

[EBSCO Support Site](#)

[Privacy Policy](#) [Terms of Use](#) [Copyright](#)

© 2007 EBSCO Industries, Inc. All rights reserved.