DEVELOPMENTAL INTERVENTION FOR INFANTS WITH HANDICAPS: PURPOSES AND PROGRAMS

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Developmental intervention for infants with handicaps and their parents has taken many forms, each with its own unique purpose. In this paper, three broad types of infant intervention are identified as prevention, infant focused, and family level, and the purposes for each are examined. For each intervention type, exemplary programs are described. Finally, issues related to efficacy and the theoretical base for infant intervention are examined.

The passage of Public Law 99-457 draws special education into a new era. In previous years, the domain of special education has been education of preschool or school-aged children, but school systems in many states are now being asked to attend to the presence and needs of infants and toddlers with handicaps, as well as the needs of their families. To date, all states have agreed to participate in the Part H section of the new law, which provides funds for planning service delivery programs for infants, toddlers, and families (Campbell, Bellamy, & Bishop, this issue). Although not all states have designated the department of education as the agency responsible for implementing the new law, in most states special educators will play a substantial role in the development of programs for infants with handicaps.

To accommodate the differing needs of infants and families, approaches to interventions with infants have varied substantially. Programs have different rationales, goals, and service delivery models. Intervention settings range from hightech neonatal intensive care units to rural households of grandmothers. The intervenors may be skilled health-care providers, special education teachers, or parents. Yet, a single unifying dimension of what appears to be a disparate set of intervention strategies is the central concern for the infant's developmental status. An underlying assumption is that the intervention program will in some way improve the developmental status of the infant.

The purpose of this paper is to provide a conceptual framework for the numerous approaches used in infant interventions designed to enhance the infant's developmental status. Medical or other interventions designed to have an effect on the infant's physical health are beyond the scope of this review. We have organized our review around the *purposes* for intervention (i.e., what intervention programs try to accomplish), providing a brief description of exemplary programs within each categorization. Because of space constraints, we have not in

this short review attempted to summarize the effectiveness of the programs described. However, we will return to the issue of efficacy in our conclusions. Last, we will speculate on the future directions for interventions with infants with handicaps.

PURPOSES AND RATIONALES

Intervention programs for infants with handicaps and their parents have a range of purposes, each based on unique rationales. The varying purposes of infant intervention programs are determined by the nature of the populations served, the theoretical orientation of the interventionists, and social policy.

One general purpose of some early intervention progams is prevention of eventual developmental delays. The number of neonates who are at risk for eventual developmental delays is increasing, in part because of factors associated with societal trends such as the increased survival rate of biologically fragile neonates, increased poverty, and increased teenage pregancies (Baumeister, 1988; Baumeister & Kupstas, 1987). To prevent these societal trends from resulting in greater numbers of handicapped children, many early intervention programs attempt to prevent the occurrence or severity of the co-occurring factors that are thought to cause the handicap. Common elements of these interventions are that they (a) occur before a handicap has been diagnosed and/or (b) are initiated before the infant is born or goes home from the hospital.

A second purpose of some early intervention programs for infants with handicaps is to effect changes directly in behaviors, development, or relationships with the caregivers. The rationale for these interventions is that these changes will lead to short-term improvement in infants' behaviors, skills, or relationships, which may continue as the child grows older. These intervention programs occur most frequently after the child has come home from the hospital and may be conducted by an interventionist or the parents.

A third purpose of other early intervention programs is to effect changes in the family system in order to create positive changes in the infant. The rationale for this approach is that the entrance of infants with handicaps into some families may create stressors or add to existing family stress, in turn contributing to a dysfunctional family system (see Beckman & Pokorni, this issue). By addressing the families' most pressing needs, the interdependent effects of the program upon family members may improve family functioning, and this may contribute to positive outcomes for the infant (Bailey & Simeonsson, this issue; Dunst, 1985; Dunst, Leet, & Trivette, this issue).

PREVENTIVE INTERVENTION

Prenatal Intervention Programs

In an effort to improve developmental outcomes for infants of high-risk mothers, preventive intervention programs have been developed for and implemented with these mothers before the infants are born. Infants born to these mothers are developmentally at risk due to environmental and/or physiological

factors affecting their mothers prior to conception and during pregnency (Kopp, 1987). Three groups of high-risk mothers are (a) mothers with medical or biological risks, (b) mothers from low socioeconomic (SES) groups, and (c) mothers who are adolescents.

Medical and Biological Risks. Mothers with medical or biological risks may have chronic health problems such as diabetes or heart disease, a history of reproductive failure or premature births, or a familial history of genetic abnormality. Preconception intervention programs are implemented with these women in order to lessen the effects of these medical and biological factors on the child (Leonard, 1987; Steel, 1985). Prepregnancy counseling and educational programs are provided to enhance the woman's awareness and knowledge regarding the risks both to her and her child, allowing the mothers to make informed decisions about the continuation of the pregnancy. Medical interventions are employed in order to stabilize the woman's health condition prior to conception.

Once conception has occurred, the staff provides intensive prenatal care for these mothers. Programs involving changes in activity levels, dietary planning, self-monitoring for premature labor, and continued education on risk factors are developed and implemented (Papiernik, 1984; Steel, 1985).

Environmental Risk. Mothers from low SES homes constitute a second group of high-risk mothers. The environments of this group of women place them at high risk for premature delivery, the delivery of low birthweight infants, and a higher incidence of neonatal mortality (Stockbauer, 1987). The two former conditions place the infant at risk for developmental delays.

Two federal programs serve as funding sources for preventive intervention projects for low SES mother and infants (Chelimsky, 1984; Taylor, Berg, Kapp, & Edwards, 1983). These programs are the Special Supplemental Food Program for Women, Infants, and Children (WIC) and the Maternal and Infant Care Programs (MIC). The WIC program provides education on nutrition and supplemental foods that are high in protein, iron, and Vitamins A, C, and D to low SES women and their children. Women who participate in WIC programs are encouraged to seek prenatal care.

MIC programs provide prenatal and postnatal follow-up services for low income women and children. These programs focus primarily on medical and educational service. MIC educational programs emphasize child care and development, nutrition, and contraception. Many programs that provide care for adolescent mothers are funded through MIC (Taylor et al., 1983).

Maternal Age Risk. With the rising incidence of adolescent pregnancy, the need for preventive intervention programs that minimize the complications associated with these pregnancies has increased (McDonough, 1985). Adolescent mothers are at high risk for premature delivery, delivery of low birthweight infants, and increased incidence of neonatal mortality (Finkelstein, Finkelstein, Christie, Roden, & Shelton, 1982; Gunter & LaBarba, 1981). Prenatal preventive intervention programs for adolescent mothers focus on health care, knowledge of pregnancy and childbirth, child development information, parenting skills, and psychosocial support from community and family (Anastasiow, 1983;

Hardy, King, & Repke, 1987; Kirby, 1986; McDonough, 1985). These interventions are provided in prenatal clinic settings and in community-based programs.

The location of prenatal clinics—schools versus hospitals or medical facilities—is currently a controversial issue. School-based clinics have increased in number since the mid-1970s (Kirby, 1986); proponents of these clinics cite easy access to the prenatal programs as incentive for participation in the clinic programs (Kirby, 1986; Taylor et al., 1983). When comparing pregnancy outcome measures, studies have shown improved birthweight, fewer pregnancy complications, decreases in prematurity, decreases in neonatal mortality, and increases in prenatal care for adolescents in both types of settings (Dryfoss, 1985; Flood, Greenspan, & Mundorf, 1985; Hardy et al., 1987; Kirby, 1986; Taylor et al., 1983). However, Taylor et al. (1983) found that adolescents in school-based clinics initially attended the clinic at earlier dates in their pregnancies and had more frequent clinic contacts than those in an enhanced hospital clinic. Pregnancy outcomes were similar for both groups.

Preventive Intervention in Hospital Settings

Preventive intervention with high-risk newborns in hospital settings has evolved through the years. The literature from the mid-1970s to the early 1980s focuses primarily on stimulation of the high-risk neonate (Field, 1980; Schaefer, Hatcher, & Varglow, 1980). However, Cornell and Gottfried (1976) have suggested that future intervention researchers focus on the effects of the environment and the processing capacity of high-risk neonates.

Recently researchers and caregivers have begun to investigate and analyze intervention and caregiving routines in neonatal intensive care nurseries (NICU) (Blackburn & Barnard, 1985; Gaiter, 1985; High & Gorski, 1985; Gorski, Hole, Leonard, & Martin, 1983). A new awareness of the positive and adverse physiological effects resulting from interventions and caregiving has resulted. Als et al. (1986) have instructed NICU nurses in the development and implementation of individualized care plans based on information related to infant reaction patterns collected through behavioral observations of the infants. Infants who received individualized care showed significant medical and developmental benefits. Gorski (1987) has referred to preventive intervention as *developmental care*. This phrase implies a merging of developmental intervention with caregiving routines, which should result in better care for high-risk neonates.

Modification to the NICU Physical Environment. Developmental care influences directly the sensory development of the high-risk neonate in NICUs. NICUs are typically very bright and somewhat noisy places. To protect the neonate from the intrusive sensory stimulations present in these NICUs, nurseries have begun to make modifications in the physical environment. Changes have been made in the positioning and intensity of lighting systems in some nurseries while sound reduction methods have been employed in others. Gottfried (1985) has incorporated into the NICU methods of stimuli-reduction, such as installation of sound-proofed ceilings and walls, the use of light signals for phones and equipment, and the removal of noisy equipment to adjoining rooms.

Modification of Social Interactions in the NICU. Developmental care routines may be the first social experiences of the high-risk neonate (Gorski, 1984). Gorski and his colleagues (Gorski et al., 1983; High & Gorski, 1985) studied the amount and types of tactile stimulation infants received before, during, and after caregiving routines. Little time was spent in noncaregiving tactile contact. Efforts are being made in some nurseries to increase and encourage noncaregiving interactions with the infants. Parents and siblings are encouraged to make frequent visits to the NICU and to assist with the care of their child (Gorski, 1984).

Positioning and Vestibular Stimulation in the NICU. Positional support for high-risk neonates who may spend weeks in the NICU is important to the motor development of the infant (Updike, Schmidt, Macke, Cahoon, & Miller, 1986). Support pillows, egg crate supports, bolsters, and comfort pads are types of supports used to position high-risk neonates. Positional disorders such as neck hyperextension, shoulder elevation, head flattening, and hip abduction are avoided with the use of positional support. In addition to postitional support, vestibular-proprioceptive interventions are employed to stimulate neurobehavioral development (Korner, Schneider, & Forrest, 1983). Oscillating waterbeds are used to stimulate the vestibular-proprioceptive sensory modalities. High-risk infants receiving this form of stimulation often show improvement in sleep states (Korner, Ruppel, & Rho, 1982). Motor developmental care assists the high-risk infant in organizing and regulating physiological functions, motor responses, and state differentiation.

INFANT-FOCUSED INTERVENTIONS

Early interventionists have also designed programs to facilitate the acquisition of developmentally appropriate skills of infants with handicaps and to ensure a positive relationship with their parents. These programs occur either in the home, with the parents often playing the role of the intervenors, or in centers, where the infants spend time with the program staff and the parents.

Skill-Oriented Programs

Skill-oriented programs are specifically designed to teach developmental skills to infants or toddlers with handicaps. These programs take place in the home, in a center, or in a combination of both.

Home-Based Programs. In home-based programs, the interventionist typically visits the home a number of times per week or month, collects assessment information about the infant's skills, uses the information and parent suggestions to identify the skills that need to be developed, and either works directly with the infant to teach those skills or more often shows parents how to teach the skills.

A number of examples of these skill development programs exist. The Portage Project was one of the earliest home-based programs for infants and young children with handicaps. Staff from this project taught parents to design and carry out specific activities to teach skills and to collect detailed data on their infants' performance (Shearer & Shearer, 1976). Project SKI-HI is a home-based program for very young hearing impaired children. In this program, parents are

taught to operate and maintain hearing aids for their children as well as to implement activities for promoting language development (Bruce, Stegeman, & Rittenhouse, 1986; Clark & Watkins, 1985). Rosenberg and Robinson (1985) described a program in which parents are taught to engage their infants in activities that promote sensori-motor development. These researchers reported increases in the parents' teaching skills as a result of this program (Rosenberg, Robinson, & Beckman, 1984).

Center-Based Programs. Skill development interventions programs also take place in centers. In center-based programs, parents may attend the program with the children on a weekly or biweekly basis, as often occurs with infants, or the child may attend the program on a nearly daily basis without the parent, which happens more often with toddler-aged children. Again, specific developmental skills are identified, and instructional programs are designed to teach those skills. In the present issue, Bricker and Gumerlock describe a prototypic center-based, infant and toddler program that incorporates a unique program evaluation plan. Warren, Alpert, and Kaiser (1986) have described an infant-toddler program that has incorporated the use of environmental arrangement along with an individualized curriculum sequencing approach to instruction (Holvoet, Guess, Mulligan, & Brown, 1980). Similarly, LeLaurin (1985) employed environmental organization as well as neurodevelopmental therapy approaches in her program for infants with substantial handicaps.

Programs may also combine center- and home-based approaches. Widerstrom and Goodwin (1987) describe an infant intervention program in which parents and infants attended meetings twice a week at the center and staff visited the home twice monthly. In a long-term follow-up, parents reported that their children had benefited greatly from the program. In a center- and home-based program for infants with moderate and severe handicaps, Hanson (1985) reported significant gains made by infants across several measures of child development.

Use of Computer-Technology. Researchers and program developers have used computer technology in several ways to design intervention approaches for infants with handicaps. Brinker and Lewis (1982a, 1982b) used a computer-assisted approach to promote contingency awareness and motoric responding in very young children with severe motoric handicaps. The computer apparatus that they developed provided visual or auditory stimulation whenever the child in the intervention made a targeted physical movement. The computer automatically recorded the children's responses and changed the reinforcing stimulation as the child tired of it. In a separate investigation of a similar contingency learning approach, Dunst, Cushing, and Vance (1985) suggested that such response-contingent learning could possibly have second-order effects. As the infants became more responsive, the parents might begin interacting with them more frequently, thus setting the occasion for future positive contingency learning experiences in a parent-infant social context.

Using a computer-managed instructional approach, Sandall, Fewell, Schlater, and Vadasy (1986) created a series of instructional activities that could be accomplished in routine activities occurring in the homes of infants with handicaps.

These activities were placed in a data base and cross-referenced with the skills appropriate for the infants in the program. Parents conduct an assessment at home, and relay this information to the program manager. With this information the data base generates a set of activities that the program manager relays back to the parents for use in the home.

Parent-Infant Interaction Programs

Infant intervention programs also focus on developing the quality and quantity of social interactions between infants and their parents. These programs may be designed solely to influence the style of parent-child interactions or to produce changes in the relationship between parents and their infants.

Interventions for Producing Changes in Interactional Style. Developmental literature suggests that parents contribute positively to certain aspects of their infants' development when they are responsive and playful with their infants (Bruner, 1975; Fogel & Thelen, 1987). However, some infants with handicaps either do not respond to parents' efforts to play with them or respond in ways that may be unclear to the parent (Yoder, 1986). This style of responding may result in interactions that are brief and unsatisfactory for the parents and the infants. Parents' reactions to this style of interaction may be to try very hard to get their infant to respond, thus dominating the interaction and perhaps overstimulating the infant, or to become unresponsive and withdraw from interaction (Mahoney & Robenalt, 1986). By teaching the parents to recognize their infants' attempts to interact and to be responsive to those attempts, a more positive interactional style may be achieved (Fraiberg, 1977). However, it should be emphasized that such atypical interaction patterns, while present for some mother-infant dyads, do not exist for all infants with handicaps and their mothers. Screening is required to identify the infants and mothers who are engaging in interactions that are not mutually satisfying.

A secondary effect for some interaction interventions may be that by promoting natural social interactions between infants and parents, development in other related areas (e.g, communication skills) might also be facilitated (Harding, 1984). In the present issue, Mahoney and Powell describe an intervention program for promoting interactions of mothers and their infants with handicaps. Teacher consultants made weekly home visits, modeled turn-taking interaction with the infants for mothers, and assisted mothers in developing activities and incorporating turn taking into their routine. Importantly, their findings suggest that the resulting increases in reciprocal mother-infant interaction were related to increases in other aspects of children's development.

In an earlier intervention program with teenage mothers of at-risk infants, Field (1983) described an interaction coaching approach to increase the positive social interactions between mothers and infants. In this interaction, mothers were taught to imitate their infants' behaviors, repeat their vocalizations, and remain silent during pauses or breaks in the interaction. Similarly, in the present issue, Brown-Gorton and Wolery describe a strategy for increasing mothers' imitation of infants with handicaps as a strategy for assisting mothers to be more re-

sponsive. They found that as mothers' responsiveness increases, mothers' directive behavior toward the infants decreases. A number of other researchers have designed intervention programs for promoting positive parent-infant interactions through (a) designing social interaction objectives for parents and monitoring their patterns of interaction (McCollum, 1986; McCollum & Stayton, 1985), and (b) video taping interactions and providing feedback to mothers (Kogan, 1980).

Relationship Focused. The dysfunctional social interaction patterns between some parents and their infants with handicaps not only reduce the frequency with which parents and infants will engage in playful interactions in the future, but they may also affect the emotional relationship that develops between the infant and its parents. Some social interaction intervention programs are designed to promote the parent-infant interaction for the explicit purpose of improving the relationship between the parent and the infant.

In a program for blind infants, Fraiberg (1971, 1975) documented through a series of case studies the process of making parents aware of the infants' communicative signals, which were disguised by the child's disability. She suggested that this intervention program could influence the attachment relationship that develops between infants and their mothers. In a home-based program for infants with substantial handicaps, Bromwich (1981) and her colleagues designed an intervention approach in which parents first learned to enjoy playing with their infants before they specifically began working on developmental, skill-oriented activities. Progress was documented in this intervention by some parents' developing an enjoyable, playful relationship with their infants and becoming knowledgeable about play activities that were developmentally appropriate for their children. In a somewhat similar relationship-focused intervention program, Affleck, McGrade, McQueeny, and Allen (1982) taught parents to engage infants in social interactions in order to build playful relationships.

FAMILY SYSTEMS LEVEL INTERVENTIONS

Current theories and correlational findings support the notion that parents will be more willing and able to affect their children's development positively when parents' most pressing needs for personal well-being are met (Dunst, 1985; Dunst, Leet, & Trivette, this issue). These and other findings suggest that basing early intervention at the family systems level rather than at the individual child level or parent-child dyad level may be a productive approach to promoting development of infants and toddlers with handicapping conditions. The introduction of the Individualized Family Service Plan in P.L. 99-457 (see Campbell et al., this issue) reflects this broader, family-oriented approach to early intervention.

Family systems level interventions may produce positive effects for infants in an indirect manner by attempting to influence the systems rather than directly intervening with the infants or the parent-infant dyad. Dunst and his colleagues (Trivette, Deal, & Dunst, 1986) have represented the proposed indirect influences of social support on child behavior and development. A simplified version

of Dunst's model (see Figure 1) proposes that professional and nonprofessional social support may indirectly facilitate infant functioning by directly increasing the family members' personal health and well-being. It is proposed that physically and psychologically healthy family members are more capable of interacting with the child in ways that facilitate the child's present functioning and future development.

Trivette et al. (1986) have provided a summary of the clinical approach implied in this model of infant intervention. In brief, this approach requires that goals be generated from a comprehensive assessment of the family's potential resources and needs, a rating of adequacy of family resources to meet these needs, and a matrix for determining which of the family's existing resources could help meet a perceived need. The targeted goals are those that the parents and interventionist feel to be most pressing. The role of the interventionist varies according to the targeted goals. To avoid dependency on professionals and to enhance self-efficacy of the family, the interventionist's role is to help the parents use their existing resources to meet their needs and to perform only tasks the family is not able to do themselves. In the present issue, Dunst et al. provide evidence that adequacy of family resources is related to both personal well-being of the parents and parents' stated willingness to carry out intervention programs for their infants and toddlers with handicaps.

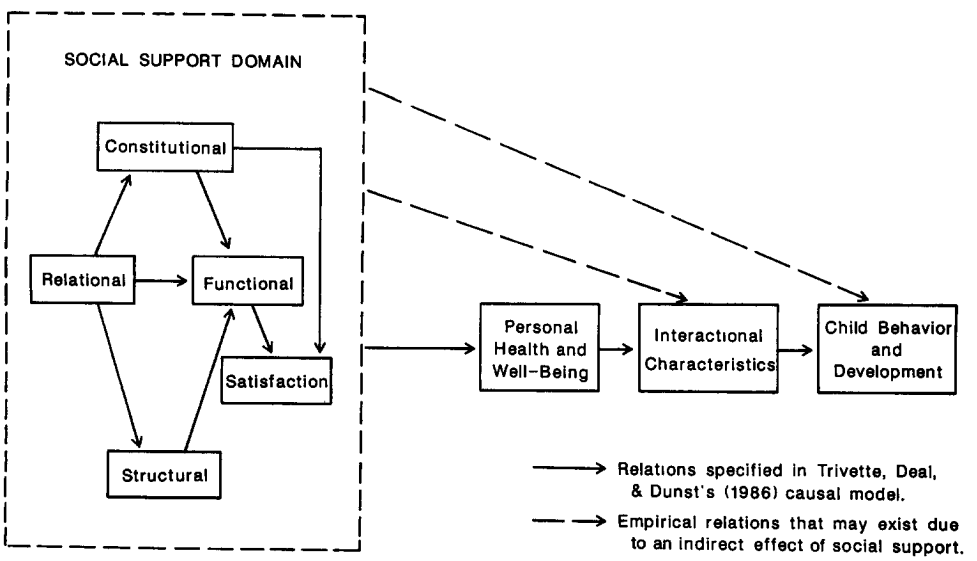

Figure 1. Indirect influences of social support on parents, family, parent-child, and parent functioning. *Note:* From "Family Needs, Sources of Support, and Professional Roles: Critical Elements of Family Systems Assessment and Intervention" by C.M. Trivette, A. Deal, and C.J. Dunst, 1986, *Diagnostique, 11,* 246-267. Copyright 1986 by Diagnostique. Adapted by permission.

Bailey and his colleagues (Bailey et al., 1986) have proposed a family-focused intervention model based upon the family systems approach. In this model, assessment information is collected from a variety of sources to determine family and child needs; then, tentative child/family goals are established, and a family interview is conducted to share those goals and solicit parent participation in the goal establishment process. Essential elements of this model are the parents' participation in the identification of the family's needs (see Bailey & Simeonsson, this issue) and their collaboration in establishing the goals of the intervention (Bailey, 1987).

CONCLUSIONS: CONCEPTUAL UNDERPINNINGS AND EFFICACY

The new law has generated much enthusiasm for infant intervention, as reflected in part by this topical issue. The specification of an individualized family service plan has created an expanding emphasis on recognizing the family context for intervention, and working within that context rather than intervening with the infant individually or intervening with the parent-infant dyad (Bailey & Simeonsson, in press; Dunst & Trivette, in press). However, even with professional enthusiasm and legislative mandates, at least two concerns about infant intervention still exist: theoretical underpinnings and efficacy.

Infant interventionists may at times have a weak theoretical base for their intervention procedures (Bricker, 1984). Early infant programs were built on a stimulation model, which assumes that (a) more is better and (b) the compensatory experiences in infancy will produce effects that will endure regardless of later experiences. A number of researchers have noted that generally increasing the quantity of stimulation may not be the best approach to improving infants' developmental status (Gardner, Karmel, & Dowd, 1984), and that stimulation must be tied to individual infant (and family) needs (Bricker, 1984). In fact, as we noted earlier, one purpose of interventions in NICUs is to reduce the amount of auditory and visual stimulation that preterm neonates receive in the hospital environment.

The assumption that positive experiences in infancy will produce substantial long-term gains, regardless of subsequent environmental conditions, is also not well founded. Current theory suggests that child development is dependent more on cumulative environmental experiences than early experience alone (Brownell & Strauss, 1984). This theory does not imply that early experiences are not important, but rather that developmental status later in childhood will depend both on early experiences and those that come later. Ramey and Suarez (1984) suggest that future research should examine the time in development when early intervention may be most effectively initiated.

The efficacy of infant intervention is an important and frequently discussed issue. Early meta-analysis reviews have been equivocal. Casto and Mastropieri (1986) found that infant intervention programs, while producing reasonable effect sizes, were less effective than programs that intervened later in the preschool years; they also found that programs not including parents produced greater ef-

fects than programs that did involve parents. A re-analysis of a portion of the Casto and Mastropieri data that address only infant intervention found more substantial effect sizes for programs that (a) began earlier for mildly impaired infants, (b) had highly structured curricula, and (c) had extensive parent involvement (Shonkoff & Hauser-Cram, 1987). However, as Meisels (1984) and Guralnick (in press) have both pointed out, and as we mentioned at the outset, early intervention is not a single entity. To address the issue of efficacy, more differentiated questions must be asked (e.g., For which infants and parents is early intervention most effective?). In addition, given the current view of child development, questions of immediate, short-term, and long-term effects will require different analyses, with the latter investigations incorporating information about children's experiences after they have moved out of the infant intervention program.

In conclusion, developmental intervention for infants and their families exists in many different forms and is designed for different purposes. Social policy now encourages and supports, to some extent, the development of statewide programs for infants with handicaps and their families. We anticipate that with the advent of the Individualized Family Service Plan, intervention programs in the future will resemble more the family level programs that we described above, but will contain components of both skill-oriented and interaction-oriented approaches. There is limited but important empirical support for the effectiveness of infant intervention programs, but the long-term implications of most programs have yet to be fully determined. Given the push for infant intervention at the state level, it will be imperative for the states to closely monitor the immediate and short-term effects of intervention programs on infants and families, and the opportunity will soon be present for collecting information on the longitudinal effects of these programs on a system-wide basis.

References

Affleck, G., McGrade, B., McQueeny, M.,& Allen, D. (1982). Promise of relationship-focused early intervention in developmental disabilities. *The Journal of Special Education, 16,* 413-430.

Als, H., Lawhorn, G., Brown, E., Gibes, R., Duffy, F. H., McAnulty, G., & Blickman, J. G. (1986). Individualized behavioral and environmental care for the very low birthweight preterm infant at high risk for bronchopulmonary dysplasia: Neonatal intensive care unit and developmental outcome. *Pediatrics, 78,* 1123-1132.

Anastasiow, N. J. (1983). Adolescent pregnancy and special education. *Exceptional Children, 49,* 396-403.

Bailey, D. B. (1987). Collaborative goal-setting with families: Resolving differences in values and priorities for service. *Topics in Early Childhood Special Education, 7*(2), 59-71.

Bailey, D. B., & Simeonsson, R. J. (in press). *Family assessment in early intervention.* Columbus, OH: Charles E. Merrill.

Bailey, D. B., Simeonsson, R. J., Winton, P. J., Huntington, G. S., Comfort, M., Isbell, P., O'Donnell, K. J., & Helm, J. M. (1986). Family-focused intervention: A functional model for planning, implementing, and evaluating individualized family services in early intervention. *Journal of the Division for Early Childhood, 10,* 156-171.

Baumeister, A. A. (1988). The new morbidity: Implications for prevention. In J. Stark, F. Menolascino, M. Albarelli, & V. Gray (Eds.), *Mental retardation and mental health: Classification, diagnosis, treatment, and services* (pp. 71-80). New York: Springer-Verlag.

Baumeister, A. A., & Kupstas, F. (1987). *The new morbidity: Implications for prevention and amelioration.* Paper presented at the meeting of the Royal Society of Medicine, London.

Blackburn, S. T., & Barnard, K. E. (1985). Analysis of caregiving events relating to preterm infants in the special care unit. In A. W. Gottfried & J. L. Gaiter (Eds.), *Infant stress under intensive care* (pp. 113-130). Baltimore, MD: University Park Press.

Bricker, D. D. (1984). The effectiveness of early intervention with handicapped and at-risk infants. *Journal of the Child in Contemporary Society, 17*(1), 51-65.

Brinker, R. P., & Lewis, M. (1982a). Contingency interventions with the help of microcomputers. *Journal of Special Education Technology, 5,* 37-39.

Brinker, R. P., & Lewis, M. (1982b). Making the world work with microcomputers: A learning prosthesis for handicapped infants. *Exceptional Children, 49,* 163-170.

Bromwich, R. (1981). *Working with parents and infants: An interactional approach.* Austin, TX: PRO-ED.

Brownell, C. A., & Strauss, M. S. (1984). Infant stimulation and development: Conceptual and empirical considerations. *Journal of the Child in Contemporary Society, 17*(1), 109-130.

Bruce, S., Stegman, K., & Rittenhouse, R. (1986). *The SKI-HI Program: A descriptive update, 1986.* Unpublished manuscript, Illinois State University, Normal. (ERIC Document Reproduction Service No. ED 270 985).

Bruner, J. (1975). The ontogeny of speech acts. *Journal of Child Language, 2,* 1-19.

Casto, G., & Mastropieri, M. (1986). The efficacy of early intervention programs: A meta-analysis. *Exceptional Children, 52,* 417-424.

Chelimsky, E. (1984). Evaluation of the Special Supplemental Program for Women, Infants, and Children (WIC's) effectiveness. *Children and Youth Services Review, 6,* 219-226.

Clark, T. C., & Watkins, S. (1985). *SKI-HI home visit curriculum manual.* Unpublished curriculum manual, SKI-HI Institute, Logan, UT. (ERIC Document Reproduction Service No. ED 258 396).

Cornell, E. H.,& Gottfried, A. W. (1976). Intervention with premature human infants. *Child Development, 47,* 32-39.

Dryfoss, J. (1985). School-based health clinics: A new approach to preventing adolescent pregnancy? *Family Planning Perspectives, 17*(2), 70-75.

Dunst, C. J. (1985). Rethinking early intervention. *Analysis and Intervention in Developmental Disabilities, 5,* 165-201.

Dunst, C. J., Cushing, P. J., & Vance, S. D. (1985). Response-contingent learning in profoundly handicapped infants: A social systems perspective. *Analysis and Intervention in Developmental Disabilities, 5,* 33-48.

Dunst, C. J., & Trivette, C. M. (in press). A family systems model of early intervention with handicapped and developmentally at-risk children. In D. Powell (Ed.), *Parent education and support programs: Consequences for children and families.* Norwood, NJ: Ablex.

Field, T. (1980). Supplemental stimulation of preterm neonates. *Early Human Development, 4,* 301-314.

Field, T. (1983). Early interactions and interaction coaching of high-risk infants and parents. In M. Perlmutter (Ed.), *Development and policy concerning children with special needs. The Minnesota Symposia on Child Psychology* (pp. 1-34). Hillsdale, NJ: Erlbaum.

Finkelstein, J. W., Finkelstein, J. A., Christie, M., Roden, M., & Shelton, C. (1982). Teenage pregnancy and parenthood: Outcomes for mother and child. *Journal of Adolescent Health Care, 3,* 1-7.

Flood, M. F., Greenspan, S., & Mundorf, N. K. (1985). School-based services for pregnant and parenting adolescents. *Special Services in the Schools, 2,* 27-44.

Fogel, A., & Thelen, E. (1987). Development of early expressive and communicative action: Reinterpreting the evidence from a dynamic systems perspective. *Developmental Psychology, 23,* 747-761.

Fraiberg, S. (1971). Intervention in infancy: A program for blind infants. *Journal of the American Academy of Child Psychiatry, 10,* 381-405.

Fraiberg, S. (1975). The development of human attachments in infants blind from birth. *Merrill-Palmer Quarterly, 21,* 315-334.

Fraiberg, S. (1977). Blind infants and the mothers: An explanation of the sign system. In M. Bullowa (Ed.), *Before speech: The beginning of interpersonal communication* (pp. 149-169). Cambridge England: Cambridge University Press.

Gaiter, J. L. (1985). Nursery environments. In A. W. Gottfried & J. L. Gaiter (Eds.), *Infant stress under intensive care* (pp. 53-82). Baltimore: University Park Press.

Gardner, J. M., Karmel, B. Z., & Dowd, J. M. (1984). Relationship of psychological development to infant intervention. *Journal of the Child in Contemporary Society, 17*(1), 93-108.

Gorski, P. A. (1984). Experience following premature birth: Stresses and opportunities for infants, parents, and professionals. In J. D. Call. E. Galenson, & P. L. Tyson (Eds.), *Frontiers of infant psychiatry* (pp. 145-151). New York: Basis Books.

Gorski, P. A. (1987, November). *Neonatal behavioral assessment and the integration of families and community resources during hospitalization.* Paper presented at the Convention of the Council for Exceptional Children Division for Early Childhood, Denver, CO.

Gorski, P. A., Hole, W. T., Leonard, C. H., & Martin, J. A. (1983). Direct computer recording of premature infants and nursery care. *Pediatrics, 72,* 198-202.

Gottfried, A. W. (1985). Environmental neonatology: Implications for intervention. In A. W. Gottfried & J. L. Gaiter (Eds.), *Infant stress under intensive care: Environmental neonatology* (pp. 251-257). Baltimore: University Park Press.

Gunter, N. C., & LaBarba, R. C. (1981). Maternal and perinatal effects on adolescent childbearing. *International Journal of Behavioral Development, 4,* 333-357.

Guralnick, M. J. (in press). Efficacy research in early childhood intervention programs. In S. Odom & M. Karnes (Eds.), *Early intervention for infants and children with handicaps: An empirical base.* Baltimore: Paul H. Brookes.

Hanson, M. J. (1985). An analysis of the effects of early intervention services for infants and toddlers with moderate and severe handicaps. *Topics in Early Childhood Special Education, 5*(2), 36-51.

Harding, C. G. (1984). Acting with intention: A framework for examining the development of the intention to communicate. In L. Feagans, C. Garvey, & R. Golinkoff (Eds.), *The origins and growth of communication* (pp. 123-135). Norwood, NJ: Ablex.

Hardy, J. B., King, T.M., & Repke, J. T. (1987). The Johns Hopkins Adolescent Pregnancy Program: An evaluation. *Obstetrics and Gynecology, 69,* 300-306.

High, P. C., & Gorski, P. A. (1985). Recording environmental influences on infant development in the intensive care nursery: Womb for improvement. In A. W. Gottfried & J. L. Gaiter (Eds.), *Infant stress under intensive care: Environmental neonatology* (pp. 131-156). Baltimore: University Park Press.

Holvoet, J., Guess, D., Mulligan, M., & Brown, F. (1980). The individualized curriculum sequencing model (II): A teaching strategy for severely handicapped students. *Journal of the Association of the Severely Handicapped, 5,* 325-336.

Kirby, D. (1986). Comprehensive school-based health clinics: A growing movement to improve adolescent health and reduce teen-age pregnancy. *Journal of School Health, 56,* 289-291.

Kogan, K. (1980). Interaction systems between preschool handicapped or developmentally-delayed children and their parents. In T. Field (Ed.), *High-risk infants and children: Adult and peer interactions* (pp. 227-247). New York: Academic Pres..

Koop, C. B. (1987). Developmental risk: Historical reflections. In J. D. Osofsky (Ed.), *Handbook of infant development, second edition* (pp. 881-912). New York: Wiley.

Korner, A. F., Ruppel, E. M., & Rho, J. M. (1982). Effects of waterbeds on the sleep and motility of theophylline-treated preterm infants. *Pediatrics, 70,* 864-869.

Korner, A. F., Schneider, P., & Forrest, T. (1983). Effects of vestibular-proprioceptive stimulation on the neurobehavioral development of preterm infants: A pilot study. *Neuropediatrics, 14,* 170-175.

LeLaurin, K. (1985). The experimental analysis of the effects of early intervention with normal, at-risk, and handicapped children under three. *Analysis and Intervention in Developmental Disabilities, 5,* 128-150.

Leonard, T. A. (1987). Preconception—A much neglected aspect of perinatal care. *Wisconsin Medical Journal, 86,* 13-17.

Mahoney, G., & Robenalt, K. (1986). A comparison of conversational patterns between mothers and their Down Syndrome and normal infants. *Journal of the Division for Early Childhood, 10,* 172-180.

McCollum, J. (1986). Charting different types of social interaction objectives in parent-

infant dyads. *Journal of the Division for Early Childhood, 11,* 28-45.

McCollum, J., & Stayton, V. (1985). Infant/parent interaction: Studies and intervention guidelines based on the SIAI model. *Journal of the Division for Early Childhood, 9,* 125-135.

McDonough, S. C. (1985). Intervention programs for adolescent mothers and their offspring. *Journal of Children in Contemporary Society, 17,* 67-78.

Meisels, S. J. (1984). The efficacy of early intervention: Why are we still asking this question? *Topics in Early Childhood Special Education, 5*(2), 1-11.

Papiernik, E. (1984). Proposals for a programmed prevention policy of preterm birth. *Clinical Obstetrics and Gynecology, 27*(3), 614-635.

Ramey, C. T., & Suarez, T. M. (1984). Early intervention and the early experience paradigm: Toward a better framework for social policy. *Journal of the Child in Contemporary Society, 17*(1), 3-13.

Rosenberg, S., & Robinson, C. (1985). Enhancement of mothers' interactional skills in an infant education program. *Education and Training of the Mentally Retarded, 20,* 163-169.

Rosenberg, S., Robinson, C., & Beckman, P. (1984). Teaching skills inventory: A measure of parent performance. *Journal of the Division for Early Childhood, 8,* 107-113.

Sandall, S.R., Fewell, R. R., Schlater, A. L., & Vadasy, P. F. (1986). A computer-assisted program for underserved families. *Journal of the Division for Early Childhood, 10,* 216-223.

Schaefer, M., Hatcher, R. P., & Barglow, P. D. (1980). Prematurity and infant stimulation: A review of research. *Child Psychiatry and Human Development, 10,* 199-212.

Shearer, D. E., & Shearer, M. S. (1976). The Portage Project: A model for early childhood intervention. In T. Tjossem (Ed), *Intervention strategies for high risk infants and young children* (pp. 335-350). Austin, TX: PRO-ED.

Shonkoff, J. P., & Hauser-Cram, P. (1987). Early intervention for disabled infants and their families: A quantitative analysis. *Pediatrics, 80,* 650-658.

Steel, J. M. (1985). Prepregnancy counseling and contraception in the insulin-dependent diabetic patient. *Clinical Obstetrics and Gynecology, 28,* 553-566.

Stockbauer, J. W. (1987). WIC prenatal participation and its relation to pregnancy outcomes in Missouri: A second look. *American Journal of Public Health, 77,* 813-818.

Taylor, B., Berg, M., Kapp, L., & Edwards, L. E. (1983). School-based prenatal services: Can similar outcomes be attained in a non-school setting? *Journal of School Health, 53,* 480-486.

Trivette, C. M., Deal, A., & Dunst, C. J. (1986). Family needs, sources of support, and professional roles: Critical elements of family systems assessment and intervention. *Diagnostique, 11,* 246-267.

Updike, C., Schmidt, R. E., Macke, C., Cahoon, J., & Miller, M. (1986). Positional support for premature infants. *American Journal of Occupational Therapy, 40,* 712-715.

Warren, S. F., Alpert, C. L., & Kaiser, A. P. (1986). An optimal learning environment for infants and toddlers with severe handicaps. *Focus on Exceptional Children, 18*(8), 1-11.

Widerstrom, A. H., & Goodwin, L. D. (1987). Effects of an infant stimulation program on the child and family. *Journal of the Division for Early Childhood, 11,* 143-153.

Yoder, P. (1986). Clarifying the relation between degree of infant handicaps and maternal responsivity to infant communicative cues: Measurement issues. *Infant Mental Health Journal, 7,* 281-293.