The Next Decade of Research on the Effectiveness of Early Intervention

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ABSTRACT: The effectiveness of early intervention programs for children with developmental disabilities and for children at biologic risk was reviewed and analyzed. A general pattern indicating important effects of early intervention programs was noted, with effect sizes averaging between one-half and three-quarters of a standard deviation. The ability of early intervention programs to minimize declines in development was identified as a significant outcome. The effects of specific program features—age of start and family involvement—were selected for more detailed examination, and the moderating influence of the levels of severity of children's disabilities was also analyzed. Future directions for improving the effectiveness of early intervention include using the emerging knowledge of biobehavioral and child development research, as well as enhancing children's social competence.

The decade of the 1990s marks the beginning of a cautiously optimistic yet critical period for the field of early intervention. Building on 20 years of research, demonstration programs, and the efforts of advocates, we enter this decade with an unprecedented commitment to provide comprehensive, coordinated, and family-focused services to children with established disabilities and their families. Moreover, a similar, though less well-articulated, commitment exists for preventive intervention programs for children at risk for developmental problems because of biologic or environmental factors. The emerging national prominence of early intervention programs has resulted in landmark federal legislation (Public Law 99-457), and proponents of early intervention have ensured that relevant issues are on the agendas of policymakers in virtually every state and community.

Central to this commitment is a belief that the array of early intervention services makes positive and important differences in the lives of children with disabilities and to their families (Guralnick, 1988). In fact, evidence from diverse sources that existed at the time of the passage of P.L. 99-457 provided support for this view. Whether obtained from secondary analyses of the large numbers of available research studies, particularly in the form of two meta-analyses that were conducted (Casto & Mastropieri, 1986; Shonkoff & Hauser-Cram, 1987), or based on conclusions derived from more qualitative analyses of the early intervention literature (Guralnick & Bennett, 1987a), beneficial but modest effects of early intervention have been the remarkably consistent findings. Even physicians, who are typically cautious in their appraisals of intervention effectiveness (Palmer, Capute, & Shapiro, 1988), perceive that high-quality early intervention services are of value to both children and families (Guralnick et al., 1988).

Effect size, which in this case reflects the impact of early intervention compared with control or contrast conditions measured in standard deviation units, is an especially useful metric to evaluate effectiveness because it allows data to be aggregated across many diverse studies. Effect size also serves as a useful summary measure of effectiveness for individual studies. Best estimates indicate that early intervention yields an effect size of approximately one-half to three-quarters of a standard deviation. As applied to cognitive development, the most commonly used measure of child outcome, this means that children enrolled in early intervention programs can expect, on average, to achieve an increase on standard tests of intelligence of approximately 8-12 IQ
points in comparison to those children not receiving intervention services.

IMPORTANCE OF CONTINUED EFFECTIVENESS RESEARCH

Despite the general consistency and developmental significance of these analyses of effectiveness, the federal commitment and encouragement of early intervention in the form of P.L. 99-457, as well as the extensive local activism on behalf of early intervention services for children and families, the decade of the 1990s will likely be the most challenging period ever for those involved in evaluating the effectiveness of early intervention. In particular, legislators are scrutinizing budgets with unusual care, and documentation of the effectiveness of programs and their immediate and long-term effects can be highly persuasive. Unfortunately, however, the early intervention data base appears to be vulnerable on scientific grounds. Critics have contended that results from a number of well-controlled investigations and alternative analyses of the existing literature contradict prevailing views regarding effectiveness (Gibson & Fields, 1984; Piper & Pless, 1980). Moreover, virtually every reviewer of the early intervention literature has commented on the methodological inadequacies that characterize the available studies, especially for children with documented disabilities. Criticisms include improper sampling procedures, lack of appropriate control or contrast groups, applications of inappropriate statistical techniques, failure to document the actual implementation of the intervention, observer bias, and poor choice of assessment instruments (Bricker, Bailey, & Bruder, 1984; Carter, 1988; Dunst, 1986; Dunst & Rheingrover, 1981; Farran, 1990; Gibson & Fields; Simeonsson, Cooper, & Scheiner, 1982).

Consequently, to the extent that these criticisms are accurate, the competitive position of early intervention programs seeking financial support may well be compromised. Clearly, more scientifically valid studies must be carried out. In addition, the less than sound data base makes it difficult to establish parameters regarding what children and families can reasonably expect from their participation in early intervention programs. Extravagant claims of success emerge periodically in the field of early intervention (see Guralnick & Bennett, 1987b, for discussion). An empirical framework that connects well-documented intervention strategies to a range of possible outcomes is invaluable in providing a context for interpreting these claims.

But perhaps the most important challenge to research on the effectiveness of early intervention in the 1990s will be to increase its relevance to educational and clinical decision making. Existing research tends to be global in nature, with relatively poor documentation of the characteristics of the interventions themselves and inadequate descriptions of the children and families who participated. As a consequence, only limited knowledge is available regarding the differential effects of potentially important program features such as the duration, intensity, and point of initiation of services; the developmental model; and the nature of parent involvement. Rarely, in fact, is information organized around these important features. Correspondingly, whether the effects of these program features are moderated by the characteristics of children, such as the type and severity of their disabilities, or family factors, such as financial resources or social supports available, have not been examined systematically (Guralnick, 1988). Yet, the real value of early intervention effectiveness research for clinicians and educators can be found in the extent to which researchers can identify the most effective configurations of early intervention program features and how these features interact with child/family characteristics. Information is required at this level of sophistication to help guide decisions that match children and families to programs and services.

Accordingly, the purpose of this article is to summarize issues and findings associated with specific program features and child and family characteristics in relation to the effectiveness of early intervention. Because of programmatic and policy implications, I selected two program features: age at which intervention is initiated and the nature of family involvement. In addition, I have considered the extent to which the severity of a child’s disability moderates the effects of these and other factors. To address concerns regarding the quality of research, where available, I have emphasized findings from well-controlled studies. The final section of this article outlines future directions for research, particularly the importance of focusing on children’s social competence and the need to develop new intervention strategies in collaboration with biobehavioral scientists and child development specialists.
AGE OF START

A strong rationale exists suggesting that the earlier intervention begins, the more effective it will be. Proponents of this position have pointed to the possible existence of certain sensitive periods in the early development of the central nervous system that may result in long-term adverse consequences in the absence of specific experiences, as well as the greater neural plasticity of the nervous system in younger organisms (Anastasiow, 1990). Attachment theorists (Bowlby, 1969; Sroufe, 1979) also contended that early experiences, although certainly moderated by current circumstances, nevertheless have lasting influences. Vulnerabilities established during the infant and toddler years, in particular, may become evident during later developmental periods (Sroufe, Egeland, & Kreutzer, 1990). Similarly, it can be argued that the earlier the intervention begins, the fewer secondary complications will arise, including disruptions between parent-child interaction patterns (Guralnick & Bennett, 1987c).

Research addressing this important issue has been equivocal. The original meta-analysis on the complete data set involving children with handicaps from birth to 5 years of age (Casto & Mastropieri, 1986) provided no support for the principle “earlier is better,” as effect sizes were similar irrespective of when intervention was initiated. Similar analyses of a subset of those data focusing only on the birth-to-3-year-old group, however, indicated that more mildly handicapped children had better outcomes if they were enrolled in early intervention programs prior to 6 months of age (Shonkoff & Hauser-Cram, 1987). Preliminary findings from well-controlled longitudinal studies currently being carried out under the auspices of the Early Intervention Research Institute at Utah State University (White, 1990) also have revealed moderate or no differences as a function of age of start on a variety of child and family outcome measures for samples composed primarily of medically fragile children.

This pattern of results contrasts sharply with Lovaas’ (1987) contention that, for children diagnosed as autistic, age of start is a critical factor. The results of his longitudinal investigation suggested that early intensive treatment can result in dramatic improvements in the development and function of children with autism, whereas similar interventions with older groups are unsuccessful (see also Hoyson, Jamieson, & Strain, 1984). It must be noted that the identification of children with autism occurs much later than for children with genetically-based disorders or other severe disabilities (usually becoming apparent during the first 18 months of life). Consequently, the age-of-start issue, in particular, must be considered in the context of specific disability groups.

Preventing Declines in Development

Children with Down syndrome represent one such group that is readily identifiable at birth, and families are usually promptly referred to early intervention programs. These circumstances lead to an alternative perspective of the age-of-start issue. When intervention occurs at this early time and is maintained, an important result is that the decline in cognitive development that typically occurs during the first 12-18 months of life for these children (see Guralnick & Bricker, 1987) appears to be prevented from decreasing further throughout the remaining early childhood years (Berry, Gunn, & Andrews, 1984; Reed, Pueschel, Schnell, & Cronk, 1980; Sharav & Shlomo, 1986). The effect size associated with this prevention of decline in cognitive development after the first 12-18 months is approximately one-half to three-quarters of a standard deviation; most children stabilize at the mild to moderate levels of developmental delay. Children with Down syndrome are also responsive to intervention initiated at a later time (Guralnick & Bricker, 1987) but may not achieve as high a developmental level as the early-start group (Clunies-Ross, 1979). Because other factors, such as parental motivation, are easily confounded with age of start, more systematic research is clearly in order.

This phenomenon, in which further declines in development across the early childhood years can be prevented or reduced by early and continuous intervention, appears to be a more general outcome of early intervention programs. For example, not only are progressive declines in the cognitive development of children with Down syndrome prevented from occurring, but similar outcomes have been observed for the motor development of children with cerebral palsy participating in a comprehensive early intervention program (Palmer, Shapiro, et al., 1988). Moreover, this same pattern has been reported in a number of studies of children at risk because of biologic factors. Specifically, declines in cognitive development typical of children with low birth weight or prematurity can be minimized.
emerge during various developmental periods. As part of the intervention process, families can be assisted to become more confident and competent in their decision-making roles and to improve their ability to access formal and informal supports from the network of individuals, groups, and agencies. Within this framework, the traditional disability-focused early intervention programs constitute only one segment of a child’s developmental and support system (see Dunst, 1985). Finally, a new model of parent-professional relationships has evolved, consisting of a true partnership, with all parties working together to meet the needs of families and children.

These new approaches to families involved in early intervention programs are firmly grounded in contemporary family systems theory and well-established ecological and developmental models (Barber, Turnbull, Behr, & Kerns, 1988; Bailey & Simeonsson, 1984; Bronfenbrenner, 1977; Sroufe, 1979). In addition, this family focus is expressed in the Individualized Family Service Plan of P.L. 99-457. Finally, family involvement, in the most general sense of the term, constitutes a major program feature in analyses of the effectiveness of early intervention. The relationship between family involvement and child outcome is examined in the following sections.

Children with Established Disabilities

From a more global perspective, the meta-analysis carried out on the larger data set by Casto and Mastropieri (1986) found that child outcome measures were unrelated to the level of parental involvement in early intervention programs. In contrast, the meta-analysis using only a subset of the data (children birth to 3 years of age) did find differences (Shonkoff & Hauser-Cram, 1987). Specifically, intervention programs in which the planned level of parent involvement was extensive yielded a mean effect size of .70 in comparison to .30 for those studies in which the planned level of parent involvement was doubtful or non-existent. Similarly, if programs involved parents and children together in the intervention, a mean effect size .74 was achieved. For those programs in which parents or children were the focus of intervention separately, the mean effect size was only .44.

The basis is unclear for the discrepancy between the two meta-analyses, although the impact of parent involvement is likely to be more substantial during the first 3 years of life. Never-
theless, it must be recognized that the data set upon which these meta-analyses were based included substantial numbers of studies in which the nature of parent involvement did not represent more contemporary family systems, ecological, or developmental models. In fact, family involvement typically meant parent participation in a series of informational and support-type meetings. Training sessions to enable parents to assume a didactic role were also common. However, recent, well-controlled, longitudinal studies have suggested that this model of family involvement, despite being the most prevalent form, does not appear to have any substantial impact on child development (White, 1990). Moreover, investigations of the effectiveness of very early interventions (age-of-start studies) tend to adopt both a narrow approach to intervention (e.g., a focus on physical therapy rather than comprehensive early intervention) and to define family involvement solely in terms of this parent participation/didactic form (see White).

Whether the incorporation of more contemporary models of family involvement into intervention programs will result in outcome evaluations of key program features that differ from previous findings remains an important question for the future, but recent work appears promising (Guralnick, 1989). For example, a comprehensive, parent-centered infant stimulation program for children with cerebral palsy produced increases in motor development in contrast to a more motor-focused physical therapy-oriented intervention. In fact, the more disability-specific approach resulted in a decline in motor development over the treatment period (Palmer, Shapiro, et al., 1988). Although the basis for this difference has been difficult to determine using questionnaire and checklist measures (Palmer, et al., 1990), the comprehensive intervention program may well have improved the coping abilities of parents (Palmer, Shapiro, et al., 1988). Similarly, results from a correlational study involving developmentally delayed infants and toddlers (Mahoney & Powell, 1988) suggested that developmental gains were associated with a curriculum that fostered more natural parent-child relationships. Direct instruction of children by parents was discouraged in this intervention program.

Finally, Dunst, Trivette, and Cross (1986) found an association between social support designed to strengthen families and child outcomes. Specifically, families of a heterogenous group of delayed and at-risk preschool children participated in an intervention program explicitly designed to provide an array of support services to families. Results revealed that the decline in intellectual development of children over a 1-year period was minimized for those parents who were more satisfied with their level of social support. This finding, although not always replicated (Shonkoff, Hauser-Cram, Krauss, & Upshur, 1991), is consistent with the model presented by Dunst and Trivette (1988), suggesting that the benefits of social support on family interactions can be traced through both direct and indirect pathways that affect a child’s development.

**Children at Biologic Risk**

Perhaps the strongest empirical support for the importance of family involvement can be found in recent preventive intervention studies for infants with low birth weight and prematurity. Programs designed to improve the quality of parent-child interactions and enhance the competence and problem-solving abilities of families, using contemporary developmental models, have been successful in preventing the usual decline in assessed cognitive development that typically occurs over time for this group of children (Rauh et al., 1988; Resnick et al., 1988). The effect sizes obtained of approximately .6 to .9 for cognitive measures are of the same order of magnitude that have been found for children with documented disabilities. Of equal interest is the fact that greater maternal self-confidence with respect to competent parenting and satisfaction with the parenting role as perceived by mothers was associated with prevention of declines in cognitive development (Rauh et al.). Moreover, the quality of observed parent-child interactions was closely associated with children’s cognitive development (Resnick et al.).

The recent report of the Infant Health and Development Program (1990) provides the most comprehensive, carefully controlled, multisite preventive intervention investigation to date for children with low birth weight and prematurity. At 3 years of age, the development of those infants who had been enrolled in a comprehensive program, including extensive parent and daycare components, was compared with those in a nonintervention, follow-up group. For the cognitive measure, this comparison revealed a mean effect size of .83 for children who participated in the intervention and weighed between 2,001 and
2,500 g. For children weighing less than 2,001 g, the impact of the preventive intervention program was less pronounced, with a mean effect size of .41. Because this intervention had many facets, it is difficult to determine whether its effects can be attributed to a family involvement component. Subsequent analyses of this data set are likely to be directed toward these issues.

The positive effects of family involvement as a general program factor are extremely encouraging when it is recognized that contemporary models of family involvement have emerged only within the last decade. The field of early intervention is in the midst of a transition from family-oriented programs to a truly family-focused approach (Krauss & Jacobs, 1990), and it will take some time before this process is completed and refined. It is also true that problems in definition of the various dimensions of family involvement exist. Moreover, many problems remain to be solved regarding the application of assessment instruments to early intervention programs designed to evaluate aspects of families' existing social support networks, levels of stress, coping strategies, resources, and parenting styles (Bailey & Simeonsson, 1984; Krauss & Jacobs). Nevertheless, if more contemporary family-focused forms of family involvement, instituted as early as possible, yield the benefits that have been suggested, future analyses of the effectiveness of early intervention related to family involvement may reveal more substantial, long-lasting effects.

SEVERITY OF THE DISABILITY

Of all the factors that contribute to developmental outcome, the severity of a child's disability appears to be that child or family characteristic that exerts the most pervasive modifying influence on the various program features of early intervention. It is not uncommon for multiple regression analyses to find that 50%-75% of the variance in developmental outcomes, even when children are enrolled in early intervention programs, can be accounted for by the level of severity of a child's disability at the time intervention begins (e.g., see Palmer, Shapiro, et al., 1988, for children with cerebral palsy; Shonkoff et al., 1991, for children with developmental delays).

But the effects of severity on the outcomes of early intervention do not occur uniformly; the influence of this factor appears to increase with greater degrees of the severity of a child's disability. Early studies revealed that more severely delayed children were less responsive to early intervention (e.g., Bricker & Dow, 1980). This has been confirmed by findings from an ongoing descriptive study of children with developmental delays and motor impairments enrolled in community-based early intervention programs (Shonkoff et al., 1991). This investigation revealed that after 1 year of intervention, children with severe delays had smaller relative increases in mental age than those with mild or moderate delays (see also Dunst et al., 1986; White, 1990). Moreover, difficulties in achieving effects for children with severe disabilities were noted earlier in the meta-analysis for children birth to 3. Those findings suggested that intervention programs begun earlier were more effective than interventions initiated at a later time, but only for children with mild delays (Shonkoff & Hauser-Cram, 1987).

A similar pattern can be found for children at biologic risk, as indicated by results from the intensive 3-year, multisite preventive intervention program for children with low birth weight and prematurity (Infant Health and Development Program, 1990). Although the effect size for children in the lighter birth weight groups was .41, those children who were in the subgroup likely to have the most severe problems (as indicated by birth weight less than 1,500 g and an IQ less than 70), were the only ones who were totally unresponsive to the intervention program.

The pattern of results suggesting that children with more severe disabilities are less responsive to intervention (irrespective of the type of measure used) has been observed frequently, although exceptions can be found (see Shonkoff & Hauser-Cram, 1987). Yet, it should be pointed out that children with severe disabilities in the form of autism have demonstrated remarkable responsiveness to early intervention programs (e.g., Hoyson et al., 1984; Lovaas, 1987). Whether these outcomes can be replicated or extended to children with other disabilities remains to be established.

FUTURE DIRECTIONS

Do the effect sizes that consistently result, averaging between one-half and three-quarters of a standard deviation, suggest that we are nearing the limit of what can be accomplished through early intervention? Is it possible to go significantly beyond preventing or minimizing declines in children's primary areas of disability, particu-
larly cognitive development? Are we measuring the right outcomes? These are particularly important questions because, as we have seen, there remain numerous children for whom early intervention programs have minimal or no impact. Children with more severe disabilities constitute one important group that requires attention, but there exists a significant proportion of children with a range of disabilities and levels of severity who are not adequately responsive to intervention efforts (Dunst et al., 1986; Shonkoff et al., 1991). It is possible that further refinements in the family involvement program feature may be of considerable value, and maximizing the configuration of program features that constitute best practice may yield additional benefits. However, perhaps the most significant immediate challenge to improving the effectiveness of early intervention programs is to identify additional sources of knowledge from which new advances may emerge.

Biobehavioral and Child Development Research

The ascendance of the developmental model (e.g., Cicchetti & Beeghly, 1990), joined with results from multidisciplinary biobehavioral research such as that involving attentional-arousal systems, are helping to advance our understanding of the detailed developmental patterns of well-defined etiological groups of children (Guralnick, 1988; Spiker, 1990). Insights into the developmental processes associated with children with Down syndrome, fragile X syndrome, fetal alcohol syndrome, and numerous other groups may allow clinicians and educators to develop more effective strategies (see Gibson & Fields, 1984; Hodapp, Burack, & Zigler, 1990).

Developmental and educational strategies associated with specific curricula are not easily defined in the field of early intervention. Analyses of the effectiveness of curricula have generally been limited to assessments of surface dimensions such as the degree of structure or planning. But content of the curriculum is also important; a major challenge for the field in the future will be to translate and integrate emerging developmental and biobehavioral knowledge into highly individualized intervention strategies and to evaluate their effectiveness.

Social Competence

Yet there is reason to believe that we may actually be underestimating the true impact of early intervention, even within the framework of our existing programmatic efforts. Specifically, as a consequence of investigators’ almost total reliance on measures of the effectiveness of early intervention that are developmental-domain or primary-disability specific, (i.e., mainly cognitive, language, or motor development measures), important effects on critical developmental dimensions that rely on the integration of skills and abilities across disability-specific domains, such as children’s social competence, may have been overlooked.

It is, of course, reasonable to expect that early intervention programs designed to support families and to enhance parent-child interactions will yield benefits to children as assessed by developmental-domain or disability-specific outcomes. In fact, the resulting improved ability of parents to provide an appropriately responsive and stimulating environment is presumed to be a central factor that mediates the positive effects that early intervention has consistently produced. Yet if we look beyond the effects of early intervention on children’s primary disabilities, a considerable body of research exists to suggest that improved family functioning, particularly enhanced parent-child interactions, is likely to have an important positive impact on children’s social competence as well (Guralnick, 1990b). An indication that those factors may be operating for families in which a child with disabilities is involved can be found in the Dunst et al. (1986) study noted earlier. Specifically, the array of social supports to families was associated with greater personal well-being and emotional and physical health of parents. Moreover, parents reporting a greater degree of social support indicated that they believed their children were more socially accepted by others, had fewer behavior problems, and were less likely to be considered as having more difficult behavior characteristics.

The importance of the domain of children’s social competence has become apparent in recent years, suggesting that social competence is a central organizing construct in child development with considerable relevance to the field of early intervention (Guralnick, 1990a). Moreover, it has now been well established that young children at risk, as well as those with established disabilities, experience problems in various aspects of social
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REFERENCES


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**ABOUT THE AUTHOR**

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**Call for Nominations for Executive Committee Positions**

CEC members have the privilege and responsibility of submitting names of candidates for upcoming vacancies on the Executive Committee of the Board of Governors. Nominations must be postmarked by November 15, 1991.

**Office (Incumbent)**  
**Term of Office**  
First Vice President*  
1992-1996  
(Suana Wessendorf)  
Governor-at-Large, U.S.*  
1992-1995  
(Pamela Gillet)  
Governor-at-Large, Canada**  
1992-1995  
(Arnold G. Jones)  
Governor-at-Large  
1992-1995  
(Helen Bessant-Byrd)

*The individual elected to this office assumes the position of First Vice President during 1992-1993; President Elect during 1993-1994; President during 1994-1995; and Immediate Past President 1995-1996.

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Any Council member or unit may submit names for any of the vacant positions except the Canadian Governor-at-Large. Names and supporting information on candidates will be presented to the CEC Board of Governors for a ballot vote resulting in the selection of two nominees for each vacancy. This slate of candidates will be announced in the February 1992 issue of *Exceptional Children* and voted on by the Delegate Assembly at the 1992 Annual Convention in Baltimore.

Qualifications that contribute to the successful nomination of a candidate include such factors as length of membership in CEC; active participation in Council affairs on local, state/provincial, and international levels; and professional contributions to the field. Members of units of CEC submitting names for a vacancy should provide the following pertinent information:

1. Name, complete address, and telephone number(s) of nominee.
2. Office for which the person is being nominated.
3. Length of membership in CEC. (Note: The candidate must also be a current CEC member.)
4. A completed and signed "Biographical Information Form" prepared by the nominee. (Blank forms are available on request from CEC headquarters.)
5. Name, address, and unit affiliation (if any) of the person submitting the candidate’s name.

All nominations and supporting materials must be postmarked by November 15, 1991, and submitted to Joni Alberg, Chair, Nominations Committee, CEC, 1920 Association Drive, Reston, Virginia 22091-1589.