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The notion that the type and nature of early experience to which human infants are subjected will make a measurable and permanent difference in their developmental life course as children and adults has been supported by a convergence of research findings from widely disparate disciplines: animal research, human genetics, and neuroanatomy. Continually debated are such issues as the degree of malleability or plasticity in development, the age at which intervention is necessary or useful, which types of intervention activities are beneficial, and the cultural relativity of outcome parameters. Some contend that development below age 2 years is highly canalized (i.e., there is a predetermined, genetically based pathway for infant development that exhibits strong "self-righting" tendencies and resists outside influences) and therefore intervention during early infancy may not be very useful (McCall, 1987). Others point out that recent evidence supports a probabilistic versus linear view of development (i.e., simple one-to-one relationships cannot adequately explain which factors or combination of factors actually account for developmental change) and that changes throughout the life span as well as individual differences play as much of a role as early experience in determining developmental outcome (Lerner, 1987; Scarr & Arnett, 1987). However, these same authors support early prevention and intervention activities because of a belief that it is easier to change or prevent problems and deficits the earlier one starts, although it is not necessarily impossible to intervene effectively later in life.

There is thus a spectrum of belief as to the relative importance of early experience, the degree of malleability of development, and the rigidity of "critical" or "sensitive" periods during which intervention may or may not produce results. One's position on this spectrum dictates one's belief as to the roles early intervention programs can play in preventing or treating developmental problems. Although there is currently common agreement that early intervention programs should be provided to infants with documented handicapping conditions (Guralnick & Bennett, 1987) and to those at some level of identifiable risk of developmental problems (Bennett, 1987), little attention is paid to the need for primary prevention programs for all young children. This chapter will discuss the prevention roles currently played by early intervention programs and the potential for expanding the range of prevention services in order to reach a larger number of infants and families. The discussion will begin by presenting traditional definitions of prevention and move to a discussion of the problems in defining the concept of risk. The current evidence for the preventive impact of early intervention programs will then be reviewed, followed by a discussion of the need to
develop a broader national policy oriented toward prevention of child and family dysfunction.

TRADITIONAL CONCEPTS OF PREVENTION

Traditionally, health services have been conceptualized as encompassing three levels of prevention: primary, secondary, and tertiary (Keogh, Wilcoxen, & Bernheimer, 1986). These three levels can be thought of as three progressively narrowing nets, with the largest number of individuals caught in the first net, fewer in the second, and the fewest in the last. However, when the net at either of the first two levels has gaps, that is, fails as a preventive agent, more individuals end up at the next level, requiring more intensive and costly services than if prevention efforts had occurred. Primary prevention thus involves providing services to the broadest group of individuals in order to prevent health-threatening conditions from occurring. Such services attempt to stem the conditions that give rise to the causes of illnesses and psychosocial problems – in other words, to stop the process before it starts. A program to provide prenatal care and education classes to all first-time mothers would be an example of a primary prevention effort to reduce birth complications that place infants at risk for later developmental problems. Immunizations and health screenings are other good examples of primary prevention services.

Secondary prevention involves services provided once a condition is identified, but before symptoms or problems become evident (i.e., in the asymptomatic or preclinical stage). Service delivery at this level is designed to prevent progression of the disease or problem and the development of more extensive symptoms that will require more intensive and costly intervention. For example, despite the best primary prevention efforts, some pregnancies will develop complications. Specialized management of these pregnancies, however, may still prevent insults to the fetus or neonate (as well as detrimental effects on the mother), thus constituting secondary prevention. Another example of secondary prevention is the provision of a special infant formula and subsequent specialized diet for children who screen positive for phenylketonuria (PKU). In early infancy these children show no symptoms, but without a special diet they will develop mental retardation due to an inability to process one of the nine amino acids necessary for growth, present in many protein foods. Secondary prevention targets individuals whose characteristics or symptoms place them at risk for developing further problems if some type of intervention is not undertaken at that point.

Tertiary prevention is the smallest net – the one into which an individual falls if things go wrong or fail to be identified at an earlier stage of symptom or disease development. In some cases, despite our best efforts at earlier stages of identification and prevention, or because prevention efforts did not reach everyone or were flawed in methodology, the disease or problem will fully manifest itself. Tertiary prevention is thus not really “prevention” at all; rather, it is the treatment and management of the disease, disability, or problem once it has occurred. The goal is to ameliorate or “cure” the condition, to restore the earlier healthier condition, or to prevent continued deterioration or death.

Along this continuum of service delivery, early intervention services for infants and toddlers can most often be described as tertiary services because they primarily target children with a clearly identified medical or developmental problem. The goal is to manage the problem and provide services to mitigate the effects of the condition. In some instances, however, early intervention programs have also been utilized to provide secondary prevention services to young children, who at the time of referral, do not
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Exhibit specific deficits or developmental problems. For example, premature infants often have poorly developed abilities for self-regulation that are implicated in later attention deficit and behavior problems (Als, Duffy, McAnulty, & Badian, in press). Whereas no identifiable problems may be evident at a few weeks of age, programs can assist parents to understand the subtle cues of their premature infant and can teach them special handling techniques. This intervention constitutes secondary prevention directed at a “risk” group prior to the development of symptoms.

Primary prevention services are rarely delivered by early intervention programs because legislative and funding mandates for these programs, as is the case with most health and social services, require that target populations with a specified need for services be identified before services are delivered. Since the concept of primary prevention implies that services be provided before the need develops, it has always been difficult to muster resources and support for any service that is described as a primary prevention (Healy, Keese, & Smith, 1985). Some would say that primary prevention is not a wise use of resources because lack of specificity as to risk groups means that some children will be served who did not require preventive services, and others will be served who do not benefit from these services because they require different, more intensive services (Gardner, Karmel, & Dowd, 1984; Kaye, 1986). Current political thinking holds that government roles should be limited rather than limitless, thus placing great emphasis on using resources for those most in need or most likely to benefit (Singer & Butler, 1987). Short of offering services only at the tertiary level, the problem then quickly becomes one of being able to accurately identify target groups most likely to need intensive services without earlier preventive activities.

The evolving concept of risk

The determination of which interventions prevent developmental delay in childhood requires some knowledge of causation of handicapping conditions (Keogh et al., 1986). Attempts to identify families and children at risk for later problems, however, are quite imprecise. For example, Ramey and MacPhee (1986) report that about 75% of mildly mentally retarded children are from low-income families, but only 2–10% of low-income children are mentally retarded. Similarly, infants infected with cytomegalovirus (CMV) are reportedly at much greater risk of developing long-term problems if they are from low-income families (Haskins, 1986). But attempts to use straightforward socioeconomic indicators from birth certificates to identify children with later school problems have resulted in highly inaccurate predictions (Finkelstein & Ramey, 1980; Ramey, Stedman, Borders-Patterson, & Mengel, 1978).

Chamberlin (1984) notes that childhood problems occur in families where little experience or knowledge about childbirth or child care is present, where there is limited emotional support for parents, and under conditions of economic, health, or emotional stress. In a summary of several British studies, Chamberlin concludes that about 80% of children identified with school problems come from only 20% of all families with children. This would seem to indicate that it is relatively easy to identify risk. However, both sensitivity (the degree to which children with problems are correctly identified) and specificity (the degree to which children are correctly excluded from intervention if they do not need services) are at issue in defining risk. What is most desirable is to have a method for identifying children at risk that includes the highest percentage who actually need help (i.e., high sensitivity), but at the same time limits the number who are falsely identified as at risk (i.e., high specificity).
A number of studies have hypothesized the direct relationship of certain perinatal factors, such as prematurity or low birth weight, to the appearance of later developmental problems, but only with limited success. For example, Rogers (1968) determined that 41% of children from a birth register had to be followed in order to accurately identify only 65% of the children who later developed chronic handicaps. Davie, Butler, and Goldstein (1972) found that only 51% of the children who later evidenced mental retardation were identified by selectively following 25% of a geographic cohort of children whose early characteristics indicated they were at risk (representing higher specificity, but lower sensitivity than the Rogers method). Werner, Bierman, and French (1971) reported that only 15% of all school problems in a birth cohort followed through age 18 were contributed by the group of children with high perinatal risk indicators (representing quite low sensitivity). The sensitivity of the birth register or perinatal identification methods for determining children at risk for later developmental problems is thus not high. Many children who are at risk are not identified through these methods while, at the same time, large numbers of children are tracked who do not evidence problems (low specificity).

Although these simple risk register methods that isolate either socioeconomic factors or perinatal health risks do not appear fruitful, there is evidence that by considering the interactive, or “transactional,” nature of perinatal risk and the caregiving environment, a better understanding of which infants are likely to develop later problems can be achieved (Sameroff & Chandler, 1975). For example, Alberman (1973) found that birth order and social class were better predictors of reading problems in school than was birth weight alone. Both Honig (1984) and Beckwith (1984) found significant interactions among developmental competence of infants and family sociodemographic status, with infants from higher income families consistently showing more optimal developmental outcome than those from lower socioeconomic status families, regardless of initial risk indicators.

More recent work has also indicated that developmental delay may be best explained by multiple risk factors that extend beyond even the major influence of socioeconomic status (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). These factors include maternal mental health status, level of anxiety, belief in control, and educational level; number of children in the family; racial status; father absence; and stressful life events. No single risk factor was found to be related to a child’s IQ in this study. Rather, multiple risks were required to predict lower scores. This may be explained in part by the hypothesis that there are strong species-specific developmental patterns at work in early infancy (i.e., highly canalized patterns) that result in adaptability and self-righting tendencies in the face of most environmental and biological insults (Brownell & Strauss, 1984). There is thus a strong and somewhat elastic template for normal development, although there are limits to this adaptability in the face of such major trauma as central nervous system damage or multiple environmental assaults (Brownell & Strauss, 1984; Lerner, 1987; McCall, 1987; Scarr & Arnett, 1987).

Werner (1986) and Ramey and MacPhee (1986) note that even with a sophisticated, interactional model of risk, the risk approach only examines the deficit aspects of development, rather than simultaneously examining both deficits and strengths in individual children and families. Thus, a simultaneous look at “protective” factors and risk factors would yield more insight into why certain children and families do well and others do not (see Werner, this volume). For adequate development to occur, Werner indicates that such protective factors as sources of social support and a sense of competence must be balanced against such risk factors as stress and biological insult.
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When risk factors accumulate and cannot be compensated for through a variety of protective factors, child development is impaired. We thus need to consider an even broader array of issues in order to predict developmental outcome.

The evidence for the powerful roles of social support and stress in influencing child development is mounting and provides us with additional clues as to why some families and children thrive, even in the presence of traditional risk factors, and others do not (see Dunst & Trivette, this volume). For example, studies have shown that the quality of infant attachment can be predicted by mothers' level of social support, isolated families are more likely to evidence child abuse, and verbal and emotional responsivity to children occur more often in mothers who have more contact with friends (Crockenberg, 1981; Powell, 1980, 1982). In another study, mothers without social support systems were found to be more restrictive and punitive toward their preschoolers (Colletta, 1979). The possibility of causal links between adequate parental social networks and children's cognitive outcomes has also been raised (Cochran & Brassard, 1979). In a study of mothers with less than high school education, social support, life stress, and measures of expectations for the child significantly predicted IQ at 48 months and language facility at 36 months (Bee et al., 1982). Better pregnancy outcomes have also been found for mothers who experienced high emotional support during pregnancies when prenatal stress was present. Only 33% of mothers with both high stress and high social support evidenced pregnancy complications, whereas 91% of those with high stress but low social support experienced complications (Nuckolls, Cassel, & Kaplan, 1972).

As we have seen, the concept of "risk" for developmental problems in children grows more complex with new research findings. Yet there are even other levels of risk that must be considered. These involve the broader institutional, social, and cultural impacts on families and children that play a role in developmental outcome (Bronfenbrenner, 1979, 1986; Garbarino, 1982, this volume). In particular, recent sociodemographic changes have created different, more stressful conditions for child rearing than existed in the past. These changes include increased employment of mothers due to economic necessity as well as new opportunities for women, increased divorce rates, decreasing family size, and family mobility, all of which create the need for more nonfamilial supports in order to provide adequate child-rearing environments (Bronfenbrenner & Weiss, 1983; Kagan, Klugman, & Zigler, 1983). Communities, schools, and government have been slow to respond to these changes, holding on to a traditional ethic of nonintervention in family life and a traditional, but outmoded, definition of what constitutes a family. The pervasiveness of these changes comes into startling focus when it is projected that by 1990 as many as one-third of the children in this country will have experienced the divorce of their parents (Kagan et al., 1983).

Particularly in the last decade this country has witnessed an erosion of family income that has caused middle-income families to slip into low-income groups; a substantial increase in the number of families below the poverty line; a 75% increase in teenage, out-of-wedlock pregnancies; an increased teen suicide rate; and widespread substance abuse. These phenomena mean that fewer families and children are immune to conditions that may impair healthy functioning (Kagan et al., 1983). At the same time, informal sources of family support are less available and public services have been cut back to target only the most desparately in need (Bawden, 1984). As Margaret Mead (1980) points out, "What we have failed to realize is that even as we have separated the single family from the larger society, we have expected each couple to take on a range of obligations that traditionally have been shared within the larger community" (p.
The consideration of these broader social issues as part of the “risk index” for predicting child developmental problems illustrates precisely just how difficult it is to identify which children require and can benefit from prevention activities.

In short, the concept of what constitutes risk to healthy child development has evolved into a complex understanding concerning cumulative and dialectical interactions among the characteristics of the infant, the infant’s parents, and other environmental factors. Rather than fixed and linear, infant development is viewed as “plastic” and “probabilistic,” with strong tendencies to self-correction in the face of biological and environmental insults. This more multifaceted understanding of the factors that will predict poor child development outcomes must also then dictate our understanding of the types of prevention and intervention activities that will likely have an impact on these outcomes. The simple, linear, main effect model is clearly not very useful. It is within this context that we will now examine the evidence that has accrued concerning the successful prevention activities of early intervention.

TRADITIONAL TARGET GROUPS FOR EARLY PREVENTION SERVICES

As discussed, early intervention programs typically serve specific groups of children, often with a priority placed on infants and toddlers with moderate-to-severe readily identifiable disabilities. For infants with clear medically diagnosed disorders, the role of early intervention programming is to provide tertiary services, that is, to treat or manage the existing condition. For most of these children, the goal is not to cure the disability but to prevent secondary handicaps, that is, to avoid additional disabilities by providing environmental facilitation and support designed around the specific capabilities of the infant. For example, without active intervention in the early months, a child with cerebral palsy may develop contractures and experience less range of movement and motor control than indicated by the initial central nervous system insult.

However, the potential for the true “preventive” roles of early intervention programs is best exemplified by services to groups of children with less well-defined disabilities or risks. By examining the secondary prevention activities of early intervention programs in serving children who are at risk for developmental delay, but who in early infancy are not yet manifesting problems, we can more clearly understand the potential benefits of broader primary prevention activities for young children. The two risk groups most often served by such early intervention efforts are preterm or low birth weight infants and infants from low-income families.

Preterm and low birth weight infants

The risks for developmental problems in preterm, or low birth weight infants (gestational age under 37 weeks; birthweight less than 2,500 grams) have been well documented (Als, 1986; Bennett, Chandler, Robinson, & Sells, 1979; Hagberg, 1978; National Institute of Health, 1979). A high correlation has been demonstrated between low birth weight and such conditions as cerebral palsy, mental retardation, epilepsy, visual problems, motor coordination problems, and learning disabilities (Hayden & Beck, 1982). Differences in temperament and arousal state between preterm and full-term babies are also frequently noted (Field, 1983; Gardner et al., 1984). However, it is difficult to predict from neonatal complications due to premature delivery and/or low birth weight which individual infants will have later developmental problems (Cohen, Sigman, Parmelee, & Beckwith, 1982; National Institute of Health, 1979).
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Intervention for premature or low birth weight babies is designed to provide developmental facilitation for the infant and caretaking information for the parents to meet the unique needs of these infants. Because of their difficult temperament and neurological immaturity, it is postulated that special services can prevent or lessen developmental problems (Field, Widmayer, Stringer, & Ignatoff, 1980). For example, Barrera, Rosenbaum, and Cunningham (1986) reported on a home visiting program for a group of preterm infants compared to matched controls and full-term infants. Developmental activities and parent-infant interaction were the focus of the curriculum. Although differences in cognitive development were not identified between the program and control preterm infants, the control group mothers were noted to be significantly less responsive to their infants at age 16 months, and scores on a measure of the caretaking environment (the HOME, Caldwell & Bradley, 1984) were significantly higher for the intervention group.

Bronwich and Parmelee (1979) reported on a 2-year study of a center-based intervention program for preterm infants from families of varied socioeconomic status. Infants receiving programming had more positive social interactions and social skills. Minde, Shoshenberg, Marton, Thompson, Ripley, and Burns (1980) provided weekly group meetings with a veteran mother and nurse for parents of premature infants and compared the infants and mothers to a control group during the hospital stay and at 1, 2, and 3 months postdischarge from the hospital. Mothers who participated in the in-hospital groups visited their infants significantly more, had more positive discharge reports, and were more active with their infants than the controls. Once home, the program mothers talked to and looked at their infants more, and more often participated in social activities for themselves. In a study of low birth weight and preterm infants from low-income families who were matched to controls and were provided with a year of home visiting services, Ross (1984) reported significantly higher 12-month developmental and home environment scores for the intervention group, although no overall differences were found on maternal ratings of infant temperament or maternal attitudes. Similar findings concerning better developmental and home environment scores for home-visited mothers were reported by Field et al. (1980) in a study that compared black, lower-class, preterm and full-term babies and their teen mothers (some receiving intervention, others not) to babies with older mothers. In addition, this latter study found the intervention mothers to return to work more frequently and to have fewer repeat pregnancies. The babies of intervention mothers were also reported by mothers to have easier temperaments.

The studies described thus far focus on mother-infant interactions. More recent studies of the developmental outcome of very low birth weight infants (less than 1,250 grams) have found that a critical factor may be overstimulation of these infants in the first few days and weeks of life (Als, 1986; Als, Lawhon, Brown, Gibes, Duffy, McAnulty, & Blickman, 1986; Thoman, 1987). It is postulated that due to neurological immaturity, preterm infants are hypersensitive to the extraordinary level of sensory stimulation of the neonatal intensive care nursery, that is, the bright lights, noise, frequent handling, and painful medical interventions. This overstimulation may have an impact on the organization of neural pathways and can cause hemorrhages in different areas of the brain, thus accounting for some of the common developmental problems associated with prematurity (Als, 1986).

The intervention proposed by Als and her colleagues is less, rather than more, stimulation, particularly directed toward assisting the neonate to develop self-regulatory behaviors. This includes allowing for more quiet sleep, prone positioning, nonnutritive
sucking, and self-regulated feeding. Evidence of the outcome of such an approach to caring for preterm infants extends to age 3 years, when verbal ability, memory, and motor skills have been found to be significantly better than in control infants (Als et al., in press). Of further interest, Als et al. (in press) have assessed both premature and full-term infants and found that they could be differentiated into three distinct groups based on their self-regulatory behavior. Although a large number of premature infants were found in the “highly reactive/sensitive” group, as were a few full-term infants, other preterms were categorized as “moderately well modulated,” and even a few as “well modulated.” This method of evaluating neonates appears to hold promise for explaining some of the variance in the developmental outcomes among infants, whether premature or full-term, as well as providing a new model for early intervention.

This brief review of recent reports of the impact of intervention for preterm and low birth weight infants and their families illustrates that positive changes appear to be engendered in individual infant development and in parenting behaviors when early intervention services are provided. The question to raise next is whether these early changes are correlated with the prevention of future deficits in development, school performance, and adult functioning. There is some evidence from longitudinal studies that environmental factors are better predictors of outcomes for preterm infants than are perinatal problems. For example, Beckwith (1984) monitored 126 preterm infants through age 2 years and then again at age 5. Developmental quotients for infants from English-speaking (primarily middle-income) families were within the normal range. Higher socioeconomic status predicted improving developmental quotients over time, while low socioeconomic status was correlated with declining developmental quotients, this being most evident for Hispanic infants. Very low birth weight (less than 1,500 grams in this study) or other perinatal complications were not significantly related to developmental quotients over time. There were gender and birth order differences as well as interactions among these variables and maternal characteristics. More verbal interaction, physical contact, and attention by mothers correlated with higher child developmental quotients at 4, 9, and 24 months and at 5 years for all ethnic groups.

The Beckwith study points to socioeconomic status and mother–infant interaction as major factors in the development of preterm infants. The substantial influence of the environment, as contrasted with perinatal insults, is further supported by the longitudinal study (birth through age 18) of 698 children from the island of Kauai (Werner, 1986). This study concluded that middle-class infants who sustained severe perinatal complications (although not all were low birth weight) did not demonstrate, on the average, significant developmental or intellectual deficits. In addition, children identified as resilient, even though from lower income families, were from smaller families and had more than one adult caretaker at home, more attention in childhood, and an informal support network beyond their parents. There were also interactive effects among difficult infant temperament and poor infant health and presence in a disorganized family, which led to poorer outcomes for certain children. This study thus points to additional factors that may serve as intervention points in the prevention of developmental deficits for biologically vulnerable infants, that is, family functioning and social support.

**Infants from low-income families**

The previous discussion concerning prevention of developmental problems in preterm and low birth weight infants concluded that environmental factors, particularly
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socioeconomic status, may have an equal, if not predominant, influence on an infant’s developmental outcome. (Of course, due to lack of access to adequate health care among low-income groups, socioeconomic status may also be one of the best predictors of prenatal and perinatal complications that result in higher numbers of low birth weight and preterm infants.) Whereas the relationship between environmental factors and developmental outcome for infants with severe central nervous system impairment is not as strong, the relationship between socioeconomic status and child development status has been investigated extensively (Caldwell & Bradley, 1984; Honig, 1984; Ramey & MacPhee, 1986; Whitman, Brown, & Deutsch, 1967; Whitman & Deutsch, 1967). Haskins (1986), for example, summarized the child rearing techniques that discriminate among low- versus middle-income families and that seem to have an effect on child development. These include verbal responsibility, avoidance of punitive control, warmth, and environmental stimulation.

The importance of early childhood experience in terms of lasting impact on lifetime development has also been widely described, and has served as the theoretical basis for the development of preschool compensatory education and early intervention programming since the mid-1960s (Bloom, 1964; Fowler, 1968; Hunt, 1964; Lazar & Darlington, 1982). An early review of the effectiveness of compensatory education (Bronfenbrenner, 1974) reported that IQ gains, although evident in the first few years after intervention, tended to fade at intervention ceased and long-term gains were rarely found. However, a more recent review of the lasting effects of preschool compensatory education that reported follow-up studies of 11 groups of children at ages 9–19 found major long-term impacts on children, including less need for special education, less grade retention, better achievement test scores, and more achievement-oriented attitudes (Lazar & Darlington, 1982). In a 10-year follow-up of a program of home visits, center activities, and day care provided at birth through 30 months of age to a group of low-income, predominately minority families, similar results were also found (Provence & Naylor, 1983; Seitz, Rosenbaum, & Apfel, 1985).

Berretta-Clement, Schweinhart, Barnett, Epstein and Weikart (1984) described non-school-related impacts of the Perry Preschool Project for their study sample at age 19. They cite evidence that the treatment group experienced a higher percentage of employment, fewer arrests, and fewer teen pregnancies. This group (which received either 1 or 2 years of preschool beginning at ages 3 or 4) also had higher high school graduation rates, higher rates of enrollment in college or vocational training, better high school grades, and better scores on competency tests.

In another study of early intervention with infants from low-income families, group day care provided to randomly assigned, at-risk infants from 3–36 months of age maintained IQs in the normal range, whereas a control group that did not receive day care showed declines in IQ starting at age 12 months (Ramey & Haskins, 1981). Follow-up until age 5 showed continued declines in the cognitive scores of control infants, but intervention children’s scores remained in the normal range (Ramey & Campbell, 1984). The risk factors utilized to identify children eligible for the study included family income; parental education, welfare, and employment histories; school-age siblings evidencing school problems; social service histories; and father absence. A study of day-care intervention supplemented by home visiting, compared to home visiting alone, found that children from home-visited families did no better than controls (Ramey, Bryant, Sparling, & Wasik, 1985).

These studies on an extremely intensive intervention of full-day infant care, year-round for several years, can be contrasted to results found by Slaughter (1983) that
compared mother discussion groups versus in-home toy demonstration activities provided to two groups of randomly assigned, low-income black mothers. Slaughter found that the discussion group mothers showed significantly better ego development and maternal teaching styles compared to controls at the end of the second year of the program. Differences found in favor of both treatment groups on openness and flexibility toward child rearing at the end of the first year of the program disappeared by the end of the second year. However, scores on the McCarthy Scales of Children’s Abilities (McCarthy, 1972) for children from both treatment groups were higher compared to controls at final testing. All children evidenced declining cognitive and verbal assessment scores. However, the scores of children in the treatment group did not decline as much. Slaughter concludes that the discussion group had broader-ranging impacts because of its greater impact on the mothers (i.e., social support, assistance with multiple aspects of child rearing), as compared to the situation-specific “infant stimulation” focus of the home-visiting, toy demonstration intervention.

The Slaughter study presents somewhat counterintuitive results in favor of a less intensive intervention with at-risk infants that nevertheless holds promise of significant impact on maternal behavior. Maddan, Ottara, and Levenstein (1984), the researchers who originated the toy demonstration–home visit model of early intervention with economically disadvantaged families, recently studied a cohort of families who participated in their early treatment groups. Prevention of school disadvantage through developing early positive mother–child interactive patterns and parent responsiveness to the child has been the major focus of their work. They note that although IQ differences of 13–15 points were found among children participating in early cohorts of the project, evidence of lack of impact was also found. First-grade follow-up of children indicated maternal interaction differences for only one of three cohorts and no long-term effects of the intervention on cognitive development, teacher ratings, retention in kindergarten, or attendance in special education. The researchers concluded that selection factors in the original cohorts may have eliminated potential differences and that preschool program participation by the majority of children in both treatment and control groups probably resulted in the similar performance of the groups in kindergarten and first grade. Further, they point out that depending on socioeconomic status alone to identify children and families in need of intervention may not be an adequate selection criterion.

In a review of 12 prevention programs for at-risk infants that employed an experimental design (i.e., random assignment of infants to treatment and nontreatment groups), it was found that more intensive, center-based infant activities produced the largest IQ differences at age 2 years (Bryant & Ramey, 1984). However, six of ten studies reported statistically significant differences in treatment versus control group IQ, primarily due to the lack of decline in developmental scores for the treatment group as compared to the controls. Seven of ten studies reported statistically significant differences in cognitive scores at age 3 years. Some differences in the home environment and in mother–child interactions were found favoring the treatment groups in these studies. However, Bryant and Ramey conclude that these differences are modest and their long-term value is unknown.

In contrast to focusing solely on child IQ outcomes, at least some studies also investigated such functional impacts on families as education and income. Field (1983) reported that intervention mothers more often returned to work and had fewer repeat pregnancies. Guteius, Kirsch, MacDonald, Brooks, and McErlean (1977) reported that treatment group mothers finished school more often. Garber and Heber (1981) reported more stable employment and higher incomes for treatment groups mothers. Olds (1984)
reported similar findings for low-income and teenage mothers involved in a home visiting program that began prenatally for first pregnancies and continued until the infant was 2 years of age. A 10-year follow-up of children and their mothers who participated in an infancy support program (including 30 months of home visits, day care, and center activities) found that mothers of program children had fewer children and better housing, education, and employment status compared to controls (Provence & Naylor, 1983; Seitz et al., 1985).

Nauta and Travers (1982), in reporting the findings of the Child and Family Resource Program (CFRP), indicated that there were no differences in infant developmental scores for program versus control children, but that program mothers showed greater awareness of their role as educators of their own children and interacted more with their toddlers. They also reported higher employment among single black teenage mothers enrolled in the program as compared to controls. The CFRP program consisted of comprehensive family support services such as referrals to jobs, counseling, health, and housing resources as well as a home visiting program and center-based group activities for parents and children aged birth to 8 years.

This review of preventive and compensatory interventions directed at socioeconomically disadvantaged infants illustrates that intervention can have specific impacts on the child's development, the mother's child-rearing style, and the mother's subsequent education and employment. Further, there is evidence of a substantial long-term impact on children's lives in terms of functional outcome (employment and educational achievement, level of need for public services, and delinquent behavior), although there is no evidence for long-term change in IQ scores.

There is thus substantial documentation of the potential for early intervention services to have an effective preventive impact for a range of risk groups. It can be argued that this does not constitute evidence of "primary" prevention because of the strong association of problematic child development outcomes that are identified with these high-risk groups. In contrast, since the concept of risk is quite complex, it is often necessary to serve a large number of children and families who may not have required assistance in order to catch the few who would have progressed to more intense needs without early services. Thus, the question remains as to whether the role of early intervention services can or should be expanded to become a primary prevention system for all infants and families.

A BROAD VIEW OF PREVENTION

When the risks to healthy child development are recognized as multifaceted and dependent on the interaction of both detrimental and nurturing factors, it becomes apparent that prevention programs must be prepared to provide a wide variety of services. In addition, it must be recognized that although there may be different targets of prevention, initiation of programs at one level of risk (e.g., individual family) will not be very effective unless programs are initiated simultaneously at other levels that directly or indirectly affect that quality of the child’s caretaking environment. Garbarino (1982, this volume), drawing on Bronfenbrenner's (1979) work on the ecology of human development, describes a systems approach to identifying risk that encompasses four levels: microsystem (individual family), mesosystem (child’s school, service system), exosystem (parent’s work place and government agencies that set policies that affect the child indirectly), and macrosystem (broad cultural or policy assumptions such as racism, sexism, federal support of national health insurance or day care).
At the microsystem level, primary prevention consists of such activities as family planning and education in parenting, childbirth, and child development (Healy et al., 1985). These should be designed to assist parents in understanding the qualities of interaction with their children that promote healthy development, although it should be recognized that the impact of other systems may prevent even the most well-intentioned parents from carrying out their role adequately (Garbarino, 1982; Zigler & Weiss, 1985). The Minnesota Early Learning Design (MELD) program, which consists of parent-facilitated groups meeting twice a month, starting during pregnancy and continuing until the infant is 2 years old, is a good example of a communitywide primary prevention program aimed at educating individual families as well as providing informal support (Ellwood, 1983).

At the mesosystem level, appropriate services need to be provided that are oriented toward health issues and social support. These include comprehensive prenatal, perinatal, and well-child care. Periodic screening of all children for health and developmental problems provides the greatest promise of adequate sensitivity in identifying children who need help, as contrasted to the risk factor approach discussed earlier in this chapter (Chamberlin, 1984; Meisels, 1984). Specific parent support services such as access to home visitors, homemaker, or aids services, transportation, day care, drop-in day care, and respite care are additional preventive services that address the risks of family stress (Chamberlin, 1984). The Brookline Early Education Project (BESEP) is a good example of a program that attempted to provide both parent education services and instrumental support in terms of parent groups, home visits, and day care to all children in a particular birth cohort from one community, randomly assigned to differing intensity of services (Pierson et al., 1983). Documented outcomes for children included more optimal social skills and better use of time in kindergarten and second grade, as well as more advanced reading skills.

Schools themselves need to be more attuned to individual differences and be able to provide supportive, nonthreatening environments for learning. Reasons for school failure need to be identified as much in the organization, curriculum, and climate of the schools as in the problems of individual children or their families. Other mesosystem issues include coordination and communication between the formal service systems and the home so that parents, other caregivers, and teachers can engage in complimentary and not contradictory interactions with the child. Attention must be paid to cultural, ethnic, racial, and religious differences in order to accomplish this aim (Ogbu, 1987).

Exosystem issues concern policies at the formal, regulatory level (e.g., official government, corporate, health, social welfare, and educational policies) that can help facilitate individual family functioning as a supportive caregiving environment. For example, school curriculum policies are needed for sex education and parenting education, including the introduction of these topics early enough to prevent adolescent pregnancy (National Research Council, 1987). Similarly, the corporate sector must examine its policies with regard to day care, parental leaves subsequent to a birth or adoption, flex time, and so on (Galinsky, 1986; Garbarino, 1982). To the extent that a parent's work setting does not accommodate the parenting role, children may be deprived of adequate high-quality interaction with a caring adult, which is essential to the prevention of child development problems (Bronfenbrenner & Weiss, 1982).

Perhaps even more important and basic to adequate child development are exosystem-level policies that keep welfare benefits below the poverty level, ignore labor market trends that create conditions of high unemployment, focus on private profit in
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housing so that displacement and homelessness of families becomes common, and ignore public transportation and recreation needs of lower income families. Even when policies that are favorable to children and families are established, a lack of coordination of services, inconsistent or contradictory eligibility rules, and poor implementation present major roadblocks to delivering preventive services (Healy et al., 1985). Meisels (1984) aptly notes that the Early Periodic Screening, Diagnosis and Treatment program (EPSDT), a federal prevention program that is designed to identify and treat physical and mental problems in poor children, ages birth through 21, has not fulfilled its promise because few physicians and eligible families know about the program, eligibility criteria are unclear, and there are inadequate standards, monitoring, and funding. Moreover, evidence from a Michigan study shows that EPSDT has very limited impact on tertiary health-care utilization (Meisels & Margolis, 1988).

Finally, at the macrosystem level, we are talking about the absence of a national climate or policy that is inclined to take seriously the systems view of examining developmental risk in infancy and childhood. We continue to view family life primarily as if it exists in the context of small-town America where extended families provide support and services to each other. In this view, family life is considered to be a private affair in the context of a social Darwinist approach to family needs, with policies that provide minimum services only for those in most dramatic need (Garbarino, 1982, this volume). This alternative is a climate that provides broad-based support for child development and family life activities, and includes national health insurance, a national day-care policy, and a comprehensive continuum of child and family support services that are available to all families when needed.

CONCLUSION

This chapter has reviewed the definitions of prevention traditionally utilized in the health care field and has examined the role that early intervention programs have played in preventing developmental problems in infants and young children. We have seen that there is a rich research literature describing both the short- and long-term impact on children and their families through participation in such early intervention services as home visiting, parent groups, and day care. Although these effects have been quite dramatic in some cases (e.g., Berrueta-Clement et al., 1984), the substantive impact of such programs as the Perry Preschool Project represent less of a "miracle," than a more socially constructive and less impoverished outcome for a selected group of economically disadvantaged children. Nevertheless, whereas many such programs undoubtedly have provided preventive services, they have been directed toward specific risk groups, which limits their potential as true tests of primary prevention. The programs have not been opened wide enough to capture in their nets a majority of the children and families who need and could benefit from early services.

How do we know that early intervention services delivered to a broad range of children is a good investment of national resources? We have seen that it is quite difficult to predict developmental outcomes for children from the variety of well-established risk indicators, including birth weight, perinatal health status, and socioeconomic status. The work of Als et al. (in press) has shown that there are subtle, but identifiable, individual differences in the self-regulatory behavior of any infant that may predict later developmental outcomes. Although there is a higher percentage of poor
indicators in premature infants, a commonly targeted risk group, these indicators are also found in full-term infants who are not likely to be identified as being at risk for developmental problems. Other studies have identified a broader range of factors that can be influential in child development, including social support, family functioning, and mothers' attitudes and education (Colletta, 1979; Crockenberg, 1981; Powell, 1980, 1982; Sameroff et al., 1987; Werner, 1986). Still other research has pointed out such potential influence as divorce, family size, and mobility that impinge on the family system and, indirectly but powerfully, on the environment of the growing child (Bronfenbrenner, 1979, 1986; Bronfenbrenner & Weiss, 1983; Garbarino, 1982; Zigler & Weiss, 1985). Our understanding of the concept of risk has evolved from a focus on single, intuitively obvious factors to a multifaceted, transactional model. Thus, simple screening methods, such as risk registers, are not sensitive or specific enough to detect children and families in need of services when this newer understanding of risk is adopted.

Experience suggests that we cannot assume that programs aimed at specific, commonly targeted risk groups will be sensitive enough to identify most of the children and families who can benefit from early services. By failing to detect developmental problems in their earliest stages, that is, by failing to support the goals of primary prevention, we set the stage for having to serve larger numbers of children with more complex and costly intervention needs at the secondary and tertiary levels. School failure, delinquency, and teen pregnancy are but a few of these most common, costly results.

Current early intervention programs have substantial experience in serving disabled children and other young children identified as being at risk for later developmental problems. Many of the services developed by such programs can play a wider role in primary prevention if they are made available to all families and in the context of recognition of a multilevel system of influences on child developmental outcome. This is not to say that the only solution is for federal or state government to provide comprehensive, free support services to any family requesting help. Rather, national policy should reflect the lessons learned from research on the impact on children of the broadly conceived caregiving environment. Attention must be paid to developing an infrastructure that makes available appropriate medical, educational, therapeutic, recreational, housing, and child-care help to all families, and at the same time thoughtfully attacks the fundamental causes of poverty. This means developing government policy that provides resources for training paraprofessionals and professionals to deliver a variety of care-giving services; capital expenditures for housing, schools, clinics, recreation facilities, and community centers; health and social insurance mechanisms; better unemployment and welfare programs; and further research and demonstration projects. At the same time there is clearly a role for private sector participation, both in terms of resources and policies.

Families will have a range of needs for child support services, from minimal and infrequent to more intense and ongoing, and a range in ability to seek out and pay for services. Currently, families at the two economic extremes are those most likely to be able to access services, although the lack of fundamental agreement on the broader social need to be supportive of children and families makes services sometimes unavailable, at any cost, and poorly delivered when designed entirely for the disenfranchised. This situation leaves many children, regardless of socioeconomic status, at risk for developmental difficulties. The lessons learned from early intervention research demonstrate that it may be possible to prevent many of these problems.
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