

EXPLAINING CHILD MALTREATMENT: FROM BEHAVIOR ANALYSIS TO BEHAVIORAL BIOLOGY

*EXPLICACIÓN DEL MALTRATO A NIÑOS:
DEL ANÁLISIS DE LA CONDUCTA A LA BIOLOGÍA CONDUCTISTA*

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ABSTRACT

This paper begins with a brief overview of the history of research on the causes of child maltreatment and why the "social interactional" approach was developed by the first author (Burgess, 1979). This approach, based on fundamental principles of the experimental analysis of behavior, established the importance of interpersonal contingencies of reinforcement and punishment as proximate determinants of child abuse and neglect. Because of difficulties faced in successfully intervening with maltreating families and because of the importance of contextual factors operating at different levels of analysis, the authors examine "life-history theory", which is a centerpiece of behavioral biology, in an attempt to explain how personal, social and ecological factors, and interpersonal contingencies of reinforcement and punishment, combine to produce the family dynamics culminating in the abuse and neglect of children.

Key words: child abuse, reinforcement, punishment, experimental analysis of behavior, evolutionary biology, life-history theory.

RESUMEN

Este artículo empieza con una revisión histórica rápida de la investigación en las causas del maltrato infantil y de porque el enfoque "Interaccionista social" fue desarrollado por el primer autor (Burgess, 1979). Este enfoque, basado en los

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principios fundamentales del análisis experimental de la conducta, estableció la importancia de las contingencias interpersonales de reforzamiento y castigo como determinantes inmediatos del abuso y de la negligencia infantil. Debido a dificultades encontradas para intervenir en las familias con maltrato infantil, y debido a la importancia de factores contextuales que operan a diferentes niveles de análisis, los autores examinan la "teoría de la historia de vida" (una pieza central de la biología conductual) para intentar explicar como los factores personales, sociales y ecológicos, y las contingencias interpersonales de reforzamiento y castigo, se combinan para producir las dinámicas familiares que culminan en el abuso y la negligencia de los niños.

Palabras claves: abuso infantil, reforzamiento, castigo, análisis experimental de la conducta, biología de la evolución, teoría de la historia de vida.

In 1962, Kempe and his colleagues shocked the general public and the scientific community with their publication of the influential and now classical paper on "the battered child syndrome" (Kempe, Silverman, Steele, Droegemueller, & Silver, 1962). Virtually overnight, we were jolted out of our tendency to view the family, as Christopher Lasch (1977) put it, as a "haven in a heartless world," and were forced to face the stark realization that a large number of children were not experiencing the idyllic fictional childhood portrayed on television. On the contrary, many children were being grossly abused and neglected. An outraged population, fanned by a media obsessed with this controversial issue, demanded information and explanations immediately. The scientific community set out to placate and pacify the public, and there was an explosion of research on the maltreatment of children.

As so often happens in a newly developing area of research, progress was uneven and made all the more so because researchers from various disciplines and research traditions entered the foray. They arrived with their own theoretical biases as well as their own customary research methods. For example, the earliest investigators, trained in the various specialties of medicine, emphasized the role of psychopathology (Kempe, 1973; Spinetta & Rigler, 1972). Their research was based on small clinical samples. Psychologists expanded on their effort and explored the role of certain personality traits, such as depression, aggressiveness, and suspiciousness as correlates of child abuse and neglect (e.g., Brunquell, Crichton, & Egeland, 1981). In response to this, researchers trained in sociology, social work, and the ecology of individual development, argued that our focus should be on the forces in society, like economic and social impoverishment, that lead adults to abuse or neglect their children (e.g., Gelles, 1973; Gil, 1970; Garbarino, 1977; Straus, Gelles, & Steinmetz, 1981).

All of these early efforts were important and contributed pieces to the puzzle of why parents might behave in ways that were harmful to their own children. Nevertheless, as a researcher trained in the experimental analysis of behavior,

the first author was dissatisfied with these early approaches for several reasons. Perhaps the most important was the failure to distinguish between “marker” and “process” variables. Even if poverty conditions or certain personality traits were reliably correlated with maltreatment, it was important to recognize that those connections were not invariant. For example, even if the likelihood of maltreatment was higher under conditions of impoverishment, the fact remained that most poor people did not either abuse or neglect their children. What needed to be accomplished was the identification of the actual processes that lead from poverty (or maternal depression) to maltreatment. This led to the formulation of a “social interactional” approach (Burgess, 1979) and a series of investigations termed PROJECT INTERACT.

A SOCIAL INTERACTIONAL APPROACH

The social interactional perspective incorporated several features that were unique to the study of child maltreatment at that time. Among those distinctive features were certain assumptions, a few of which we will describe here. The first assumption, based on a behavioral or operant perspective, was that critical process variables were most likely to be found in interpersonal contingencies of reinforcement or punishment operating within families. Following upon the work of Patterson (e.g., 1976), the second assumption was that these contingencies would be evident from the day-to-day social interactions that transpired between parents and their children and that these should be observed and recorded in the natural ecology of the family. The third assumption was that it would be necessary to observe and record interactions between and among all family members. The basis for this assumption was evidence that maltreatment was sometimes selective within families and that some children may actively contribute to their own maltreatment. It is these assumptions that led Burgess to term this a social interactional perspective.

There were two other assumptions critical to this approach which we will refer to later. But first, let us return to the distinction between marker and process variables. Given the fact that factors such as parental personality traits (or, for that matter, child traits) and ecological conditions such as poverty were only “markers” that identified where important causal processes might be operating, PROJECT INTERACT identified three types of families to study and compare. Data were collected from families that had either seriously abused or neglected their children. As expected, these families, both single- and two-parent families, were poor and lived below the poverty line. The third type of family were those with no known history of abuse or neglect that were matched to the maltreating families in terms of income, education, occupation, family size, and neighborhood.

The primary focus of study was, of course, the patterns of interaction that occurred in each of these three family types. An observational code was carefully

designed and was used to record: who interacted with whom (verbally and physically); who was the initiator and who was the target; the emotional affect of the behavior; whether the interaction included a command; and, if so, whether the command was followed by compliance or refusal. The intent was to test the assumption/hypothesis that there were patterns of family interaction that distinguished abusive and neglectful families from other families that were similar in most other respects but where neither abuse nor neglect occurred.

The results from these studies are described in several publications (e.g., Burgess & Conger, 1978; Burgess, 1979; Burgess, Anderson, Shellenbach, & Conger, 1981). When we compared family interactions in abusive and neglectful families with non-maltreating poverty families, we found that there was a kind of "basic training" for mutually aversive exchanges within the maltreating families. In brief, maltreating parents and their children were observed to reciprocate each other's negative behaviors more than their positive behaviors. This was found to be true for the neglectful families as well as the abusive families. They were found to be more demanding of each other than were the comparison families, but they acceded to each other's demands less often. The largest differences between the maltreating and non-maltreating families, however, were that the former were less positive to one another and they interacted with each other less often. This was somewhat surprising and was not fully appreciated until later. In any case, other investigators subsequently found a similar pattern. For example, Reid (1984) reported that abusive mothers display approximately twice the rate of punitive behavior as non-abusive mothers with child management problems and nearly four times the rate found in non-distressed well-functioning families.

So, it seemed that the basic assumptions of the social interactional perspective had merit. In short, the correlates of child maltreatment such as economic deprivation appear to lead to either abuse or neglect *if* the kinds of coercive interpersonal contingencies described above are activated. Moreover, having identified the importance of the daily patterns of interaction in maltreating families, we had a target for intervention with real promise.

One of the first such efforts was made in PROJECT INTERACT. The major focus of the intervention program (Burgess et al., 1981) involved teaching abusive and neglectful parents the importance of reinforcement and punishment contingencies, instructing them how to respond to compliance and noncompliance, modeling the behaviors for the parents, and having them role play and then practice the behaviors. Immediate feedback was given throughout the training phases. In general, the program was promising in the sense that the rate of positive parental behavior could be increased. Nevertheless, gains were hard-earned, small, and difficult to sustain over time despite the fact that the intervention program also addressed the multiple environmental stresses that emerge in these families and that exacerbated conflict and disaffection between the family members. These components of the intervention included (1) relationship establishment between clients and staff; (2) counseling in life management skills; (3) referral to available

community agencies for family support services; (4) advocacy by acting as a liaison to community agencies; and (5) offering practical services such as providing transportation and nutritional and financial management advice. Unfortunately, intervention programs targeting maltreating families continue to have only modest effects today.

In summary, the behaviorally oriented research carried out in PROJECT INTERACT clearly did add to our understanding of child maltreatment. Nonetheless, a number of questions remained unanswered. For example, why does coercion and rejection seemingly develop so easily among some parents? Why is it so difficult to intervene successfully with maltreating parents? Given that the correlates of child maltreatment are multi-dimensional, occurring at different levels of analysis, how do we link them together? Is there a general theoretical paradigm that can help us answer questions like these?

In an attempt to answer these questions, the first author returned to the two remaining assumptions of his social interactional approach (Burgess, 1979). These assumptions specified the importance of looking at distal as well as proximate causes and recognition that biological as well as environmental processes must be considered. Thus, in 1988, Burgess, Kurland, & Pensky employed what biologists call "life history theory" to explain child maltreatment. In the balance of this paper, we will describe a modified version of life history theory to explain how personal, social and ecological factors, and interpersonal contingencies of reinforcement and punishment combine to produce the family dynamics culminating in child maltreatment.

LIFE HISTORY THEORY

The central premise of life history theory is the assumption that any evolutionarily successful organism must balance its allocation of time, energy, risk, and other resources to itself—its own growth and maintenance (somatic effort)—with those spent on finding a mate and beginning reproduction (reproductive effort) (Pianka, 1970; Stearns, 1992). Similarly, with respect to reproductive effort, "decisions" are made between strategies that lead to having many offspring who necessarily receive lower levels of per capita parental investment as opposed to strategies that involve having fewer offspring, each of whom is capable of being more intensively nurtured.

Evolution-based research has made it clear that reproductive effort is strategic. Evolutionary ecologists have distinguished between *r* and *K* reproductive strategies. Organisms that are usually faced with transient and unpredictable environments pursue strategies that permit them to reproduce prolifically. Such organisms are referred to as *r-strategists*. *K-strategists* display evolved traits that are in response to competition with conspecifics under conditions of resource scarcity. Given these circumstances, high levels of parental investment are critical

in order to successfully produce offspring that, themselves, will reach reproductive maturity.

For our purposes, the key distinction between r- and K-strategists is the low level of per capita parental investment in the former and the relatively higher level of per capita parental investment of the latter. Even if we accept the common premise that there has been natural selection for high-investment parenting in humans, (e.g., Lancaster & Lancaster, 1983), there are undoubtedly individual differences in reproductive strategies (e.g., Draper & Harpending, 1988). Some individuals allocate more energy in the pursuit of finding a mate, sometimes producing offspring from several different mates (a mating or r-strategy), than they do to devoting their energy and other resources to intensively nurturing their offspring (a parenting or K-strategy). Differing levels of parental investment have always reflected a compromise between parental effort, on the one hand, and the time, energy, and resources necessary for parental survival and/or successful mating on the other (Hrdy, 1994). Whether a given parent pursues a low- or high-investment parenting strategy depends on a variety of factors including the perceived benefits and costs associated with these alternative strategies, an issue to which we will return. Looked at over entire lifespans, it is probably the case that most of us pursue a mixed strategy. Nonetheless, there are those who, on a mating-to parenting-effort continuum, can be found at either extreme.

Whichever strategy a person follows, there are costs and trade-offs that must be made and these two alternative strategies may be incompatible at the extremes of the reproductive effort continuum. For example, high investment parenting incurs considerable costs in providing children with the high-quality experiences and environments that eventually contribute to the children's success in ecologically adverse and competitive environments. These costs are not limited to time, money, and energy expenditures. As Trivers (1972) indicated in his classic definition of parental investment, cost refers to the parent's compromised ability to invest in other (actual or future) offspring and other mating opportunities.

In summary, we have described the core elements of life history theory and how it has identified two analytically distinct reproductive strategies. These alternative strategies describe different orientations toward the production and care of offspring and are explained by ecological constraints acting on parents. These constraints may be real or imagined. One orientation toward offspring, a K-strategy, is found in predictably adverse and competitive environments where high parental effort enhances offsprings' life-chances and subsequent reproductive success. The other, an r-strategy or mating strategy, is found in environments where parents have, or perceive they have, little ability to increase their own life chances or those of their offspring. Under such circumstances, low investment parenting is likely, which in turn can result in child maltreatment. Our task is to identify under what circumstances low parental investment leads to maltreatment.

SOCIAL AND ECOLOGICAL FACTORS

Throughout history, human groups have been exposed to ecological changes that signal improvement or deterioration of their life situation. According to life history theory, ecological instability will affect the behavioral systems associated with mating and parental effort. Specifically, situations in which the availability of necessary resources is variable and social mobility is uncertain contribute to the low level of parental care associated with an r-strategy (MacDonald, 1997).

While it is true that child maltreatment has been found to occur across all social classes, it is also true that maltreatment is disproportionately represented in lower socioeconomic classes (Pelton, 1978). According to Gelles (1992), severe violence towards children is most likely to occur in families where the annual income is below the poverty line. In 1985, The Second National Family Violence Survey found that in families where incomes are below the poverty line, overall violence towards children was 4% higher, severe violence was 46% higher, and very severe violence was 100% higher than in families above the poverty line (Gelles, 1992). Research examining the income-to-needs ratio has revealed that, under conditions of chronic and permanent poverty, families meet only 59% and 46% of children's needs, respectively (Ashworth, Hill, & Walker, 1994). Pervasive conditions of poverty can create an environment marked by the unpredictability and uncertainty associated with an r-strategy and result in severe stress, increased irritability, conflict, and punitive behavior (Burgess, 1988). Thus, ecological instability powerfully impacts the costs of parenting and the potential for high parental investment.

Economic hardship, however, does not occur in splendid isolation; it may be buffered or exacerbated by kin, neighborhood and social supports. It exists, in other words, within a social context. Thus, various ecological circumstances can result in low levels of parental investment. These would include a low potential for paternal investment, especially in environments where such support is essential (Egeland, Jacobvitz, & Sroufe, 1988). Similarly, factors such as social isolation and particular community norms, along with low income (Drake & Pandey, 1996; Wilson, 1987), have been associated with increased levels of child maltreatment. For example, Garbarino & Kostelny (1991) found that certain areas of Chicago tended to have higher rates of child maltreatment than other areas with comparable socio-economic conditions. Several factors may be operating here. On the one hand, there may be a lack of social relationships that can provide parents with the emotional support needed to overcome the stress caused by poverty and provide benefits such as child care resources, parenting information, and social controls sanctioning inappropriate parental actions (Vondra, 1990). In the absence of social exchanges and social visits, there are fewer opportunities for parents to observe family life within other parents' homes. On the other hand, the contacts an abusive parent has with relatives, friends, neighbors, and the larger community or its agencies may serve as mutual reinforcement for socially inappropriate

parental behavior. Wahler and Hahn (1984) have shown that, rather than interacting with people who form a social support network and who provide assistance, empathy, and problem solving, abusive parents often interact with others who are in similar situations to themselves. The outcome is that instead of helping each other they often simply match "war stories," thus exacerbating rather than ameliorating the coercive interactions they have both within and outside of the family. In this way, the abusive parent becomes more and more isolated from helpful social supports and monitoring mechanisms, and maltreatment becomes even more likely.

The association of poverty or resource scarcity with child maltreatment in modern, complex societies is, of course, familiar to everyone. To be sure, there are special stresses and strains experienced by families living in poverty, perhaps especially for those living in communities deficient in appropriate social supports. Nonetheless, poverty or resource scarcity does not inevitably result in low investment parenting or the maltreatment of children. Poverty as well as stress and deficient social networks are simply marker variables; we need to know more about when and why they are associated with punitive and neglectful parenting. These indicators of ecological instability do seem to intensify conflicts of interest within families, yet they do not inevitably lead to maltreatment. Other factors, at a more micro-level of analysis, allow us to explain individual differences in response to the accumulating stress often associated with resource scarcity.

INDIVIDUAL FACTORS

Parent traits

From the perspective of psychology, certain personality traits and a history of abuse have been advanced as determinants of child maltreatment. Evidence for the importance of parental attributes, such as cognitive competence and antisocial behavior, are revealed in several studies. For example, Reid and colleagues (1987) found that abusive parents tend to rate their children as more deviant than do parents in comparable at-risk families even though no differences were found in direct observations of the children's behavior. Similarly in Elder's longitudinal study of families who experienced the Great Depression (e.g., Elder, Liker, & Cross, 1984), it was found that economic hardship affected fathers more than mothers, but, more importantly, income loss was strongly predictive of arbitrary and explosive parental behavior only among those men who exhibited hostility toward their children before the Depression and who were also experiencing marital problems. For previously friendly and accepting fathers, economic deprivation was not predictive of the nature and degree of paternal involvement.

Concerning cognitive ability or intelligence, Polansky and his associates (1981), in their comprehensive study of child neglect, found the typical neglectful

mother to have less than an eighth grade education and an IQ below 70. In a similar manner, low cognitive competence has been found to be associated with poor prenatal care, low birth weight, low HOME (Home Observation for Measurement of the Environment) scores, difficult child temperament, and problem behaviors such as antisocial behavior and hyperactivity. These findings led Herrnstein and Murray (1994) to conclude that cognitive competence (IQ) has a strong effect on parenting practices.

Additional support for the importance of parental characteristics has been implied in the study of the intergenerational transmission of abuse. Recognition that patterns of personality characteristics and child maltreatment are often found in successive generations, has been a mainstay of the child abuse literature. While not a study of maltreatment, Elder, Caspi, and Downey (1984) report that an abrasive and irritable interpersonal style is often transmitted from one generation to the next. They found that retrospective ratings of grandmothers' irritability correlated significantly with fathers' and mothers' irritability.

Although no one would assert that intergenerational continuity is a definitive outcome, it does frequently occur (Burgess & Youngblade, 1988; Widom, 1988). Research has yet to conclusively identify how this transmission occurs or what is being transmitted. It is possible, of course, that something more basic than social learning occurs. Given that maltreated children and maltreating parents display similar profiles for heritable personality traits such as aggressiveness and impulsivity (Burgess, 1997), it may be that the capacity for maltreatment is a heritable predisposition. In fact, research has demonstrated that child-rearing styles are trait-like in that they are genetically influenced (Plomin & Bergeman, 1991). Moreover, traits such as intelligence and aggression, which are believed to be associated with child maltreatment as noted above, have been shown to have strong heritabilities (Rowe, 1994). For example, violent aggressive behavior in males has been linked to heritable testosterone levels (Blum, 1997; Mednick & Volavaka, 1981).

It is also possible that fundamental changes occur in an individual's developmental trajectory as a result of early traumatic experiences, such as abuse, neglect, or high levels of stress (Karr-Morse & Wiley, 1997; Widom, 1988). Experiences within the family could induce ontogenetic changes on various levels from alterations in brain functioning to modeling social behavior. The family itself can function as an important learning environment wherein family members train one another to be increasingly coercive and contentious (Patterson, 1982). This implies that parents who display a pattern of interpersonal irritability use ineffective parenting practices which foster the development of this trait in the next generation via reinforcement contingencies and modeling.

Experiences in the family may have an additional role in family members' development. The capacity for child maltreatment may be a stress-induced response to early experience. Exposure to interparental anger may induce emotional stress in children, enmesh children in the parents' problems, or cause anger

and aggression that over time will result in the development of dysfunctional behavior. Recent research in the field of brain development has some intriguing implications. Findings indicate that victims of early traumas in childhood tend to suffer from right hemisphere impairments; evidence suggests that right hemisphere deficiencies are correlated with a lack of certain behaviors such as pity, compassion, and attachment (Henry, 1993). Thus in some cases, the low frequencies of positive interaction and parental care found in abusive families may be due to the fact that the parent has a low capacity to form close bonds with others (Bolton, 1983; Draper & Harpending, 1988). Additionally, "any factors which increase the activity or reactivity of the brainstem (e.g., chronic stress) or decrease the moderating capacity of the limbic or cortical areas (e.g., neglect) will increase an individual's aggressivity, impulsivity, and capacity to display violence" (Perry, 1997, p. 129). The fact that parental aggression toward children is strongly associated with interspousal aggression (Gelles, 1987; Hughes, 1988; Jouriles, Barling, & O'Leary, 1987) is consistent with the idea that the inability to control aggressive impulses and to form close attachment relationships is a generalized response expected from brain impairments experienced early in a child's life.

In sum, intergenerational continuity is not an absolute, and neither low intellectual ability nor a pessimistic disposition correlates perfectly with child maltreatment. Widom's (1988) well-known work on intergenerational transmission and relationships among abuse, neglect, and later antisocial behavior challenges a determinist approach and suggests that child abuse or neglect does not inevitably result in a cycle of maltreatment. There are multiple pathways, and the role of individual traits may interact with ecological conditions during development. In fact, Widom (1988) suggests several factors, including age, intelligence, cognitive appraisal, and temperament, which may influence the effects of child maltreatment on development. Thus, personal characteristics appear to mediate the effects of the environment during childhood as well as mediate the effects of ecological conditions on parental investment.

Child traits

According to an evolutionary perspective, parents who care for offspring do so altruistically in that they incur considerable costs while benefitting their offspring. Such behavior is considered to be selectively advantageous to the parent only in circumstances that will lead to an increase in parental inclusive fitness (Hamilton, 1964; Trivers, 1972, 1974). If relatedness between parent and offspring is low or uncertain, if the parent's losses are large, or if the benefits to offspring are slight, then parental investment may not necessarily be adaptive. Because of circumstances such as these, parental investment is not invariant over time and is not expected to be indiscriminately distributed among offspring.

If child abuse is a behavioral response influenced by natural selection, then it is more likely to occur when there are reduced inclusive fitness payoffs due to

uncertain or low relatedness. Thus, abuse of stepchildren by stepparents should be more likely than abuse of biological offspring by parents, parents should be more likely to abuse their stepchildren than their biological offspring when both are available ("the Cinderella effect"), and males should be more likely than females to be the abusers. Research supports such predictions (Daly & Wilson, 1981; Lightcap, Kurland, & Burgess, 1982).

In addition, evolved mechanisms of parental investment should be sensitive to the ability of offspring to convert care into fitness. Therefore, a child's age and health status are critical factors. Research has shown that handicapped children are more likely than nonhandicapped children to be abused (Daly & Wilson, 1981; Lightcap et al., 1982). Younger children are more likely to be abused because of lower reproductive value relative to older siblings; however, escalating parent-offspring conflict as children approach puberty is also crucial. Indeed, it appears that the age-specific rates of child maltreatment form a trimodal distribution with peaks for infants, two-year-olds, and prepubescent children (Burgess & Richardson, 1984; Lenington, 1981). Consistent with Trivers' (1974) model of parent-offspring conflict, these peaks correspond to periods marked by relatively high parental investment cost-benefit ratios.

COSTS AND BENEFITS

We have asserted that parental and child traits in concert with certain ecological factors predict varying levels of observed parental care. However, no one of these markers alone inevitably leads to low investment parenting. Thus, a definitive understanding of child maltreatment requires a transition from these various marker variables to the level of actual parental investment to the occurrence of abuse or neglect. The point we address now is how these factors actually effect changes in the level of parental investment.

The general argument advanced here is that natural selection has led to the evolution of psychological mechanisms that enable individuals to adopt specific behavioral alternatives based on cost-benefit decisions, whether in direct or indirect reproductive terms. The rationale for our position is the fact that the two million years of the Pleistocene were marked by our ancestors spreading into ecological settings that were incredibly diverse and often changing in fundamental ways due to climatological and geological events (cf. Potts, 1996). Under selection pressures such as these, cognitive mechanisms and facultative responses appropriate to a large variety of social and ecological circumstances should have been favored (Alexander, 1990). Because of this, ancestral humans would have been able to make conditional decisions about the allocation of their energies to somatic, mating, or parental effort. In our estimation, selection forces have led to the tendency to monitor environmental variation and make benefit-cost assessments that typically involve behavioral consequences that historically have been

correlated with reproductive success. Examples of such consequences include resource acquisition, status enhancement, and favorable resolutions of interpersonal conflicts of interest. Our view, then, does not assume that inclusive fitness maximizing necessarily functions as a motive in human affairs. Rather, we are motivated by outcomes that vary in their proximity to the bottom line of reproductive success.

Whether our hypothesis that the tendency to make benefit-cost assessments is a domain-general adaptive psychological mechanism turns out to be correct or not, the fact is the assumption that individuals attempt for the most part to optimize benefits and minimize costs in their interactions with others has long characterized all of the most useful theories in the behavioral sciences. For example, there is the "matching law" of learning theory or behaviorism, the relative frequency of a response tends to match its relative frequency of reinforcement (Herrnstein, 1970). Similarly, social exchange theory (Burgess & Nielson, 1974) and microeconomic theory (Becker, 1981) emphasize the importance of cost-benefit analyses. Focusing on proximate outcomes, Becker and Murphy (1988) find that parents' altruistic behavior toward their children depends on the number of children, the benefits expected from each child, and the parents' own perceived needs, because parents typically must reduce their own consumption to increase the time and resources they spend on their children. In the terminology of life-history theory, individuals are faced with the problem of balancing their allocation of resources to themselves (somatic and mating effort) versus committing those resources to high-investment parenting.

For these reasons, we propose that cost-benefit analysis may be the link between the various marker variables we have described and actual parental effort. The relationship between costs and benefits, as displayed in Figure 1, translates into different levels of parental investment. Costs and benefits are not endpoints on one continuum; if costs increase, benefits do not necessarily decrease. The relationship is more complex and much remains unknown. However, we propose that parental investment modeled on the ratio of benefits to costs takes the shape of a sine curve (see Figure 1). Thus, a general assumption implicit in this model is that there are upper and lower thresholds for high and low parental investment, respectively. The threshold refers to the point where changes in the benefit-to-cost ratio result in minimal changes in parental care. In other words, parental investment attains a plateau, whether it be a high or low investment plateau.

The point that distinguishes high and low parental investment has been described in research on altruism and the degree of relatedness. Evolutionary theory implies that altruistic behaviors directed at kin have reproductive value for the altruist if the benefit-to-cost ratio is larger than the inverse of the degree of relatedness (Trivers, 1974). Thus, given that the biological parent-child coefficient of relatedness is one-half (Hamilton, 1964), on average, perceived costs must be one-half of perceived benefits (i.e., $\text{benefits-to-costs} \geq 2$) to result in acts of high

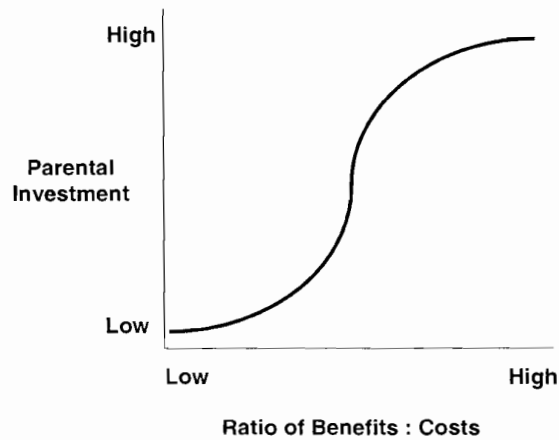


Figure 1. Ratio of benefits-to-costs and parental investment.

parental investment. Nevertheless, it is important to understand that this curvilinear relationship is individually determined; thus, it may be slightly different between individuals, as well as moderately change through time for an individual.

The threshold for “acceptable” benefit-cost ratios (i.e., those which correspond to higher parental investment) may be influenced by the ecological and individual factors previously described. For example, a parent who has experienced social and economic impoverishment and who has poor problem-solving skills may perceive few benefits contingent on high levels of parental effort. Alternatively, a parent who has suffered a traumatic youth or whose family of origin was abusive may have skewed perceptions of ideal parenting which affect his or her ratio threshold and resultant parental investment. More specifically, and more importantly, these factors influence the perception of costs and of benefits which leads to the second component of our cost-benefit hypothesis.

This second component concerns the relative importance of costs and of benefits in the resulting ratio and associated parental investment. Simply, we suggest that perceived costs are more influential than perceived benefits because costs are more likely to fluctuate and to do so in short spans of time. As shown in Figure 2a, when costs are held constant and perceived benefits decrease, parental investment decreases. In contrast, a comparable increase in perceived costs when benefits are held constant results in a greater decrease in parental investment (see Figure 2b).

One explanation for the disproportionate role of costs in determining investment may be a general perceptual tendency to track changes in costs more carefully than changes in benefits. The perception of costs and associated increases may be more variable and influenced by more factors than perceptions

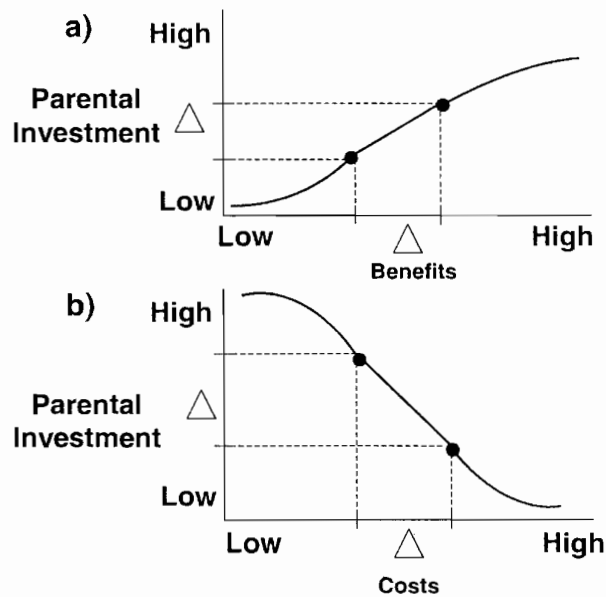


Figure 2. Parental investment as a function of (a) benefits when costs are held constant and (b) costs when benefits are held constant. The conclusion to be drawn from (a) and (b) is that equivalent changes in the predictor (i.e., $\Delta B = \Delta C$) do not result in equivalent changes in the outcome (i.e., $\Delta PI_a \neq \Delta PI_b$). In fact, the change in parental investment given a change in benefits is less than the change in parental investment given an equivalent change in costs (i.e., $\Delta PI_a < \Delta PI_b$).

of benefits. As Trivers (1974) explained, the costs of a parental act are dependent in part on the condition of the parent, whereas the benefits of a given act are dependent in part on the condition of the offspring. As we have addressed in previous sections, the condition of the parent is multiply-determined. Although ecological instability plays a significant role in child maltreatment, ecological factors do not operate in a vacuum. Individual traits work in concert with environmental elements. Indeed, "the same event may be perceived by different individuals as irrelevant, benign, positive, threatening, or harmful" (Widom, 1988, p. 48). For example, the parent with lower cognitive competence and fewer planning skills who endures economic hardship may have an augmented perception of increased costs as compared to a more competent parent who suffers equivalent hardship. The former parent's heightened perception of costs may lead to a greater change in his or her parental investment. However, it is not likely that either parent's perception of benefits greatly changed as a result of the economic hardship.

Aversive child behavior may also function to affect perceptions of costs more than those of benefits. Following Trivers (1974), it can be assumed that children have been selected to consume as many parental resources as possible; therefore, parent-offspring conflict must be expected. In this way, child aversive behavior may be functional for the child to extract additional resources in the short-term but costly to the child over the long haul because parental perception of benefits may not dramatically change but perception of costs would. Thus, parental investment would be likely to decrease as the costs increased over time.

Another possibility for understanding the role of costs centers on the general assumption individuals make about parenting. Although research asserts that benefits do exceed costs in altruistic acts (Trivers, 1974), most parents assume or perceive that they invest more resources in their children than they directly receive in return. This may be another reason why shifts in real or perceived costs play a disproportionate role in the relationship between benefit-cost ratios and degree of parental investment. This is probably also why there has been selection for the "attachment bond" as an evolved domain-specific psychological mechanism. Attachment may function either to encourage parents to pay most of their attention to the positive side of parenting or to simply relax benefit-cost considerations altogether.

Understanding the roles of perceived costs and benefits provides the link between marker variables and parental investment. Ecological factors, parent and child traits, and parental investment are objective variables. Examining benefit-cost ratios and the importance of perceived costs incorporates an additional subjective, personal element to our model.

PARENTAL INVESTMENT AND CHILD MALTREATMENT

Although Trivers (1972) provided a conceptual understanding of parental investment, as well as costs and benefits, operationalizing parental investment remains a difficult task. There is no simple relationship between the costs of high investment to the parents and the benefits to the offspring; that is, excessive costs do not necessarily result in equivalent levels of benefits (Trivers, 1972). Therefore, investment cannot be assessed in terms of costs alone. It may appear rational and easier to assess costs in the present given that benefits of investment must be evaluated over time; however, evaluating costs would only provide an estimate of relative parental expenditure or effort (Clutton-Brock, 1991). Benefits to offspring, or rather the effectiveness of parental effort, must also be evaluated to determine the level of parental investment. It should not be surprising that investment has been defined and assessed differently across numerous studies; however, each operational definition describes parental behaviors which are positively associated with benefits to the child. In general, cross-cultural studies have determined levels of parental investment based on behaviors which simply ensure survival to

reproductive maturity, whereas research in industrial and post-industrial societies has expanded parental investment to encompass behaviors which benefit offspring's psychological and physical well-being. For example, Lancaster and Lancaster (1983) imply that continuous body contact and feeding on demand constitute high parental investment among hunter-gatherers. Wilson and Daly (1994) assert a similar definition including direct and indirect care, such as breastfeeding and allocating time to protection. In his investigation of the parenting of Hazda men, Marlowe (1998) measured direct care such as holding, feeding, talking, listening, and pacifying and indirect care such as resource acquisition; however, he concluded that "direct care is probably a more reliable measure of a man's effort than is resource acquisition, which may reflect ability as much as motivation" (p. 14).

Parental investment has become more complex as societies and their demands have grown. Research by developmental psychologists suggests that a high-investment parenting strategy in modern industrial societies involves a multitude of costly and coordinated activities including feeling and expressing love towards one's child; possessing a strong emotional attachment to one's child; talking to the child often; reading to the child; playing with the child; actively listening to the child; having empathy for the child; providing emotional support for the child; imparting values such as cooperativeness, honesty, and self-control; monitoring the child's behavior; enforcing rules in a consistent but flexible manner; providing for the child's nourishment and physical health; and attempting to shield the child from harm (Maccoby & Martin, 1983).

As evidenced by the latter complicated set of behaviors constituting high parental investment, simply surviving childhood is not the only expectation for offspring. Survival does not ensure reproductive success. Physical and psychological fitness (e.g., emotional stability and social and intellectual competence) are important for reproductive success. Thus, parental investment seems more precarious, and distinguishing high from low investment has become more difficult.

Based upon multi-agent and multi-method indicators, Patterson and his colleagues have identified four especially critical components of high investment parenting which contribute to offspring prosocial behavior (e.g., Capaldi & Patterson, 1989). These "family management practices" are: (1) contingent positive reinforcement for a child's prosocial behavior, (2) a pattern of discipline that contingently punishes inappropriate behavior in an effective yet humane way, (3) careful monitoring of a child's behavior, including interaction with siblings and the choice of and interaction with peers, and (4) effective problem solving. Based upon more than 25 years of field observation and clinical efforts to intervene in the lives of several hundred problem families, Patterson has documented that breakdowns in these family management practices typically have adverse effects for the child and for general family functioning (Bank, Dishion, Skinner, & Patterson, 1990).

Inept disciplinary tactics, for example, are commonly found in families having problems. In such situations, a parent tends to be extremely negative when interacting with a child, frequently resorting to scolding, threatening, and issuing commands. Moreover, in these situations, the parents usually fail to follow through with consequences for a child's inappropriate behavior. A second breakdown in family management practices found in problem families is the failure of the parent to properly reinforce the child's appropriate and prosocial behavior. This problem can be manifested in two different but often related ways. In one case, the parent may reinforce the child but in an inconsistent and noncontingent way. The other case is found when parents simply display unusually low frequencies of positive reinforcement. Interestingly, the first case may lead to the second (Burgess et al., 1981). The third critical breakdown is in effective monitoring of a child's behavior. By failing to monitor a child's behavior, there is a lessened likelihood that the parent will properly reinforce or punish the child's behavior. The fourth breakdown is in problem solving procedures such as identifying a problem, examining potential solutions, and selecting, attempting and assessing the chosen solution. Difficulties can arise at any or all of these steps toward effective problem solving.

Structural equation analyses by Patterson and Dishion (1988) revealed that these breakdowns in family management practices typically result in aversive child behavior which, in turn, leads to parental rejection of the child and decreased parental warmth. Moreover, these effects appear to be bidirectional, such that increased rejection results in continued disrupted parenting. In this way, a vicious cycle is set in motion which can lead to a family system out of control and, in extreme cases, to parental disengagement and the maltreatment of the child. The implication here is that microsocial processes operating within a family can short-circuit optimal investment in a child and result in patterns of child abuse and neglect.

Based upon the structural equation analyses of Patterson, Reid, and Dishion (1992), we propose a multiply-mediated model. On one side, we put measures of child maltreatment as an outcome variable. As described above, the most important proximate mechanism explaining problems in parent-child relations is disrupted family management practices. Disrupted parenting is, in turn, controlled by a broad band of contextual and individual variables such as ecological instability, neighborhood or social network variables, and specific parent and child traits. While these variables all correlate with child maltreatment, their effects are mediated by cost-benefit assessments and whether parental investment is low. This can be seen in Figure 3.

The proximate determinants of child maltreatment, therefore, are to be found in the day-to-day transactions between parents and children. The proximate variable that is most crucial to understanding the link between parental investment and child maltreatment is family management practices. It is with low parental investment and the breakdown of family management practices that deteriorating ecological conditions ultimately lead to the abuse or neglect of children.

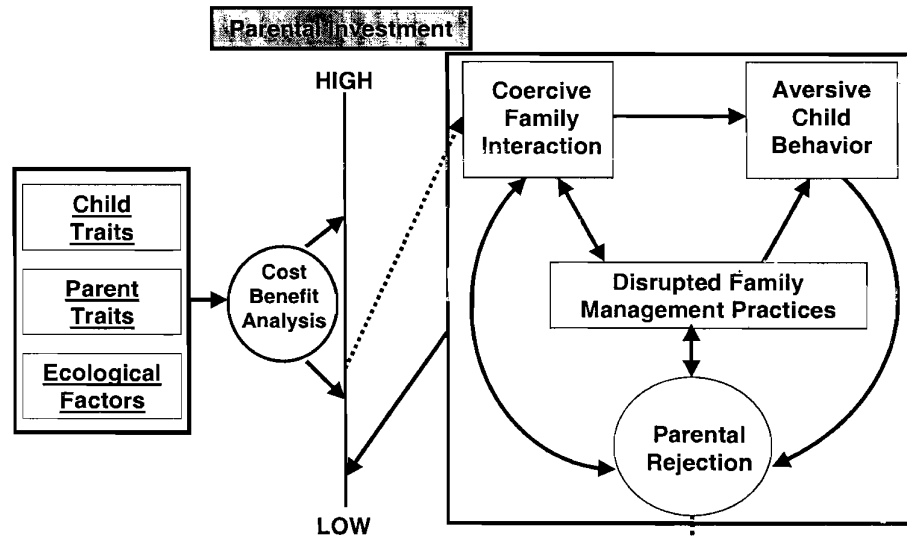


Figure 3. A Multiply Mediated Model. Dotted lines are used to designate the conditional nature of correlations between variables while solid lines are used to designate causal relationships

Moreover, there is growing evidence that ecological factors outside the family, as well as individual traits, impact upon child management practices through their effect on the kinds of microsocial and coercive processes operating within families that we found in PROJECT INTERACT. Because these microsocial processes are dyad-specific and measure the reaction of one family member to the behavior of another, individual parent and child characteristics are invariably involved as well.

As Patterson (1984) has observed, microsocial processes such as these found in maltreating families are often marked by increasingly aversive child behavior and escalating counterattacks. This, in turn, contributes to the parent perceiving the child as deviant and as a costly investment and eventually rejecting the child. All of this makes it increasingly difficult to employ effective child management practices which then feeds back into the coercive process. The key here is recognition of the bidirectional relation between these coercive microsocial processes and effective family management practices.

CONCLUSION

By now it should be evident that understanding the causes of child maltreatment is an interdisciplinary task and requires the synthesis of different levels of analysis incorporating biological as well as psychological and sociological variables. The fact that maltreatment is influenced by biological processes in no way precludes the importance of social and ecological factors operating both within and outside of families for explaining such behavior. Social and ecological conditions do impact a person's reproductive strategy and play important roles in the etiology and persistence of the maltreatment of children. For example, there is substantial empirical support for the assertion that poverty is positively associated with the physical abuse and neglect of children (Drake & Pandey, 1996). Nevertheless, at least in societies where abuse and neglect are non-normative, resource scarcity does not invariably lead to low investment parenting or child maltreatment.

Because not all parents with annual incomes below the poverty line resort to low parental investment, individual characteristics must be considered. For example, research examining resilience found that parents of stress-resistant children tend to have more optimistic global opinions about stressful experiences than parents of stress-affected children; in addition, the researchers suggested that this difference in parents may be attributed to different cognitions of similar, stressful events (Cowen, Wyman, Work, Kim, Fagen, & Magnus, 1997). Thus, psychology offers insights into who tends toward negative perceptions of costs and benefits and low investment parenting and is thereby most affected by ecological instability. Parental traits, such as intelligence and certain personality traits, may be markers for situations which lead to disrupted family management practices that culminate in child maltreatment.

The explanatory model we have presented implies that low parental investment results from a combination of factors which impact the perception of benefits-to-costs, as well as the threshold for acceptable ratios. Because degree of investment is mediated by cost-benefit analysis, it may be assumed that were perceptions of benefits-to-costs favorable, observable parental investment would be high, whereas skewed, unfavorable perceptions would result in low investment.

Low parental investment and child maltreatment are not, however, invariably linked. Proximate antecedents such as coercive family interactions and poor family management practices mediate the relationship between degree of investment and maltreatment. By definition, high investment parenting is incompatible with coercive family interactions and, therefore, will not culminate in child maltreatment. Thus, coercive family interactions are only present in cases of low parental investment, yet low parental investment does not always imply the presence of coercive family interactions and poor family management practices. Nevertheless, a low investment strategy can result in increasingly coercive family interactions and a breakdown in family management practices which lead to a

downward-spiraling, self-perpetuating system of aversive child behavior, increased rejection of the child, the escalation of coercive family interactions, poor management practices, and progressively lower parental investment. Child maltreatment is the rock bottom of this downward whirl of interactions. However, abuse and neglect are not the endpoints of this cycle. Not only do the malignant interactions persist between parent and offspring, but the pattern may be extended to the next generation via direct and indirect routes, as previously noted.

Although life history theory is able to explain intergenerational continuity, as well as new cycles of maltreatment, our central premise has been that an evolutionary explanation that accounts for varying levels of parental investment gains added precision by incorporating empirical findings originating from other disciplines and theoretical perspectives. By using the degree of parenting investment as a guiding principal in our analysis, we were able to parsimoniously relate anthropological, psychological, and sociological research to gain a better understanding of child maltreatment and its multiple causes.

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