Childhood Experience, Interpersonal Development, and Reproductive Strategy: An Evolutionary Theory of Socialization

Author(s): Jay Belsky, Laurence Steinberg and Patricia Draper

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Theoretical Paper

Childhood Experience, Interpersonal Development, and Reproductive Strategy: An Evolutionary Theory of Socialization

Jay Belsky
The Pennsylvania State University

Laurence Steinberg
Temple University

Patricia Draper
The Pennsylvania State University

BELSKY, JAY; STEINBERG, LAURENCE; and DRAPER, PATRICIA. *Childhood Experience, Interpersonal Development, and Reproductive Strategy: An Evolutionary Theory of Socialization.* CHILD DEVELOPMENT, 1991, **62**, 647–670. The concept of "reproductive strategy" drawn from the field of behavioral ecology is applied to the study of childhood experience and interpersonal development in order to develop an evolutionary theory of socialization. The theory is presented in terms of 2 divergent development pathways considered to promote reproductive success in the contexts in which they have arisen. One is characterized, in childhood, by a stressful rearing environment and the development of insecure attachments to parents and subsequent behavior problems; in adolescence by early pubertal development and precocious sexuality; and, in adulthood, by unstable pair bonds and limited investment in child rearing, whereas the other is characterized by the opposite. The relation between this theory and prevailing theories of socialization, specifically, attachment, social-learning, and discrete-emotions theory, is considered and research consistent with our evolutionary theory is reviewed. Finally, directions for future research are discussed.

In 1982 Draper and Harpending offered a novel interpretation of the early cross-cultural and subsequent psychological literature on father absence, which suggested that boys from families in which parents divorced frequently engage in exaggeratedly and stereotypically masculine behavior during childhood, and that girls from such homes tend to be sexually "promiscuous" during adolescence (e.g., Biller, 1981; Hetherington, 1972). In particular, these anthropologists proposed that early family experiences shape children's orientations toward pair bonding in a manner that makes biological sense. Drawing on concepts from modern evolutionary theory, and particularly Trivers's (1974) parental investment theory, Draper and Harpending (1982) argued that early experience "sets" the reproductive strategy that individuals will follow in later life. Whereas children growing up in father-absent homes stemming from divorce develop behavior profiles consistent with an expectation that paternal investment in child rearing will not be forthcoming and that pair bonds will not be enduring, those from

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father-present households anticipate the opposite and thus defer sexual activity once they reach biological maturity and seek to establish and maintain enduring, close, heterosexual relationships.

Central to Draper and Harpending's (1982) application of modern evolutionary theory to the study of father absence is the proposition that these distinctly different "reproductive strategies" maximize the reproductive prospects of children in the distinct environments in which they grow up. In essence, they theorized that humans have evolved to be sensitive and responsive to the context of early rearing, and as a consequence they develop certain behavioral patterns and psychological orientations that subsequently guide their reproductive functioning. Fundamentally, evolution has primed humans to learn particular lessons during the first 5–7 years of life that will shape their subsequent pair-bonding and child-rearing behavior.

We believe that Draper and Harpending's (1982) insightful analysis of the father-absence literature lays the seeds of a far more general theory of early experience, socialization, and psychological development than even they realized—one that enables students of human development to bring several contemporary theories of psychological and behavioral development into line with several currents within modern evolutionary thinking. Whereas Draper and Harpending restricted their focus to father absence, we contend that by thinking more generally about early affective experience in the family in light of contemporary theories of psychological and behavioral development, it is possible to build a far more general and evolutionary-based theory of socialization. The primary purpose of this article is to articulate this evolutionary theory of socialization and lifespan interpersonal development. In so doing, we attempt to integrate several diverse areas of inquiry in the field of developmental psychology, including research on contextual stress and its effects on parents, parenting behavior and child development, the antecedents and consequences of variations in security of attachment, the genesis of behavior problems, the antecedents and consequences of variations in pubertal timing, and influences on sexual behavior.

Consistent with the arguments of Draper and Harpending (1982), the theory of childhood experience and psychological behavior development we advance draws heavily upon concepts basic to the fields of behavioral ecology (e.g., Krebs & Davies, 1981) and sociobiology (Hamilton, 1964). From sociobiology we take the maxim that natural selection tends to favor behavior that increases fitness, that is, the representation of an individual's genes (relative to unrelated individuals) in future generations. From behavioral ecologists we take the maxim that behavioral strategies that contribute to reproductive success are facultative, that is, contextually conditional. In other words, optimal strategies depend upon the options available to individuals given the physical, economic, and social ecology (Crawford & Anderson, 1989). A given pattern of behavior is only optimal in the context of a specific environment. From the perspective of modern evolutionary theory, complex, highly social organisms such as humans evolved to modulate social behaviors like mating and parenting in response to particular environmental cues (Hinde, 1982). Thus, the lifespan theory of socialization and interpersonal development we advance does not presume biological determinism in any narrow sense. Instead, and consistent with contemporary behavioral ecology, it assumes an evolved flexibility of organismic response to variations in context, in the service of biological goals (i.e., reproductive fitness).

Our theory underscores the need to distinguish among ultimate, distal, and proximate causes of behavioral development (Tinbergen, 1963). A proximate cause is closely spaced in time to a given phenomenon. A distal cause is further away, yet intricately and causally related to the proximate mechanism. An ultimate cause concerns the evolutionary or biological function of a phenomenon, with "why" a process or phenomenon occurs, rather than "how" it occurs. In this article we contend that contextual stress, a distal cause, shapes parental behavior, a more proximal influence, which affects interpersonal and behavioral development and, thereby, somatic development, and that the ultimate function of these processes is to enhance (at least in the environment of evolutionary adaptedness) reproductive fitness. Ultimate, distal, and proximate explanations, then, are by no means mutually exclusive, nor should they be regarded as providing alternative explanations. Rather, they are linked together in a system of causation.

Consistent with Draper and Harpend-

ing's (1982) father-absence analysis, we assume that evolution has designed humans to vary their mating and child-rearing behavior in accordance with the contextual conditions in which they develop, so as to maximize their reproductive success. This notion that rearing context shapes life history, which is itself systematically related to patterns of pair bonding and parenting in a manner designed to maximize the dispersion of an organism's genes in subsequent generations, has a long history in biobehavioral research on many species of animals (Konishi, Emlen, Rickets, & Wingfield, 1989; Lack, 1947), however surprising it may appear to traditionally trained social scientists. There is good reason to believe that humans, too, have evolved to modify their reproductive behavior (i.e., mating and parenting) in the service of fitness considerations and in accord with social and ecological variables.

Although we will argue that there is much about contemporary human development that can be illuminated by an analysis of reproductive strategies, the fact that the current ecology of human development contrasts markedly with the environment of evolutionary adaptation (i.e., the context of early humans in which behavior evolved) means that the predictions our theory generates are necessarily constrained. Even though we do not expect that early social context, rearing, and psychological and behavioral orientation will necessarily forecast the number of offspring borne, given widespread access to both contraception and abortion, we do anticipate that these factors, particularly in combination, predict other markers of reproductive strategy. These markers include pubertal timing, sexual activity, and pair bonding.

This article is divided into three major sections. In the first we outline the evolutionary theory of socialization and lifespan interpersonal development and propositions derived from it. Specifically, we distinguish two prototypic developmental trajectories that lead to two distinct reproductive strategies, and we describe the contextual conditions and developmental processes hypothesized to give rise to them. It remains unclear whether the phenomena and processes we detail are equally characteristic of male and female development. Certain aspects of the theory are more strongly supported in studies of males, while others are more strongly supported in studies of females.

Although the two social orientations we describe—one geared toward opportunistic advantage taking, the other toward mutual commitment and reciprocal benefit—are often considered in terms of immoral versus moral or improper versus correct behavior, we regard them as being distinctively, yet equally, well suited for the particular ecological niches in which they develop. While Western majority culture may value one more than another, the evolutionary processes which led to their emergence existed apart from contemporary moral evaluations. Additionally, although the term "strategy" implies a conscious plan to many, we presume no such awareness and use the term in the same sense that behavioral ecologists do when studying the behavior of many species of animals.

In the second major section of this article, we review evidence consistent with the theory we advance. We must note at the outset, following Hinde and Stevenson-Hinde (1990, p. 67), that "there can be no *proof*" that the developmental phenomena which our evolutionary theory seeks to explain "are the products of natural selection operating in our environment of evolutionary adaptedness. All that can be said is that, in such cases, a wide range of otherwise apparently independent facts are integrated better by the theory of natural selection than by any other." Finally, in a third section, we outline limits of the theory, particularly in terms of alternative explanations, and propose two research designs capable of disconfirming critical predictions derived from the theory—predictions that are important because they cannot be derived from related theories of socialization.

An Overview of the Theory

Evolutionary ecologists theorize that in order for any organism to reproduce, effort must be apportioned among three fundamental tasks—(1) growth and development, (2) mating, and (3) parenting (including gamete production). Yet species differ dramatically in how they apportion effort across these tasks. Relative to other species, humans emphasize growth and development, as seen in the prolonged period of juvenile dependence and delayed sexual maturation. And in contrast to most other mammals, we are unusual for the importance we attach to pair bonds and for the high levels of biparental care required to rear children to maturity. But despite this generalization about the species, there is substantial diversity in the ways in which different populations of hu-

mans manage (1) growth and development, (2) mating, and (3) parenting.

A central tenet of the theory we advance is that a principal evolutionary function of early experience—the first 5–7 years of life—is to induce in the child an understanding of the availability and predictability of resources (broadly defined) in the environment, of the trustworthiness of others, and of the enduringness of close interpersonal relationships, all of which will affect how the developing person apportions reproductive effort. Individuals whose experiences in and around their families of origin lead them to perceive others as untrustworthy, relationships as opportunistic and self-serving, and resources as scarce and/or unpredictable will develop behavior patterns that function to reduce the age of biological maturation (within their range of plasticity) (see Barkow, 1984, footnote 7, for a similar prediction), accelerate sexual activity, and orient them toward short-term, as opposed to long-term, pair bonds. In other words, a disproportionate amount of reproductive effort will be allocated toward the individual's growth and development and mating rather than toward parenting. Individuals, in contrast, whose experiences lead them to perceive others as trustworthy, relationships as enduring and mutually rewarding, and resources as more or less constantly available from the same key persons will behave in ways that inhibit (relative to the first type) age of maturation, will defer sexual activity, and will be motivated to establish—and be skilled in maintaining—enduring pair bonds, all of which will serve to enhance investment in child rearing. This second type of person, then, disproportionately invests reproductive energies in parenting effort rather than individual growth and development or mating. In essence, we argue that early experiences and the psychological and biological functioning they induce lead individuals to engage in either a "quantity" or a "quality" pattern of mating and rearing.

In arguing that experience shapes development, we do not mean that all or even most of the variance on human behavior is contextually controlled. Behavior-genetic studies strongly indicate that this is by no means the case (Plomin, Loehlin, & De Fries, 1985). In fact, an obvious alternative to the theory we advance is one of genetic polymorphism which asserts that individuals may be genetically predisposed to one developmental pathway or another (see Rushton, 1985). One possible way of integrating such a theory with the more strongly environmental theory we advance is via the notion of differential susceptibility to environmental experience: Whereas some individuals may be genetically predisposed to respond to contextual stress and insensitive rearing by maturing early and engaging in relatively indiscriminate sexual behavior, others may be genetically predisposed to respond to sensitive rearing by deferring sexual behavior and establishing enduring pair bonds in adulthood. Thus, while nurture may determine the direction development takes, nature may determine the likelihood that, and the extent to which, an individual will be influenced by a particular set of environmental conditions.

Figure 1 outlines the interrelation of the major domains of the theory (context, rearing, psychological development, somatic development, reproductive strategy) and contrasts the two developmental pathways mentioned in the preceding section on reproductive strategy. It is important to reiterate that even though these developmental pathways and related reproductive strategies are discussed as distinct types, it may be best to regard them as prototypes that characterize contrasting ends of a continuum of ecologically sensitive behavioral development rather than as the only two expressions of interpersonal development that are possible. The choice, then, is between what Stearns (1982), following Bradshaw (1965), refers to as discrete versus continuous phenotypic plasticity. In discrete plasticity there are few if any intermediate phenotypes, and all individuals show one or the other of only a small number of discrete phenotypes that are triggered by the environment, whereas in continuous plasticity the phenotypic response is matched or scaled to the environment (Chisholm, 1988).

Although the figure and the discussion that follows are consistent with a path model, whereby context affects rearing and, in turn, psychological and behavioral development, somatic development, and reproductive behavior, it may not be best to conceptualize the theory in terms of such a linear flow. An alternative, though not necessarily mutually exclusive, approach involves more of a cumulative-conditional-probability conceptualization. This alternative, which we favor, states that when antecedent conditions A, B, and C obtain, the probability of D is greater than when only two of these antecedent conditions obtain, and that the probability of D is even

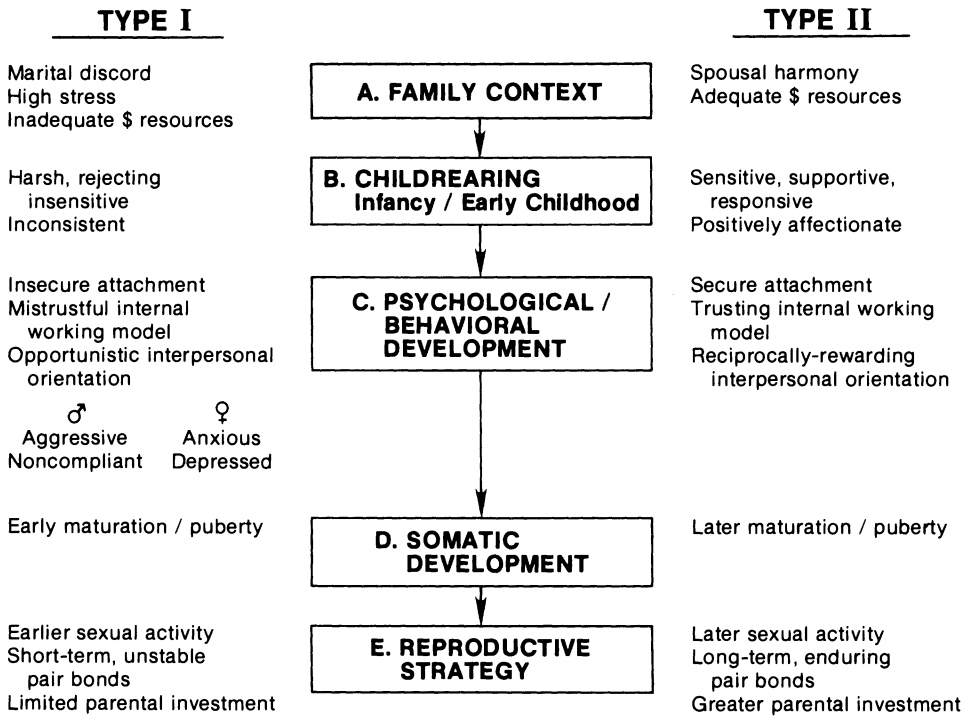

FIG. 1.—Developmental pathways of divergent reproductive strategies

less when just a single such condition obtains. Thus, whereas a path-oriented theory predicts that an effect will obtain only when the immediately preceding influential condition exists, a conditional theory presumes multiple paths to an outcome and greater and lesser probabilities of an outcome ensuing given varying antecedent conditions. Although we are not inclined to make such specifications at this time, variations on a conditional theory might differentially weight the importance of proximal versus distal antecedent conditions in forecasting certain behavioral developments.

Theoretical Propositions and Predictions

The first feature of Figure 1 to be considered is the relation between context and child rearing. Consistent with traditional cultural anthropology (Whiting & Whiting, 1975), we presume that patterns of child rearing reflect and are derivative of the general ecology in which families reside and that, implicitly (if not explicitly), rearing strategies represent attempts by parents to prepare their children for the world that they "expect" their offspring to encounter. Where we differ from the traditional view is in theorizing that a critical feature of this (often unconscious) interpretation of the future involves expectations regarding reproductive success, and especially the chances of establishing an enduring pair bond in which a man and a woman reciprocally exchange resources for purposes of facilitating the rearing of their progeny (Draper & Belsky, 1990). Thus, in our view and that of others (e.g., Burgess & Draper, 1989), contextual stressors, among them, marital discord, single parenthood, and unstable employment, will foster more insensitive, harsh, rejecting, inconsistent, and/or unpredictable parenting behavior. This, in turn, will induce in the child what students of attachment theory refer to as an insecure or mistrustful internal working model (particularly of the insecure-avoidant variety) of the self, others, and relationships (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969; Sroufe, 1979). That is, when contextual stress and correlated rearing patterns are extant, children will be relatively more likely to come to view themselves as unlovable and as unworthy of love; others as undependable and uncaring; and, as a consequence, close interpersonal bonds as ephemeral and undependable.

In making these observations, particularly about the influence of the ecology of rearing, it is important to point out that subjective perceptions of stress are just as im-

portant as, if not more important than, objective conditions of stress. Because parents' child-rearing behavior serves a mediational function between context and development, a parent's subjective experience is critically important for understanding the context-rearing linkage. This is not to say that *only* parental behavior mediates the influence of context. It is just as reasonable to presume, especially after infancy, that the child's direct experience with the context—via watching parents argue or being witness to a single parent's relationships with a series of partners, for example—will result in the child developing particular understandings of what the future will hold with respect to relationships.

In contrast to the "scenario" of insensitive rearing and insecurity just depicted, the child growing up in an environment in which resources are (or at least are perceived to be) relatively abundant and/or predictable—including care and nurturance—develops a distinctly different working model of the interpersonal world. When parents trust and count on others and rear their children to engage in reciprocally rewarding and enduring interpersonal bonds and to expect paternal investment, children develop predispositions to selectively attend to, encode, and anticipate experiences that are strikingly different from those of children who experience insensitive, rejecting, or neglectful care. Whereas rejected or neglected children will home in on slights, offenses, and mistreatments—because they have learned to be vigilant about being taken advantage of—secure children focus on empathic and considerate social encounters and, in so doing, foster more of them. For all children, then, subsequent experience builds on past experience and, importantly, expectations and understandings set earlier in life are reinforced via self-constructing interpersonal processes.

This linkage between context, rearing, and psychological orientation to the interpersonal world fosters, as we have implied, correlated patterns of interpersonal behavior during childhood. Under conditions of family stress, insensitive rearing, and insecure feelings, behavior problems are more likely to develop—high levels of aggression, impulsivity, and/or noncompliance with adults and socialization norms (externalizing symptoms) or high levels of sadness, depression, and/or social withdrawal (internalizing symptoms).

For many social scientists today, such psychological and behavioral patterns are regarded as problems because they appear dysfunctional within mainstream society. We speculate, however, that these behavior patterns are functional when viewed from the standpoint of evolutionary biology (see Chisholm, 1988). This is because they may serve to mediate and, indeed, contribute to the influence that early experience exerts on somatic development. In particular, we theorize that externalizing and internalizing behaviors may have evolved as proximal biobehavioral mechanisms that accelerate the timing of puberty—within the individual's range of plasticity. As we will make clear in a moment, such early maturation is considered to be an important component of an opportunistic reproductive strategy, as it not only affects postpubertal sexual behavior but also makes earlier procreation possible.

Sex differences in externalizing and internalizing behaviors are commonly reported and typically attributed to cultural conditioning (e.g., Campbell, in press; Rutter, 1970). Our theory presumes, in addition, an evolved basis of the difference in how so-called behavior problems typically are manifested by boys and by girls, especially prior to puberty. In particular, we theorize that males and females are predisposed to express their "behavior problems" in different ways because different biological processes must be energized in order to influence biological maturation in the two genders.

In the case of females, we suspect that "internalizing" problems serve to lower metabolism, store fat, and thereby stimulate menarche. Such experientially and behaviorally induced maturation sets the stage for sexual activity and, thereby, procreation. Early maturation, then, is part of a constellation of biological and behavioral processes that facilitate a quantity-oriented reproductive strategy. So too is accelerated sexual activity with multiple mates. We thus predict that early maturing girls, particularly those who come from stressed families and have developed insecure outlooks on life in general (and on close relationships in particular) and who have developed internalizing symptoms before puberty, will be more sexually active and have less enduring heterosexual relationships across their life course.

Early sexual activity among females may foster reproduction in still other ways. In the human female there is an extended

period between menarche and actual fertility (Lancaster, 1986; Short, 1976). Moreover, there is some suggestive evidence that both sexual behavior and associating with nonrelated males shortens and regulates the menstrual cycle (e.g., Cutler, Garcia, & Krieger, 1979; Trevathan & Burleson, 1989). A shorter and more regular cycle affords, over a lifetime, more fertile periods and, thus, more opportunity to conceive children (Metral, 1981; Trevathan & Burleson, 1989). Thus, we speculate that early puberty and accelerated sexual activity might actually function to shorten the period of postpubertal subfertility and, in so doing, organize the menstrual cycle to permit more conceptions across the life span.

The prevalence of externalizing symptomology among males and its association with family conflict and divorce (see below for a review of literature) lead to the suggestion that it is aggressive, disobedient, and oppositional behavior that, via some unspecified biological mechanism, stimulates earlier (than would otherwise be expected) maturation among boys. Conceivably, processes involving androgenic activity might be involved. In any event, aggressive, noncompliant behavior, which seems to be inherently opportunistic vis-à-vis others, should also foster indiscriminate and opportunistic sexuality and, in concert with earlier puberty, increase the likelihood of such males becoming fathers before other men. It seems likely that earlier maturing, opportunistic males would be the least likely to use contraception. Moreover, if such males come from maritally discordant or single-parent homes, it seems unlikely that they will anticipate and seek enduring pair bonds and thus anticipate investing time, energy, and resources in their offspring (i.e., they will evidence low paternal investment).

As can be seen in Figure 1, a dramatically contrasting pattern of development and behavior is anticipated for children whose developmental experiences have fostered a secure rather than insecure outlook on life and relationships. These children, we theorize, will be especially skilled at establishing *and* maintaining close friendships during middle childhood (rather than developing behavior problems), will not be early maturers, will delay sexual intercourse (rather than engage in indiscriminate mating), and will possess the interpersonal skills *and* the motivation to establish *and* maintain enduring, heterosexual pair bonds. As parents they will bear offspring at a later point in their life course, will bear fewer progeny, and both mother and father will invest time and resources more heavily in them.

To many readers it will no doubt seem counterintuitive to assert, as we and others do (MacDonald, 1988), that a developmental trajectory characterized by attachment insecurity, behavior problems, early maturation, precocious sexuality, unstable pair bonds, limited parental investment, and high total fertility makes "biological sense." In modern Western society, this reproductive strategy appears clearly dysfunctional and disadvantageous. Why, then, would it have evolved? To answer this question it is important to keep in mind that past environments of evolutionary adaptation have been highly variable. In some contexts, such as those affording rapid expansion into favorable and previously unexploited niches, there may have been advantage to rapid reproduction and no penalty (in terms of offspring survival) to transient bonds between sexual partners and loose attachment between mothers and offspring—provided only that other group members could be relied upon to provide food and protection to juveniles. This scenario assumes an *environmentally favorable* context (Draper & Harpending, 1982).

What evolutionary mechanism, though, would underlie an accelerated reproductive schedule in the context of *unfavorable environments* such as poverty or social and familial *instability*, as we propose? We point again to the maxim that organisms have been selected to reproduce themselves and to attend to important environmental cues in the process. In the absence of indications that delayed maturation and reproduction can have benefits, early sexual activity and high fertility have much to recommend them. This strategy may be associated with higher offspring mortality, but from the point of view of fitness, individuals living in such adverse circumstances who *delay* reproducing may well be selected against (i.e., leave few or no offspring). In such an environment, a man who invests disproportionately in one woman and in children (who may not be his own) will leave relatively few of his own offspring behind. Likewise, a young woman who waits for the right man to help rear her children may lose valuable reproductive opportunities at a time when her health and physical capability are at their peak and when her mother and senior female kin are young enough to be effective surrogates. In

such circumstances, nonbonded and relatively indiscriminate sexuality, as well as high fertility, can be positively selected. It is in this sense, then, that we assert that both of the reproductive strategies that we detailed make "biological sense," in that they are optimal given the contexts in which they develop—and for which they were selected.

There is much about the evolutionary theory we have outlined that is consistent with other theories of socialization and psychological development, especially social learning (e.g., Bandura, 1977), attachment (Bowlby, 1969), and discrete emotions theory (Malatesta & Wilson, 1988). Indeed, the general proposition that experience shapes psychological orientation and behavioral functioning, which feeds back to affect experience and maintain earlier-established developmental trajectories, is embraced by virtually all modern theories of, and perspectives on, human development (e.g., Bronfenbrenner, 1977; Elder, 1981; Epstein & Erskine, 1983; Wachtel, 1973). What is unique about our theory, however, is that it integrates rather diverse developmental phenomena—including contextual stress, rearing patterns, attachment styles, behavior problems, pubertal timing, sexual activity, and pair bonding processes—in a manner that extends, rather than violates, these other perspectives. Most important, though, our theory places all of these phenomena in evolutionary perspective, using the notion of reproductive strategy as a guiding principle, and generates a critical prediction unique to it—namely, that developmental experiences and behavior patterns derivative of them serve to regulate the timing of puberty and, thereby, sexual behavior and pair bonding.

Research Evidence

There is no shortage of research consistent with many of the propositions advanced above, and in this section we seek to summarize it. Our goal is to underscore the wealth of data that are consistent with our perspective, while acknowledging evidence that is not. We begin by examining research on the contextual and rearing antecedents of patterns of behavior that might be conceptualized as "opportunistic." Accordingly, the first subsection addresses the interrelation of context, rearing, and psychological/behavioral development, that is, linkages between sections A and B and between B and C in Figure 1. In many respects, this first subsection reviews rather traditional developmental research on the determinants and consequences of variations in socialization practices.

In a second subsection, we turn attention to the most novel predictions made from the theory, namely, that pubertal timing is sensitive to rearing context, rearing styles, and/or antecedent psychological and behavioral functioning (i.e., linkages of A, B, or C with D in Fig. 1). In a third subsection, we review research linking pubertal timing with postpubertal sexual activity (i.e., D and E in Fig. 1). Then, in a final section, we briefly summarize research emanating from sociology and psychology pertaining to the determinants of pair bonding. In particular, we consider evidence that rearing experiences in childhood, such as exposure to divorce, can influence pair bonding, and we reinterpret research on the adult personality correlates of successful and unsuccessful marriage in terms, respectively, of mutually beneficial and opportunistic orientations toward relationships. With regard to Figure 1, this is research pertaining to linkages between B and E and between C and E.

Family Context, Rearing Patterns, and Development

Basic to our theory are several propositions linking family context, patterns of child rearing, and children's psychological and behavioral development. In particular, the theory asserts, consistent with much current thinking regarding the determinants and consequences of socialization practices (Belsky, 1984; Elder, Nguyen, & Caspi, 1985; McLoyd, 1990; Patterson, 1986), that under conditions of real or imagined stress parental behavior becomes less affectively positive and more insensitive, perhaps to the point of psychological or physical abuse, and that exposure to such rearing practices undermines the psychological well-being of the child. In contrast, a positive, prosocial interpersonal disposition is presumed to derive from warm, sensitive, and what have been labeled "authoritative" rearing practices (Baumrind, 1971), and these are further presumed to be promoted by social supports and economic resources (e.g., Lempers, Clark-Lempers, & Simons, 1989). In essence, when resources become limited, parental patience for and tolerance of young children's behavior declines, and, as a result, adults become more prone to anger and inconsistent disciplinary practices (Belsky, 1984).

Context and rearing.—Consideration of

research on child abuse (Belsky, 1980; Cicchetti & Carlson, 1989), economic deprivation (Burgess & Draper, 1989; McLoyd, 1990), occupational stress (Bronfenbrenner & Crouter, 1982), marital discord (Belsky, 1981; Emery, 1988), and psychological distress (McLoyd, 1990) reveals a consistent relation between contextual stress and "dysfunctional" parenting. Child maltreatment is more likely to occur under conditions of economic deprivation, an association that cannot be attributed simply to increased abuse reporting in lower-class communities (Pelton, 1978; Steinberg, Catalano, & Dooley, 1981). Elder's research on the Great Depression (Elder et al., 1985) and recent work on contemporary families that suffered serious income loss as a result of recession in the 1980s (Lempers et al., 1989) show, consistent with McLoyd's (1990) review of the literature on parenting practices among impoverished parents, that limited financial resources are associated with the use of power-assertive child-rearing techniques in disciplinary encounters. "Lower class parents are more likely to issue commands without explanation, less likely to consult the child about his or her wishes, and less likely to verbally reward the child for behaving in desirable ways. Poverty also has been associated with diminished expression of affection and less responsiveness to the socioemotional needs explicitly expressed by the child" (McLoyd, 1990, p. 322). In light of these findings, it is noteworthy that when rhesus monkeys are experimentally deprived of resources and thus must spend more time and energy foraging for food, they, too, become less solicitous of their offspring's needs (Rosenblum & Paully, 1984).

It is not just limited income that can compromise parental functioning, but also certain characteristics of the job (Crouter, in press) as well as marital processes (Belsky, 1981). Work conditions that generate feelings of distress, including lack of job protection, dirty work, excessively close supervision, overload, boredom, and underutilization, have all been linked to more irritable or less involved patterns of parenting (e.g., Bronfenbrenner & Crouter, 1982; Moen, 1982). Marital conflict and low levels of marital satisfaction are associated with less responsive, more intrusive, and more affectively negative patterns of mothering and fathering (Jouriles, Pfiffner, & O'Leary, 1988; Olweus, 1980).

In order for contextual stress originating in the economic, occupational, and/or marital sphere to influence parental behavior, it must affect the psychological functioning of the individual adult in the parental role. Because stress is a subjective experience, we would expect to find evidence that psychological distress relates directly to parental functioning. Much recent research indicates that anxiety, hostility, and depression are associated with the very same patterns of parental behavior that have been associated with income loss, under- and unemployment, poverty, and marital discord (e.g., Conger, McCarty, Yang, Lahey, & Kropp, 1984; Kochanska, Kuczynski, Radke-Yarrow, & Welsh, 1987).

The fact that contextual stress adversely influences adult psychological well-being and thereby parental functioning provides the basis of our assertion that parents, via their rearing, are "preparing" their children for the world they expect them to encounter as adults. Whereas affectively supportive behavior and harmonious parent-child exchanges convey—inadvertently or intentionally—a life-course message that the world is a caring place and that relationships can be counted upon, rearing that is affectively negative and fosters conflict and coercion conveys to the child just the opposite.

Rearing and development.—The analysis just offered presumes that children develop psychological and behavioral orientations consistent with the life-course experiences for which parents "prepare" them. Some of the most compelling—yet least surprising—evidence that insensitive, rejecting, and/or inconsistent rearing leads children to view the world as uncaring and relationships as untrustworthy and to behave in opportunistic ways comes from the study of the development of abused and neglected children (for a review, see Youngblade & Belsky, 1989, in press). Not only are infants and toddlers subjected to maltreatment at very high risk of developing insecure attachments to their maltreating parent (e.g., Cicchetti & Braunwald, 1984; Lyons-Ruth, Connell, Zoll, & Stahl, 1987), but in their relations with age-mates both during the preschool and school-age years they are more aggressive, less cooperative, less empathic, and less trusting than other children (e.g., Herrenkohl & Herrenkohl, 1981; Howes & Eldredge, 1985).

While the role of the child in precipitating child maltreatment cannot be discounted, it is noteworthy that research on

the antecedents and sequelae of patterns of infant-mother attachment in nonmaltreating populations is generally consistent with evidence just summarized. American and European research indicates that insensitive, intrusive, and/or unresponsive care during the first year of life is associated with insecure attachment relationships (Ainsworth et al., 1978; Belsky, Rovine, & Taylor, 1984; Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985). Infants and toddlers insecurely attached to their parents are less able to tolerate frustration as 2-year-olds (Matas, Arend, & Sroufe, 1978), are more prone to social withdrawal in the preschool peer group (Waters, Wippman, & Sroufe, 1979), evince less sympathy for the distress of preschool age-mates (Waters, Wippman, & Sroufe, 1979), are less ready to interact with friendly, unfamiliar adults as are 1-year-olds (Main & Weston, 1981) and 3-year-olds (Lütkenhaus, Grossmann, & Grossmann, 1985), are responded to less positively by other preschoolers with secure attachment histories (Jacobson & Wille, 1986), are liked less by preschool classmates (LaFreniere & Sroufe, 1985), and during the early elementary school years are more likely to be judged by parents and/or teachers to have serious behavior problems, including aggression and noncompliance (Erickson, Sroufe, & Egeland, 1985; Lewis, Feiring, McGuffog, & Jaskir, 1984; Renken, Egeland, Marvinney, Mangelsdorf, & Sroufe, 1989).

Research on the developmental correlates of patterns of child rearing that is *not* focused on attachment security generates findings that are strikingly consistent with the research just summarized (for a review of the last decade's research, see Belsky, 1990). Consider, for example, evidence from two recent longitudinal studies, one indicating that high levels of observed maternal positive involvement (affectionate contact and verbal stimulation) during the first 2 years of life predicted low levels of mother-reported behavior problems at age 4, even after controlling for observed maternal behavior at age 4 (Pettit & Bates, 1989), and the other showing that high levels of maternal responsivity and acceptance during the infant and toddler years forecast high levels of considerateness at age 10, again after controlling for the same dimensions of parental behavior measured at age 10 (Bradley, Caldwell, & Rock, 1988).

In sum, there is clear evidence that cooperation and compliance develop among children whose parental relationship has been characterized by shared control, sensitivity, and responsiveness (Holden & West, 1989; Kuczynski, Kochanska, Radke-Yarrow, & Girniss-Brown, 1987; Parpal & Maccoby, 1985). In contrast, disobedience, noncompliance, and aggression appear to be fostered by coercive, negatively demanding, and physically punishing patterns of parenting (Martin, 1981; Patterson, 1986). This appears to be true not only in contemporary Western society but around the world (Rohner, 1975). Thus, meeting children's social and emotional needs in a supportive, responsive manner fosters a social orientation that values mutually beneficial interactions and relationships, whereas patterns of rearing that are negative, inconsiderate, and coercive lead children to behave in ways that are self-centered. As our earlier analysis indicated, these latter outcomes are more likely to arise under conditions of contextual stress, whereas the former processes are more likely to characterize well-resourced families.

Childhood Experience, Psychosocial Development, and Pubertal Timing

A distinguishing proposition of our theory concerns the experiential, psychological, and behavioral antecedents of pubertal timing. We have proposed that individuals whose early family experiences are high in stress and who evince problematic behavior during childhood should be more likely to undergo pubertal maturation earlier than children whose childhood experiences are more pacific. Because the age of pubertal onset is a significant predictor of the age of onset of sexual activity (see below), early maturers have additional reproductive prospects and may be seen as potentially more reproductively opportunistic. Differential pubertal timing therefore provides a critical somatic link between early social experience and later reproductive behavior. More important, because traditional socialization theories do not yield obvious predictions about somatic outcomes of variation in early social experience and behavioral development, findings linking family relations or children's psychosocial functioning with later physical development distinguish our theory from its less biologically oriented predecessors.

Because the timing of puberty is strongly influenced by genetic (Plomin & Fulker, 1987) and nutritional factors (Marshall, 1978), developmentalists have paid little attention to the possibility that early so-

cial ecology and behavioral development may influence pubertal maturation. Typically, timing of puberty is treated as an independent variable, and differences in the personality and social development of early and late maturers are viewed as "outcomes" of maturational processes (see Brooks-Gunn & Reiter, in press). The fact that much of this research is cross-sectional or retrospective in design or, where longitudinal, disregards the possibility that the "outcomes" of differential pubertal timing may derive from prepubertal experiences encourages us to reconsider extant interpretations of the evidence. Following this, we consider research on the social antecedents of pubertal timing.

Personality characteristics of early and late maturers.—We would anticipate that in adolescence early maturers would be more likely than late maturers to evince aggression, extraversion, and psychological and behavioral "dysfunction," including both internalizing problems such as depression and anxiety (especially among girls) and externalizing problems such as impulsivity and conduct disorders (especially among boys). This is in fact the case. Among boys, early maturers are more popular (consistent with the expected higher level of extraversion) (Petersen, 1985); more likely to be involved in problem behavior (Duncan, Ritter, Dornbusch, Gross, & Carlsmith, 1985); and, despite their external appearance of adult maturity, more likely to experience "frequent temper tantrums" (Livson & Peskin, 1980, p. 73). Among girls, early maturers are more popular (Simmons, Blyth, & McKinney, 1983), yet have more self-image and emotional difficulties (including anxiety and depression) (Aro & Taipale, 1987; Simmons & Blyth, 1987), and are more involved in problem behavior (Aro & Taipale, 1987; Magnusson, Statin, & Allen, 1986).

Because longitudinal studies indicate that many of these behavioral patterns are stable between childhood and adolescence (Caspi & Bem, 1990; Digman, 1989), it is quite possible that observed personality and behavioral differences between early and late maturers antedate and affect puberty, rather than the reverse. Needless to say, an adequate test of this proposition requires the assessment of preadolescent psychological functioning, pubertal timing, and behavior during adolescence. Although there are numerous data sets in which this question can be examined empirically, we know of only one study that directly tested the hypothesis that behavioral dysfunction in childhood leads to earlier pubertal maturation. Using data from an ongoing, prospective study of New Zealand girls followed from birth, Moffitt, Caspi, and Belsky (1990) did not find that the presence of either internalizing or externalizing problems at age 7 was predictive of earlier maturation, however. More research on this question is clearly needed before we can fully evaluate this aspect of the theory.

Social antecedents of pubertal timing.—However unusual it may seem to students of human development that timing of puberty is affected by prior and contemporaneous social conditions, this notion is widely accepted among scientists who study reproductive development among nonhuman primates and other mammals. In this section, we examine several lines of evidence derived from both human and animal research that support the hypothesis that the timing of maturation is contextually plastic, socially mediated, and accelerated by intrafamilial stress.

The plasticity of human reproductive functioning in response to social stimuli is well established. For example, studies have documented the synchronization of menstrual cycling among dormitory mates (McClintock, 1980), that sexual activity may induce or quicken ovulation (Trevathan & Burleson, 1989), and that cross-sex contact induces menstrual regularity and shortens the menstrual cycle (Trevathan & Burleson, 1989). Although these studies do not examine pubertal timing specifically, they provide clear evidence of the link between social experience and human endocrinological functioning. Rather than viewing the hormone-behavior relation as unidirectional, recent developments in socioendocrinology indicate that the link between social experience and hormonal activity is reciprocal. As Worthman (in press) notes, there are reasons to expect that this reciprocal relation should be especially potent in the hormonal regulation of sexual behavior and reproduction, including the regulation of pubertal maturation.

Most of the direct evidence of social influences on pubertal maturation comes from research on family relations in nonhuman primates. Among most nonhuman primates living in the wild, pubertal maturation is associated with increased distance in the parent-child relationship, either in terms of increased physical distance or heightened aggression and, ultimately, forced migration

(Caine, 1986; Steinberg, 1989). When voluntary or forced migration is prevented among animals in captivity, however, reproductive maturation is inhibited, especially in the case of females. This effect has been documented in a variety of mammals, including several species of monkeys as well as hamsters, wolves, and wild dogs (Evans & Hodges, 1984; Levin & Johnston, 1986; Tardiff, 1984). Similarly, the sexual development of males housed in captivity in large groups is inhibited by the presence of dominant males and stimulated (or disinhibited) by the removal of more dominant members from the groups (Goy, 1986, personal communication). When separation of juvenile from parent occurs after an inhibitory period, however, reproductive maturity is rapidly attained (Evans & Hodges, 1984; Tardiff, 1984). Taken together, these studies suggest that reproductive maturation specifically may be inhibited by physical closeness to parents and accelerated by distance from them.

Although fewer studies of pubertal timing and family relations exist on humans, the available evidence parallels findings from the animal research. Several studies, employing a diverse set of methodologies, have shown that conflict and distance between parents and children increases at puberty; this effect is more characteristic of females than males, and is more commonly observed in mother-child than father-child relations, although findings in this general direction have been reported across studies of all four parent-child dyads (e.g., Hill, Holmbeck, Marlow, Green, & Lynch, 1985a, 1985b; Papini & Sabby, 1987; Steinberg, 1987, 1988; Susman et al., 1987). Sociobiological explanations of this phenomenon make good sense, since postpubertal distance in the parent-child relationship would minimize inbreeding and increase reproductive fitness (Steinberg, 1989).

Of course, correlational studies of puberty and parent-child distance do not indicate the causal direction of the relation between these two variables. Especially interesting, therefore, are two studies of human adolescents that suggest that parent-child distance may precede pubertal onset, at least in homes of girls, and that female adolescents who have more strained family relations mature earlier than their peers whose family relations are closer. In the first of these investigations, Steinberg (1988) found that girls who reported more strained relations with their parents (and especially with their mother) matured faster physically over the next 12 months than did age-mates who began the year at an equivalent stage of puberty but reported initially closer family ties.

The constrained time period of the Steinberg study leaves open the possibility that there were pre-assessment differences in youngsters' rate of maturation (although not in their actual pubertal status at the initial assessment) that caused the observed differences in parent-child relations. For this reason, the aforementioned study of Moffitt et al. (1990) is especially interesting. In their sample of New Zealand girls, family conflict at age 7 was significantly, albeit modestly, predictive of earlier menarche, even after the effects of parental divorce (which may also accelerate puberty—see below) and weight (which is known to be associated with earlier maturation; Frisch & McArthur, 1974) were taken into account in a path analysis.

Further evidence that preadolescent contextual stress is associated with accelerated maturation among girls is found in research on the developmental consequences of father absence. Jones, Leeton, McLeod, and Wood (1972), Moffitt et al. (1990), and Surbey (1990) each report that girls reared in father-absent households attain menarche at an earlier age than their counterparts in intact homes; moreover, early father absence (Jones et al., 1972; Moffitt et al., 1990) and years of father absence (Surbey, 1990) are especially predictive of early puberty in girls. Surbey also reports that higher levels of stress are associated with earlier menarche in families in which fathers were present. This finding, along with those of Moffitt et al. (1990) concerning family conflict, suggests that it is not the absence of a father that speeds pubertal maturation, but the stress associated with divorce and with growing up in a single-parent household (McLanahan & Booth, 1989; McLoyd, 1990).

Thus, despite the powerful role that genetic factors play in influencing individual differences in pubertal and sexual maturation, a number of studies suggest that girls who have been exposed to stressful conditions in the family both before and around the time of puberty may attain menarche earlier and mature at a faster rate. We suggest that early stress may affect pubertal timing by making the individual more biologically reactive to social conditions as she approaches the age of pubertal onset. Whether

similar processes are operative among males is not known, since most of the relevant animal and human research has focused on females. Obviously, the greater precision with which the timing of menarche can be measured compared with parallel indices of pubertal maturation in males contributes to our limited knowledge about influences on the timing of male puberty.

Although the research we have considered provides intriguing support for our propositions concerning contextual stress and pubertal timing, we would be remiss if we did not draw attention to evidence that would seem to be inconsistent with our theory. Perhaps the most noteworthy is that regarding the secular trend in physical development, as it provides the best evidence that pubertal timing is contextually plastic: For the past 200 years, age of menarche has decreased substantially in industrialized societies. Although this change is routinely presumed to be the (not necessarily exclusive) result of improvements in nutrition and general living conditions (Eveleth & Tanner, 1976; but see Adams, 1981, for an alternative explanation), we must acknowledge the possibility that industrialized society may in certain respects be more stressful than its preindustrialized counterpart. Consider in this regard not only that people live in closer proximity to nonrelatives than they ever did before, but also that the intuitive sense that parent-child relations and family life have become more harmonious in recent centuries remains unconfirmed.

Moreover, even if we attribute the secular trend to improvements in nutrition and health and regard it as inconsistent with our prediction that stress accelerates pubertal timing, the possibility must be entertained that nutrition and health affect reproductive development in a manner different from other sources of influence. Consider in this regard animal research indicating that early life stress accelerates physical development (Denenberg, Garbanati, Sherman, Yutzey, & Kaplan, 1980) and human research indicating that anovulation and amenorrhea can result from starvation, excessive exercise, or exceedingly high levels of stress (Frisch & McArthur, 1974; McClintock, 1980; Surbey, 1987).

In point of fact, evidence that maturational delay in human females results from extreme physical exercise and starvation (i.e., anorexia nervosa) raises the prospect that the relation between some stressors to which our theory draws attention and pubertal timing might best be conceptualized as curvilinear. Whereas moderate and even relatively high levels of stress may stimulate earlier maturation, extreme stress may shut down physical maturation. The biological system may have evolved to accelerate sexual development when reproductive prospects are perceived as limited and a competitive edge is needed—thus earlier maturation—but to defer sexual development when the very survival, not simply the reproductive prospects, of the organism are threatened (Surbey, 1987). In essence, under conditions of moderate to high stress, caloric resources may be marshaled in an effort to enhance reproductive possibility, but when stress becomes too extreme, the system functions to conserve resources by inhibiting sexual development.

It is beyond the scope and purpose of this article to discuss the possible neuroendocrinological processes by which early and proximate social experiences may be related to the timing of puberty. Suffice it to say that it is widely accepted that the timing of puberty is regulated by a neuroendocrine subsystem that is intertwined with other endocrine systems, and that this system is both dynamic and responsive to environmental stimuli (Brooks-Gunn & Reiter, in press). It is also important to note that the role of stress in the acceleration of puberty may be organizational rather than activational. In other words, there may be important individual differences in neuroendocrine functioning that do not emerge somatically until adolescence, but which originate in childhood experience (e.g., Phoenix, Gpy, Gerall, & Young, 1959). The notion that early events may affect pubertal development is consistent with other research on the organizational effects of hormones on pubertal maturation (e.g., Coe, Hayashi, & Levine, 1988) as well as with data from the Standard Cross-Cultural Sample (Murdock and others, 1971), indicating that average adult stature among males increases as a function of the degree to which the individual's society is characterized by high levels of stress and father absence during infancy (Gray, personal communication, no date). Such evidence, and our theorizing, together suggest that one profitable strategy for enhancing understanding of endocrinological processes involved in sexual maturation might involve comparing the endocrinological systems of prepubertal school-age children whom our theory predicts will mature at different rates

(i.e., those from high-risk environments evincing behavior problems and nondisordered age-mates from low-stress families).

Pubertal timing and sexual activity.—We have argued that processes that induce early puberty are part of a reproductive strategy that has evolved to foster early mating and limited parental investment. Moreover, we have theorized that in the environment of evolutionary adaptation, early maturation fostered the early onset of sexual activity in the service of procreation. Although one would no longer predict, given current cultural conditions, contraceptive accessibility, and the widespread availability of abortion, that early maturation necessarily leads to early childbearing, there is good reason to expect that it is related to earlier sexual activity.

The onset of sexual activity in adolescence is strongly linked to biological development: Boys and girls who mature early initiate intercourse at a younger age than their peers (Aro & Taipale, 1987; Magnusson et al., 1986; Smith, Udry, & Morris, 1985). The hormonal changes of puberty—and especially the surge in testosterone—increase the adolescent's sex drive, interest in sex, and level of arousal when exposed to sexual stimuli (Smith et al., 1985; Udry, 1987; Udry, Talbert, & Morris, 1986).

Because not all adolescents of equivalent pubertal status are equally likely to engage in sexual activity, studies of nonbiological factors that appear to augment the direct impact of puberty on sexual behavior are especially interesting. Consistent with our perspective, adolescents who come from single-parent households or who evince signs of delinquency and substance abuse are more likely than their same-age, comparably developed peers to be sexually active (Jessor, Costa, Jessor, & Donovan, 1983; Newcomer & Udry, 1987; Thorton & Camburn, 1987).

At first glance, the link between sexual activity and various "problem" behaviors and environments is easily explained within conventional theories of socialization, but upon further reflection one is forced to wonder about the underlying mechanism. In a society that no longer labels nonmarital sexual activity as "deviant," one must ask why this behavior covaries with such censured behaviors as delinquency and substance abuse. Jessor (Jessor & Jessor, 1977; Jessor et al., 1983) has suggested that an underlying personality constellation composed of impulsivity, independence striving, and unconventionality accounts for the clustering of problem behaviors in adolescence, including substance abuse, delinquency, and precocious sexual activity. According to our theory, these behaviors should cluster together, but not because they are problematic. Rather, we predict that these behaviors covary because they all manifest the same opportunistic, risk-tasking reproductive strategy.

The links between family structure and the onset of sexual activity are predicted from most theories of adolescent development, but the mediating mechanisms presumed important in these theories are not operative. Specifically, the higher rate of sexual activity among adolescents from single-parent homes is not attributable to less vigilant parental monitoring (despite the finding that single parents are less vigilant; Dornbusch et al., 1985), nor is it apparently a transient reaction to divorce-related stress, since earlier sexual activity is observed among girls from single-parent homes regardless of when or whether their parents divorced (Newcomer & Udry, 1984, 1987). We contend that an interpretation of this evidence in terms of reproductive strategy is illuminating.

Childhood Context and Adult Personality Determinants of Pair Bonding

On the basis of our theorizing that linkages among childhood experience, psychological functioning, pubertal timing, and sexual behavior have evolved to serve reproductive functions, we would expect childhood rearing experiences or environments to be systematically related to variation in adult pair-bonding processes. Because such linkages are assumed to be mediated, at least in part, by the psychological orientation of the individual, adult personality should also be related to patterns of pair bonding. We now consider evidence consistent with such notions.

Childhood family context and adult pair bonding.—Social scientists interested in the intergenerational transmission of divorce and the consequences of growing up in a single-parent family have conducted numerous studies linking childhood family context and adult pair bonding, though rarely have these inquiries been discussed in such terms. Nevertheless, research on dating behavior, sexual activity, timing of marriage, and marital instability are all, in es-

sence, investigations of pair bonding and relationship processes.

With regard to dating, there is consistent evidence that divorce and family conflict are related to increased heterosexual activity among offspring (Demo & Acock, 1988; Kinnard & Gerrard, 1986). Perhaps the first to discern such a link was Hetherington (1972), who observed that adolescent girls from divorced families, but not girls whose fathers had died, were more heterosexually assertive than girls from intact families. This evidence is consistent with Booth, Brinkerhoff, and White's (1984) finding that, compared to college students with intact families, those whose parents were divorced or permanently separated dated more often, and this activity increased further if parental or parent-child conflict persisted during and after divorce (see also Kinnard & Gerrard, 1986). Also in accord with such findings is consistent evidence that males and females not living with both biological parents initiate coitus earlier than their counterparts in intact families (Hogan & Kitagawa, 1985; Kinnard & Gerrard, 1986; Newcomer & Udry, 1987). As we noted earlier, this does *not* appear to be due to less vigilant monitoring by single parents (Newcomer & Udry, 1987).

In light of all these results pertaining to dating and sexual behavior, it should not be surprising to discover that children of divorce marry earlier than other individuals (Carlson, 1979; Mueller & Pope, 1977), even after socioeconomic factors are controlled (Keith & Finlay, 1988; McLanahan & Bumpass, 1988). Moreover, in view of the fact that age at marriage is itself related to marital stability (e.g., Bumpass & Sweet, 1972; Glenn & Supancic, 1984), there is also little reason to be surprised that children of divorce are more likely to experience, in adulthood, the dissolution of their own marriages (e.g., Glenn & Kramer, 1987; Keith & Finlay, 1988). This, too, cannot be attributed entirely to socioeconomic factors (McLanahan & Bumpass, 1988).

Adult personality and marital quality.—The fact that dating, sexual activity, and marital stability are each related to exposure to divorce in childhood provides some support for the contention that childhood family experiences are related to adult pair-bonding processes. In light of the emphasis we place on the role of experience in fostering opportunistic orientations toward others and toward relationships, we would expect *marital quality,* perhaps more than stability, to be systematically related to personality or psychological characteristics of adults; and, specifically, that marriages are more likely to be satisfactory and stable when individuals have personality characteristics that promote mutually beneficial social exchange than when they have personalities more geared toward opportunism and advantage taking.

Terman (1938; Terman & Buttenweiser, 1935) was among the first to document empirical associations between personality characteristics of spouses and marital functioning—personality characteristics, in fact, that can easily be interpreted in terms of the distinction we have been emphasizing between a secure, mutual-benefit orientation and an insecure, opportunistic, and self-centered one. Consider, in this regard, his summary of the self-descriptions of the most happy and least happy couples whom he studied. Happily married women, he noted "are characterized by *kindly* attitudes toward others and by the *expectation* of *kindly* attitudes in return. . . . They are *cooperative.* . . . They enjoy activities that bring . . . *pleasurable opportunities to others* . . . their expressed attitudes imply a quiet *self-assurance* and a decidedly *optimistic* outlook on life. . . . Unhappily married women, on the other hand, are characterized by *emotional tenseness.* . . . They give evidence of *deep-seated inferiority* feelings to which they react with *aggressive* attitudes. . . . They are inclined to be *irritable.* . . . They are *egocentric*" (Terman, 1938, pp. 145–146, emphasis added). Not surprisingly, findings with regard to men were much the same.

In the time since Terman's (1938) classic study, a large quantity of data have been collected that are generally consistent with it (Dean, 1966; Eysenck, 1980; Pickford, Signori, & Rempel, 1966). One criticism that can be wielded against all of this work is that measures of personality and marriage were obtained at roughly the same point in time. Fortunately, two recent longitudinal studies demonstrate that personality actually forecasts future marital quality. In one investigation of 300 couples followed from their engagements in the 1930s through 1980, Kelley and Conley (1987) found that higher levels of neuroticism (among men and women) and lower levels of agreeableness (among men only) predicted both greater marital instability and lower marital satisfaction. In the second longitudinal study, Skolnick (1981) reported that a self-confident and nurturant

(versus hostile) orientation during adolescence positively predicted marital satisfaction at midlife. Although none of the findings reviewed prove to be particularly surprising, they are consistent with our prediction that psychological profiles which incline one to relate to others in an opportunistic manner are associated with less stable and less satisfying pair bonds in adulthood.

Strong Inference Tests of the Theory

In summary, then, there is a rather extensive literature that is in accord with predictions derived from our evolutionary theory of socialization and interpersonal development. The evidence reviewed indicates (*a*) that under conditions of contextual stress parental care is less sensitive, more inconsistent, and more affectively negative; (*b*) that infants and young children exposed to such parenting practices are more likely than others to develop insecure attachments to their parents and to grow up evincing "problematic" behavior and opportunistic styles of relating to others; (*c*) that rearing conditions which promote such patterns of psychological and behavioral development predict, in the few studies available, earlier pubertal maturation; (*d*) that early puberty is related to opportunistic styles of relating to others, including "problem" behavior, as well as (*e*) early onset of sexual activity; (*f*) that early rearing environments characterized by marital dissolution and family conflict are predictive in adolescence and adulthood of frequent dating, early marriage, and divorce; and, finally, (*g*) that marital dissolution as well as poor marital quality are more likely when spouses are emotionally unstable, insecure, and self-centered.

Despite the abundance of evidence consistent with our perspective, none of these data actually confirm the major precepts of the theory. Indeed, the most fundamental criticism that can be directed against the research summarized is the same one that has been directed at much socialization research (Plomin et al., 1985; Scarr & McCartney, 1983). It involves the fact that although most socialization theories, ours included, presume that childhood experiences causally influence psychological and behavioral development and, in our case, even somatic development, virtually all evidence amassed in an attempt to verify them confounds genetic and environmental processes.

When this line of argument is applied to the theory we have advanced, it raises the possibility that parents, for example, who are genetically predisposed to rear their offspring in an insensitive, unresponsive, rejecting, neglecting, and/or inconsistent manner may bear children who are genetically predisposed to be aggressive, develop behavior problems, mature earlier than others, and become sexually active at earlier ages. Certainly consistent with this line of reasoning is evidence that onset of puberty (measured by peak height velocity, menarche, or ratings of secondary sex characteristics [Fischbein, 1977a, 1977b]) and age of first sexual intercourse (Martin, Eaves, & Eysenck, 1977) show substantial genetic influence (Plomin & Fulkner, 1987). However, because recent research indicates that a dimension of personality labeled "agreeableness," which defines a nice, friendly, and trusting personal style of relating to others, shows minimal genetic influence (Bergeman et al., in press), and that aggression might be one of the *least* heritable aspects of behavior (for review, see Plomin, Nitz, & Rowe, in press), we do not believe it is tenable to assume that genetics account for the entire relation between context, rearing, psychological and somatic development, and reproductive strategy.

Because the postulated effects of context, experience, and psychological and behavioral development on puberty represent the most original—and uncanny—prediction of our theory, it is essential to design strong inference research (Platt, 1964) capable of disconfirming the prediction that under conditions of contextual stress, "problematical" rearing, and/or childhood behavior problems, children will mature earlier than their peers. Two research designs seem most appropriate, one experimental, the other correlational. The correlational design would involve identical and fraternal twins reared apart and/or adopted and biological children. The central goal of the research would be to test the effect of the hypothesized antecedent conditions (contextual stress, problematic parenting, and child behavior problems), after controlling for the heritability of pubertal timing and, ideally, of problematic parenting and behavior problems as well. If the hypothesized antecedents of early puberty did not emerge once behavior genetic variance was statistically controlled, then a critical theoretical proposition would have been disconfirmed.

From a more experimental standpoint, we propose randomly assigning children

from troubled families and at high risk for the development of behavior problems to a treatment condition known to be effective in preventing behavior problems or to a nontreatment control group. On the basis of the theory outlined in this article, two predictions would be tested. The first is that children assigned to the control treatment would mature earlier than those in the experimental group; the second is that within the experimental group, those for whom the treatment proved most effective in preventing externalizing and/or internalizing behavior problems would mature later than would those within the experimental group for whom the treatment proved less effective. Needless to say, if both research designs just outlined were implemented and effects of antecedent conditions on puberty were discerned, this would provide very strong evidence in favor of the theory.

Conclusion

By placing the study of socialization in evolutionary perspective, we have sought to integrate a variety of areas of inquiry that for the most part have remained relatively separate in the developmental literature. Although a number of the topics our theory links together have been recognized as related—as demonstrated in our summaries of research on contextual stress and harsh parenting, attachment insecurity and behavior problems, early puberty and sexual activity, and experiences in the family or origin and subsequent pair bonding—no current theory of socialization provides a basis for linking these literatures within an overarching conceptual framework. We believe that an evolutionary perspective that emphasizes individual differences in reproductive strategy offers a promising foundation.

One important way in which we have recast traditional ideas about development concerns our attempt to extend contemporary attachment theory in a manner consistent with the modern view of evolution. In his original formulation of attachment theory, and "in the context of the evolutionary theory of the time" (Main, 1990), Bowlby (1969) asserted that attachment behaviors evolved because actions on the part of the infant such as crying, following, and clinging served to increase the likelihood of *species* survival. Lamb, Thompson, Gardner, Charnov, and Estes (1984) critiqued this feature of the theory on two grounds: first, that it failed to incorporate understandings derived from the "modern synthesis" of evolutionary theory—namely, that *individuals* are selected on the basis of behaviors that *maximize reproductive fitness;* and second, that students of Bowlby have presumed that a secure, trusting attachment was the norm within the environment of evolutionary adaptedness (e.g., Ainsworth et al., 1978; Sroufe, 1979). Although Lamb et al. were correct on both counts, we believe they missed an opportunity to reinterpret Bowlby in light of a contemporary understanding of behavioral evolution (Hinde & Stevenson-Hinde, 1990; Main, 1990). In essence, we have argued that the variations in attachment security that Bowlby's theory so clearly anticipated evolved to serve reproductive fitness goals in an ecologically sensitive manner.

We also believe that our view extends in new and interesting directions several other popular perspectives on development. Neither Elder's (Elder et al., 1985) sociologically informed analysis of the life-course consequences of economic deprivation nor Patterson's (1986) social-learning formulation of family processes that give rise to antisocial behavior—to cite but two examples—is informed by evolutionary thinking in general or by ideas pertaining to reproductive fitness more specifically. Nevertheless, both of these views can be easily assimilated into the framework advanced in this article in a manner that simultaneously preserves and enhances their contribution to the study of socialization and interpersonal development. While Elder and Patterson each seeks to explain how particular life experiences foster particular patterns of behavioral development (i.e., proximate causation), neither addresses *why* human development works in the way in which they describe it (i.e., ultimate causation). By focusing on questions of ultimate causation, our theory seeks to extend and incorporate theirs.

The feature of our theory that distinguishes it from others is the prediction that prepubertal rearing experiences and behavioral developments influence the timing of puberty and that these developmental events and processes collectively affect adolescent sexual behavior and adult pair bonding. Central to our theory is the notion drawn from modern evolutionary biology that humans, like many other animals, often adjust their life histories in response to contextual conditions in a manner that will enhance reproductive fitness—or at least would have in the environment of evolution-

ary adaptation. In this regard it is important to note that the influence which context, rearing, and behavioral development may have on pubertal timing today may be less than it once was. In fact, in light of the secular trend in pubertal timing, the age of reproductive maturation may be less plastic and less responsive to the developmental experiences to which our theory draws attention than it was when evolutionary pressures first shaped the processes of human development. We continue to expect prepubertal experiences to influence pubertal timing, but acknowledge that the magnitude of effect may be more limited than once might have been the case.

In order to test this prediction, it will be necessary not only to discount behavior genetic explanations but to consider seriously the conditional version of our theory. This strongest version of our theory asserts that puberty will be earlier among children (1) who grow up in contexts of stress, (2) *and* experience parent-child relationships that are rejecting or aversive, (3) *and* evince prepubertal behavior problems. In other words, adequate tests of the theory will need to take into consideration rearing context, parent-child relations, *and* prepubertal behavioral development, at least when it comes to trying to predict pubertal timing.

In only a limited manner have we addressed issues concerning the possible neuroendocrinological or endocrinological mechanisms—either in adolescence or earlier—that may link social experiences and somatic development. Certainly the findings of Moffitt et al. (1990), Steinberg (1988), and Surbey (1990) underscore a need for more research on the physiological and hormonal processes that mediate the association between family relations and pubertal timing. More generally, however, more research attention needs to be paid to the relevant developmental processes that are set in motion well before puberty but that influence its timing and tempo. It is time that developmentalists interested in adolescence begin to systematically examine pubertal timing as *an outcome of social experience,* rather than presuming the reverse causality. At the very least, we hope that our theorizing stimulates research that challenges the "conventional wisdom" that treats pubertal timing as the independent variable and psychological and behavioral development as dependent variables.

In addition to stimulating new research on social and psychobiological processes connected to pubertal maturation, we believe the theory highlights the need for new research on learning in infancy and early childhood. Cosmides and Tooby (1987) as well as Symons (1989) have recently argued that humans have evolved to process information in particular ways or to learn some things more easily than others because they are especially important with regard to reproductive fitness. When such ideas are applied to the developmental theory advanced in this article, the prospect is raised that there might be certain features of experience and relationships that young children are keen at discerning because these help set the youngster on a developmental trajectory toward a reproductive strategy consistent with the demands of his or her perceived environment (Draper & Harpending, 1982; Weinrich, 1977). Thus, children should be especially attuned—through their own emotional experience—to whether their own needs are being served via the care they are being given. Associations between attachment security and responsive maternal care can be reinterpreted in this manner.

Kurt Lewin once wrote that there is nothing so practical as a good theory. More specifically, we would argue that a good theory should do three things: (1) help to reorganize old findings in a manner that generates new understanding; (2) generate new and testable hypotheses; and, as a result, (3) lead to new inquiry and new discoveries. As to the first of these aims, we believe that our perspective both enhances and extends existing models of socialization in a manner that is consistent with recent developments in the fields of evolutionary biology and behavioral ecology. As to the second of these aims, we have attempted to set forth a number of specific and testable hypotheses about the links between context, early experience, social behavior, somatic development, sexuality, and family formation. Whether the theory we have advanced actually leads to the development of new knowledge awaits empirical inquiry.

References

Adams, J. (1981). Earlier menarche, greater height and weight: A stimulation-stress factor hypothesis. *Genetic Psychology Monographs,* **104,** 3–22.

Ainsworth, M., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment.* Hillsdale, NJ: Erlbaum.

Aro, H., & Taipale, V. (1987). The impact of timing of puberty on psychosomatic symptoms among fourteen- to sixteen-year-old Finnish girls. *Child Development,* **58,** 261–268.

Bandura, A. (1977). *Social learning theory.* Englewood Cliffs, NJ: Prentice-Hall.

Barkow, J. (1984). The distance between genes and culture. *Journal of Anthropological Research,* **40,** 9–14.

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology Monographs,* **4,** 1–103.

Belsky, J. (1980). Child maltreatment: An ecological integration. *American Psychologist,* **35,** 320–335.

Belsky, J. (1981). Early human experience: A family perspective. *Developmental Psychology,* **17,** 3–23.

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development,* **55,** 83–96.

Belsky, J. (1990). Parental and nonparental care and children's socioemotional development: A decade in review. *Journal of Marriage and the Family,* **52,** 885–903.

Belsky, J., Rovine, M., & Taylor, D. G. (1984). The Pennsylvania Infant and Family Development Project: III. The origins of individual differences in infant-mother attachment. Maternal and infant contributions. *Child Development,* **55,** 718–728.

Bergeman, C., Chipuer, H., Plomin, R., Pedersen, N., McClearn, G., Nesselroade, J., & Costa, P. (in press). Openness to experience, agreeableness, and conscientiousness assessed separately by age and gender: An adoption/twin study. *Journal of Personality and Social Psychology.*

Biller, H. (1981). Father absence, divorce, and personality development. In M. Lamb (Ed.), *The role of the father in child development* (pp. 319–358). New York: Wiley.

Booth, A., Brinkerhoff, D., & White, C. (1984). The impact of parental divorce on courtship. *Journal of Marriage and the Family,* **46,** 85–94.

Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment.* New York: Basic.

Bradley, R. H., Caldwell, B. M., & Rock, S. L. (1988). Home environment and school performance: A ten-year follow-up and examination of three models of environmental action. *Child Development,* **59,** 852–867.

Bradshaw, A. (1965). Evolutionary significance of phenotypic plasticity in plants. *Advances in Genetics,* **13,** 115–155.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist,* **32,** 513–531.

Bronfenbrenner, U., & Crouter, A. (1982). Work and family through time and space. In S. Kamerman & C. Hayes (Eds.), *Families that work* (pp. 39–83). Washington, DC: National Academy Press.

Brooks-Gunn, J., & Reiter, E. (in press). Pubertal development. In S. Feldman & G. Elliott (Eds.), *At the threshold: The developing adolescent.* Cambridge, MA: Harvard University Press.

Bumpass, L., & Sweet, J. (1972). Differentials in marital instability: 1970. *American Sociological Review,* **37,** 754–766.

Burgess, R., & Draper, P. (1989). The explanation of family violence: The role of biological behavioral and cultural selection. In L. Ohlin & M. Tonry (Eds.), *Family violence* (pp. 59–116). Chicago: University of Chicago Press.

Caine, N. (1986). Behavior during puberty and adolescence. In G. Mitchell & J. Erwin (Eds.), *Comparative primate biology: Vol. 2A. Behavior, conservation, and ecology* (pp. 327–361). New York: Liss.

Campbell, S. (in press). Developmental perspectives on child psychopathology. In M. Hersen & T. Ollendick (Eds.), *Handbook of child psychopathology* (2d ed.). New York: Plenum.

Carlson, E. (1979). Family background, school, and early marriage. *Journal of Marriage and the Family,* **41,** 341–353.

Caspi, A., & Bem, D. (1990). Personality continuity and change across the life course. In L. A. Pervin (Ed.), *Handbook of personality theory and research* (pp. 549–575). New York: Guilford.

Chisholm, J. (1988). Toward a developmental evolutionary ecology. In K. MacDonald (Ed.), *Sociobiological perspectives on human development* (pp. 78–102). New York: Springer Verlag.

Cicchetti, D., & Braunwald, K. (1984). An organizational approach to the study of emotional development in maltreated infants. *Infant Mental Health Journal,* **5,** 172–183.

Cicchetti, D., & Carlson, V. (Eds.). (1989). *Child maltreatment: Theory and research on the causes and consequences of child abuse neglect.* New York: Cambridge.

Coe, C., Hayashi, K., & Levine, S. (1988). Hormones and behavior at puberty: Activation or concatenation. In M. Gunnar & W. A. Collins (Eds.), *The Minnesota symposia on child psychology* (Vol. **21,** pp. 17–41). Hillsdale, NJ: Erlbaum.

Conger, R., McCarty, J., Yang, R., Lahey, B., & Kropp, J. (1984). Perception of child, child-rearing values, and emotional distress as mediating links between environmental stressors and observed maternal behavior. *Child Development,* **54,** 2234–2247.

Cosmides, L., & Tooby, J. (1987). From evolution to behavior: Evolutionary psychology as the missing link. In J. Dupre (Ed.), *The latest and best: Essays on evolution and optimality* (pp. 277–306). Cambridge, MA: MIT Press.

Crawford, C., & Anderson, J. (1989). Sociobiology: An environmentalist discipline? *American Psychologist*, **44**, 1449–1460.

Crouter, A. C. (in press). Processes linking families and work: Implications for development in both settings. In R. Parke & S. Kellam (Eds.), *Advances in family research*, Vol. 2. New York: Erlbaum.

Cutler, W. B., Garcia, C. R., & Krieger, A. B. (1979). Sexual behavior frequency and menstrual cycle length in mature premenopausal women. *Psychoneuroendocrinology*, **4**, 297–309.

Dean, D. (1966). Emotional maturity and marital adjustment. *Journal of Marriage and the Family*, **28**, 454–457.

Demo, D., & Acock, A. (1988). The impact of divorce on children. *Journal of Marriage and the Family*, **50**, 619–648.

Denenberg, V., Garbanati, J., Sherman, G., Yutzey, D., & Kaplan, R. (1980). Infant stimulation induces brain lateralization in rats. *Science*, **201**, 1150–1152.

Digman, J. (1989). Five robust traits and dimensions: Development, stability, and utility. *Journal of Personality*, **57**, 195–214.

Dornbusch, S., Carlsmith, J., Bushwall, S., Ritter, P., Leiderman, H., Hastorf, A., & Gross, R. (1985). Single parents, extended households, and the control of adolescents. *Child Development*, **56**, 326–341.

Draper, P., & Belsky, J. (1990). The relevance of evolutionary thinking for issues in personality development. *Journal of Personality*, **58**, 141–162.

Draper, P., & Harpending, H. (1982). Father absence and reproductive strategy: An evolutionary perspective. *Journal of Anthropological Research*, **38**, 255–273.

Duncan, P., Ritter, P., Dornbusch, S., Gross, R., & Carlsmith, J. (1985). The effects of pubertal timing on body image, school behavior, and deviance. *Journal of Youth and Adolescence*, **14**, 227–236.

Elder, G. (1981). History and the life course. In D. Bertaux (Ed.), *Biography and society: The life history approach in the social sciences* (pp. 77–115). Beverly Hills, CA: Sage.

Elder, G., Nguyen, T., & Caspi, A. (1985). Linking family hardship to children's lives. *Child Development*, **56**, 361–375.

Emery, R. (1988). *Marriage, divorce, and children's adjustment*. Beverly Hills, CA: Sage.

Epstein, E., & Erskine, N. (1983). The development of personal theories of reality from an interactional perspective. In M. Magnussen & V. Allen (Eds.), *Human development: An interactional perspective* (pp. 113–147). New York: Academic Press.

Erickson, M. F., Sroufe, L. A., & Egeland, B. (1985). The relationship between quality of attachment and behavior problems in preschool in a high-risk sample. In I. Bretherton & E. Waters (Eds.), Growing points of attachment theory and research (pp. 147–193). *Monographs of the Society for Research in Child Development*, **50**(1–2, Serial No. 209).

Evans, S., & Hodges, J. (1984). Reproductive status of adult daughters in family groups of common marmosets (*Callithrix jacchus jacchus*). *Folia Primatologica*, **42**, 127–133.

Eveleth, P., & Tanner, J. (1976). *Worldwide variation in human growth*. New York: Cambridge University Press.

Eysenck, H. (1980). Personality, marital satisfaction, and divorce. *Psychological Reports*, **47**, 1235–1238.

Fischbein, S. (1977a). Onset of puberty in MZ and DZ twins. *Acta Geneticae Medicne et Gemellologiae*, **26**, 151–158.

Fischbein, S. (1977b). Intra-pair similarity in physical growth of monozygotic and dizygotic twins during puberty. *Annals of Human Biology*, **4**, 417–430.

Frisch, R., & McArthur, J. (1974). Menstrual cycles: Fatness as a determinant of minimum weight necessary for their maintenance or onset. *Science*, **185**, 949–951.

Glenn, N., & Kramer, K. (1987). The marriages and divorces of the children of divorce. *Journal of Marriage and the Family*, **49**, 811–825.

Glenn, N., & Supanic, M. (1984). The social and demographic correlates of divorce and separation in the United States: An update and reconsideration. *Journal of Marriage and the Family*, **46**, 563–576.

Grossmann, K., Grossmann, K. E., Spangler, G., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborn orientation responses as related to quality of attachment in Northern Germany. In I. Bretherton & E. Waters (Eds.), Growing points of attachment theory and research (pp. 233–256). *Monographs of the Society for Research in Child Development*, **50**(1–2, Serial No. 209).

Hamilton, W. (1964). The genetical theory of social behavior. *Journal of Theoretical Biology*, **7**, 1–52.

Herrenkohl, E. C., & Herrenkohl, R. C. (1981). Some antecedents and developmental consequences of child maltreatment. *New Directions for Child Development*, **11**, 57–76.

Hetherington, E. M. (1972). Effects of paternal absence on personality development in adoles-

cent daughters. *Developmental Psychology,* **7,** 313–326.

Hill, J., Holmbeck, G., Marlow, L., Green, T., & Lynch, M. (1985a). Pubertal status and parent-child relations in families of seventh-grade boys. *Journal of Early Adolescence,* **5,** 31–44.

Hill, J., Holmbeck, G., Marlow, L., Green, T., & Lynch, M. (1985b). Menarcheal status of parent-child relations in families of seventh-grade girls. *Journal of Youth and Adolescence,* **14,** 301–316.

Hinde, R. (1982). Attachment: Some conceptual and biological issues. In C. M. Parkes & J. Stevenson-Hinde (Eds.), *The place of attachment in human development.* London: Tavistock.

Hinde, R., & Stevenson-Hinde, J. (1990). Attachment: Biological, cultural, and individual desiderata. *Human Development,* **33,** 48–61.

Hogan, D., & Kitagawa, E. (1985). The impact of social status, family structure, and neighborhood on the fertility of black adolescents. *American Journal of Sociology,* **90,** 825–855.

Holden, G. W., & West, M. J. (1989). Proximate regulation by mothers: A demonstration of how differing styles affect young children's behavior. *Child Development,* **60,** 64–69.

Howes, C., & Eldredge, R. (1985). Responses of abused, neglected, and non-maltreated children to the behaviors of their peers. *Journal of Applied Developmental Psychology,* **6,** 261–270.

Jacobson, J. L., & Wille, D. E. (1986). The influence of attachment pattern on developmental changes in peer interaction from the toddler to the preschool period. *Child Development,* **57,** 338–339.

Jessor, R., Costa, F., Jessor, L., & Donovan, J. (1983). Time of first intercourse: A prospective study. *Journal of Personality and Social Psychology,* **44,** 608–626.

Jessor, R., & Jessor, S. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth.* New York: Academic Press.

Jones, B., Leeton, J., McLeod, I., & Wood, C. (1972). Factors influencing the age of menarche in a lower socio-economic group in Melbourne. *Medical Journal of Australia,* **21,** 533–535.

Jouriles, E., Pfiffner, L., & O'Leary, S. (1988). Marital conflict, parenting, and toddler conduct problems. *Journal of Abnormal Child Psychology,* **16,** 197–206.

Keith, V., & Finlay, B. (1988). The impact of parental divorce on children's educational attainment, marital timing, and likelihood of divorce. *Journal of Marriage and the Family,* **50,** 797–809.

Kelley, E., & Conley, J. (1987). Personality and compatibility: A prospective analysis of marital stability and marital satisfaction. *Journal of Personality and Social Psychology,* **52,** 27–40.

Kinnard, K., & Gerrard, M. (1986). Premarital sexual behavior and attitudes toward marriage among young women as a function of their mothers' marital status. *Journal of Marriage and the Family,* **48,** 757–765.

Kochanska, G., Kuczynski, L., Radke-Yarrow, M., & Welsh, J. (1987). Resolutions of control episode between well and affectively ill mothers and their young children. *Journal of Abnormal Child Psychology,* **15,** 441–446.

Konishi, M., Emlen, S., Ricklets, R., & Wingfield, J. (1989). Contributions of bird studies to biology. *Science,* **46,** 465–472.

Krebs, J., & Davies, N. (1981). *An introduction to behavioral ecology.* Sunderland, MA: Sinauer.

Kuczynski, L., Kochanska, G., Radke-Yarrow, M., & Girniss-Brown, D. (1987). A developmental interpretation of young children's noncompliance. *Developmental Psychology,* **23,** 1–8.

Lack, D. (1947). *Darwin's finches.* New York: Cambridge University Press.

LaFreniere, P. J., & Sroufe, L. A. (1985). Profiles of peer competence in the preschool: Interrelations between measures, influence of social ecology, and relation to attachment history. *Developmental Psychology,* **21,** 56–69.

Lamb, M., Thompson, R., Gardner, W., Charnov, E., & Estes, D. (1984). Security of infantile attachment as assessed in the Strange Situation: Its study and biological interpretation. *Behavioral and Brain Sciences,* **7,** 127–147.

Lancaster, J. (1986). Human adolescence and reproduction. In J. Lancaster & B. Hamburg (Eds.), *School-age pregnancy and parenthood* (pp. 17–38). New York: Aldine.

Lempers, J., Clark-Lempers, D., & Simons, R. (1989). Economic hardship, parenting, and distress in adolescence. *Child Development,* **60,** 25–49.

Levin, R., & Johnston, R. (1986). Social mediation of puberty: An adaptive female strategy? *Behavioral and Neural Biology,* **46,** 308–324.

Lewis, M., Feiring, C., McGuffog, C., & Jaskir, J. (1984). Predicting psychopathology in six-year-olds from early social relations. *Child Development,* **55,** 123–136.

Livson, N., & Peskin, H. (1980). Perspectives on adolescence from longitudinal research. In J. Adelson (Ed.), *Handbook of adolescent psychology* (pp. 148–187). New York: Wiley.

Lütkenhaus, P., Grossmann, K. E., & Grossmann, K. (1985). Infant-mother attachment at twelve months and style of interaction with a

stranger at the age of three years. *Child Development*, **56**, 1538–1542.

Lyons-Ruth, K., Connell, D. B., Zoll, D., & Stahl, J. (1987). Infants at social risk: Relations among infant maltreatment, maternal behavior, and infant attachment behavior. *Developmental Psychology*, **2**(2), 223–232.

MacDonald, K. (Ed.). (1988). *Sociobiological perspectives on human development*. New York: Springer-Verlag.

Magnusson, D., Statin, H., & Allen, V. (1986). Differential maturation among girls and its relation to social adjustment in a longitudinal perspective. In P. Baltes, D. Featherman, & R. Lerner (Eds.), *Life span development and behavior* (Vol. **7**, pp. 74–101). Hillsdale, NJ: Erlbaum.

Main, M. (1990). Cross-cultural studies of attachment organization: Recent studies, changing methodologies, and the concept of conditional strategies. *Human Development*, **33**, 48–61.

Main, M., & Weston, D. R. (1981). The quality of the toddler's relationship to mother and to father. Related to conflict behavior and the readiness to establish new relationships. *Child Development*, **52**, 932–940.

Malatesta, C., & Wilson, A. (1988). Emotion/cognition interaction in personality development: A discrete emotions, functionalist analysis. *British Journal of Social Psychology*, **27**, 91–112.

Marshall, W. (1978). Puberty. In F. Falkner & J. Tanner (Eds.), *Human growth* (Vol. **2**, pp. 212–244). New York: Plenum.

Martin, J. A. (1981). A longitudinal study of the consequences of early mother-infant interaction: A microanalytic approach. *Monographs of the Society for Research in Child Development*, **46**(3, Serial No. 190).

Martin, N. G., Eaves, L. J., & Eysenck, H. J. (1977). Genetical, environmental, and personality factors influencing the age of first sexual intercourse in twins. *Journal of Biosocial Science*, **9**, 91–97.

Matas, L., Arend, R., & Sroufe, L. (1978). Continuity in adaptation in the second year: The relationship between quality of attachment and later competence. *Child Development*, **49**, 547–556.

McClintock, M. K. (1980). Major gaps in menstrual cycle research: Behavioral and physiological controls in a biological context. In P. Komenich, M. McSweeney, J. Novack, & N. Elder (Eds.), *The menstrual cycle* (Vol. **7**, pp. 7–23). New York: Springer.

McLanahan, S., & Booth, K. (1989). Mother-only families: Problems, prospects, and politics. *Journal of Marriage and the Family*, **51**, 557–580.

McLanahan, S., & Bumpass, L. (1988). Intergenerational transmission of family disruption. *American Journal of Sociology*, **94**, 130–152.

McLoyd, V. (1990). The declining fortunes of black children: Psychological distress, parenting, and socioemotional development in the context of economic hardship. *Child Development*, **61**, 311–346.

Metral, G. (1981). The action of natural selection on the human menstrual cycle: A simulation study. *Journal of Biosocial Science*, **13**, 337–343.

Moen, P. (1982). The two-provider family: Problems and potentials. In M. Lamb (Ed.), *Nontraditional families: Parenting and child development*. Hillsdale, NJ: Erlbaum.

Moffitt, T., Caspi, A., & Belsky, J. (1990, March). *Family context, girls' behavior, and the onset of puberty: A test of a sociobiological model.* Paper presented at the biennial meetings of the Society for Research in Adolescence, Atlanta, GA.

Mueller, C., & Pope, H. (1977). Marital instability: A study of its transmission between generations. *Journal of Marriage and the Family*, **39**, 83–93.

Murdock, G., & others. (1971). *Outline of cultural materials* (4th ed.). New Haven, CT: Human Relations Area Files.

Newcomer, S., & Udry, J. (1984). Mothers' influence on the sexual behavior of their teenage children. *Journal of Marriage and the Family*, May, 477–485.

Newcomer, S., & Udry, J. (1987). Parental marital status effects on adolescent sexual behavior. *Journal of Marriage and the Family*, **49**, 235–240.

Olweus, D. (1980). Familial and temperamental determinants of aggressive behavior in adolescent boys: A causal analysis. *Developmental Psychology*, **16**, 644–660.

Papini, D., & Sabby, R. (1987). Adolescent pubertal status and affective family relationships: A multivariate assessment. *Journal of Youth and Adolescence*, **16**, 1–15.

Parpal, M., & Maccoby, E. E. (1985). Maternal responsiveness and subsequent child compliance. *Child Development*, **56**, 1326–1334.

Patterson, G. R. (1986). Performance models for antisocial boys. *American Psychologist*, **41**, 432–444.

Pelton, L. (1978). The myth of classlessness in child abuse cases. *American Journal of Orthopsychiatry*, **48**, 569–579.

Petersen, A. (1985). Pubertal development as a cause of disturbance: Myths, realities, and unanswered questions. *Genetic, Social, and General Psychology Monographs*, **111**, 205–232.

Pettit, G. S., & Bates, J. E. (1989). Family interac-

tion patterns and children's behavior problems from infancy to four years. *Developmental Psychology*, **25**, 413–420.

Phoenix, C., Gpy, R., Gerall, A., & Young, W. (1959). Organizing action of prenatally administered testosterone propionate on the tissues mediating mating behavior in the female guinea pig. *Endocrinology*, **65**, 369–382.

Pickford, J., Signori, E., & Rempel, H. (1966). Intensity of personality traits in relation to marital happiness. *Journal of Marriage and the Family*, **28**, 458–459.

Platt, J. (1964). Strong inference. *Science*, **146**, 347–353.

Plomin, R., & Fulker, D. (1987). Behavioral genetics and development in early adolescence. In R. Lerner & T. Foch (Eds.), *Biosocial-psychosocial interactions in early adolescence* (pp. 63–94). Hillsdale, NJ: Erlbaum.

Plomin, R., Loehlin, J. C., & DeFries, J. C. (1985). Genetic and environmental components of environmental influences. *Developmental Psychology*, **21**, 391–401.

Plomin, R., Nitz, K., & Rowe, D. (in press). Behavioral genetics and aggressive behavior in childhood. In M. Lewis & S. M. Miller (Eds.), *Handbook of developmental psychopathology*. New York: Plenum.

Renken, B., Egeland, B., Marvinney, D., Mangelsdorf, S., & Sroufe, L. A. (1989). Early childhood antecedents of aggressive and passive withdrawal in early elementary school. *Journal of Personality*, **57**, 257–282.

Rohner, R. (1975). Parental acceptance-rejection and personality: A universalistic approach to behavioral science. In R. Brislin et al. (Eds.), *Cross-cultural perspectives on learning* (pp. 66–90). New York: Halsted.

Rosenblum, L., & Paully, G. (1984). The effects of varying environmental demands on maternal and infant behavior. *Child Development*, **55**, 305–314.

Rushton, J. (1985). Differential K theory: The sociobiology of individual and group differences. *Personality and Individual Differences*, **6**, 441–452.

Rutter, M. (1970). Sex differences in children's response to family stress. In E. J. Anthony & C. Koupernik (Eds.), *The child in his family* (pp. 27–54). New York: Wiley.

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

Short, R. V. (1976). The evolution of human reproduction. *Proceedings of the Royal Society of London*, **195**, 3–24.

Simmons, R., & Blyth, D. (1987). *Moving into adolescence*. New York: Aldine de Gruyter.

Simmons, R., Blyth, D., & McKinney, K. (1983). The social and psychological effects of puberty on white females. In J. Brooks-Gunn & A. Petersen (Eds.), *Girls at puberty* (pp. 111–140). New York: Plenum.

Skolnick, A. (1981). Married lives: Longitudinal perspectives on marriage. In D. Eichorn, J. Clausen, N. Haan, M. Honzika, & P. Musser (Eds.), *Present and past in middle life* (pp. 243–265). New York: Academic Press.

Smith, E., Udry, J., & Morris, N. (1985). Pubertal development and friends: A biosocial explanation of adolescent sexual behavior. *Journal of Health and Social Behavior*, **26**, 183–192.

Sroufe, L. A. (1979). The coherence of individual development. *American Psychologist*, **34**, 834–841.

Stearns, S. (1982). The role of development in the evolution of life histories. In J. T. Bonner (Ed.), *Evolution and development* (pp. 47–73). New York: Springer-Verlag.

Steinberg, L. (1987). The impact of puberty on family relations: Effects of pubertal status and timing. *Developmental Psychology*, **23**, 451–460.

Steinberg, L. (1988). Reciprocal relation between parent-child distance and pubertal maturation. *Developmental Psychology*, **24**, 122–128.

Steinberg, L. (1989). Pubertal maturation and parent-adolescent distance: An evolutionary perspective. In G. Adams, R. Montemayor, & T. Gullotta (Eds.), *Advances in adolescent development* (Vol. **1**, pp. 82–114). Beverly Hills, CA: Sage.

Steinberg, L., Catalano, R., & Dooley, D. (1981). Economic antecedents of child abuse and neglect. *Child Development*, **52**, 975–985.

Surbey, M., (1987). Anorexia nervosa, amenorrhea, and adaptation. *Ethology and Sociobiology*, **8**, 475–615.

Surbey, M. (1990). Family composition, stress, and human menarche. In F. Bercovitch & T. Zeigler (Eds.), *The socioendocrinology of primate reproduction* (pp. 71–97). New York: Liss.

Susman, E., Inhoff-Germain, G., Nottlemann, E., Loriaux, D., Cutler, G., & Chrousos, G. (1987). Hormones, emotional dispositions, and aggressive attributes in young adolescents. *Child Development*, **58**, 1114–1134.

Symons, D. (1989). A critique of Darwinian anthropology. *Ethology and Sociobiology*, **10**, 131–144.

Tardif, S. (1984). Social influences on sexual maturation of female *Saquinas oedipus oedipus*. *American Journal of Primatology*, **6**, 199–209.

Terman, L. (1938). *Psychological factors in marital happiness*. New York: McGraw-Hill.

Terman, L., & Buttenweiser, P. (1935). Personal-

ity factors in marital compatibility. *Journal of Social Psychology*, **6**, 143–171.

Thorton, A., & Camburn, E. (1987). The influence of the family on premarital sexual attitudes and behavior. *Demography*, **24**, 323–340.

Tinbergen, N. (1963). On the aims of methods of ethology. *Zeitschfrift fur Tierpsycologie*, **20**, 410–433.

Trevathan, W., & Burleson, M. (1989, August). *Human pair bonding and non-ovulatory sexual activity in females: New hypotheses.* Paper presented at the first annual meeting of the Human Behavior and Evolution Society, Northwestern University, Evanston, IL.

Trivers, R. (1974). Parent-offspring conflict. *American Zoologist*, **14**, 249–264.

Udry, J. (1987). Hormonal and social determinants of adolescent sexual initiation. In J. Bancroft (Ed.), *Adolescence and puberty* (pp. 147–163). New York: Oxford University Press.

Udry, J., Talbert, L., & Morris, N. (1986). Biosocial foundations for adolescent female sexuality. *Demography*, **23**, 217–230.

Wachtel, P. (1973). Psychodynamics, behavior therapy, and the implacable experiments. *Journal of Abnormal Psychology*, **82**, 324–334.

Waters, E., Wippman, J., & Sroufe, L. A. (1979). Attachment, positive affect, and competence in the peer group: Two studies in construct validation. *Child Development*, **50**, 821–829.

Weinrich, J. D. (1977). Human sociobiology: Pair-bonding and resource predictability. *Behavioral Ecology and Sociobiology*, **2**, 91–118.

Whiting, B., & Whiting, J. (1975). *Children of six cultures.* Cambridge, MA: Harvard University Press.

Worthman, C. (in press). Socioendocrinology: Key to a fundamental synergy. In T. Ziegler & F. Bercovitch (Eds.), *The socioendocrinology of primate reproduction.* New York: Liss.

Youngblade, L., & Belsky, J. (1989). Child maltreatment, infant-peer attachment security, and dysfunctional peer relationships in toddlerhood. *Topics in Early Childhood Education*, **9**, 1–15.

Youngblade, L., & Belsky, J. (in press). The social and emotional consequences of child maltreatment. In R. Ammerman & M. Herson (Eds.), *Children at risk: An evaluation of factors contributing to child abuse and neglect.* New York: Plenum.