

The Theoretical and Empirical Basis of Early Amelioration of Developmental Disabilities: Implications for Future Research

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This article reviews the empirical support for several theoretical approaches to infant intervention. It is not another review of the general efficacy of past or present early intervention programs. Such general reviews reveal little about the validity of the assumptions behind the interventions because many intervention approaches are combined within one program and many programs are aggregated. With the purpose of more specific evaluation of various intervention approaches in mind, specific intervention approaches that differ on theoretical rationale will be discriminated. For each specific intervention approach, the underlying theoretical assumptions will be identified. For each assumption, the empirical support will be reviewed. Any discrepancy found between the assumptions and the empirical support for these assumptions will be used to suggest research questions for future research. This systematic approach to reviewing the intervention approaches should (a) help interventionists select an approach to facilitate the specific aspects of development they wish to address in specific children and (b) help researchers select and

prioritize research questions for future research on infant intervention.

The specific intervention approaches are organized according to one of three primary models of infant intervention. In the first two models, the infant is the direct beneficiary of the intervention. One approach to direct infant intervention involves providing toys or computers that are thought to facilitate child development (i.e., direct intervention via nonsocial means). The second approach to direct infant intervention may be carried out through interaction with an interventionist (i.e., direct intervention via social means). This second model encompasses the majority of the currently used infant intervention approaches. There are two specific approaches within this model—responsive interaction and direct skill instruction. The relative efficacy of these two approaches will be reviewed. The third model of intervention involves providing social support to the families of handicapped infants (i.e., indirect infant intervention via social support to the family), expecting that infant development and functioning will be indirectly facilitated. This third model is relatively complex and

therefore will be explained in more detail in that section of the review.

DIRECT INFANT INTERVENTION VIA NONSOCIAL MEANS

The term "nonsocial means" is used here to refer to toys and computers that do not require social mediation to facilitate children's development. The paucity of information about the effect of the physical environment on infant development may be due in part to a widely accepted assumption that the environment can influence development only when it is mediated by social interaction (Clarke-Stewart, 1973). However, Wachs and Chan (1985) found that variability in language performance was associated with differences in the physical environment, even after partialling out variability due to social environmental influences. The assumptions underlying the notion that inanimate objects facilitate development are as follows.

Assumption: Object engagement facilitates object concepts. Object manipulation and engagement may facilitate child discrimination of distinctive object properties and the uses (or affordances) associated with specific objects (Wohwill & Heft, 1987). In normally developing children under 9 months of age, the sheer number of available toys is related to general cognitive and receptive language. This may occur because availability of toys may be related to the amount of object manipulation in which the child engages. In older normally developing infants, it is variety in the types of toys available that is positively correlated with cognitive development (see Wachs & Gruen, 1982, for a review). Research with normally developing 6-month-olds indicates that persistence in trying to operate a toy has been found to predict general cognitive level at 12 months (Yarrow et al., 1983). Similarly, in a sample of

Down syndrome infants, persistence in operating toys predicted later cognitive development (Vietze, McCarthy, MacQuiston, Mac-Turk, & Yarrow, 1983).

Future research questions include the following. (a) Does the amount of object engagement correlate with later development of the more specific cognitive variable, object concepts, in handicapped children? (b) As a more powerful test of whether object engagement facilitates object concepts, does increasing object engagement through intervention result in greater object concept development in handicapped children? (c) Because handicapped infants have been seen to engage in the environment less frequently than normally developing infants (Dunst, 1981; Glenn & Cunningham, 1983; Miranda & Fantz, 1973; Switzky, Ludwig, & Haywood, 1979), simply providing a variety of toys may not facilitate these children's development. Therefore, the last research question might be "What strategies increase handicapped children's engagement in objects?" The next two assumptions discuss two promising methods for increasing object engagement.

Assumption: Reactive objects elicit object engagement and facilitate generalized self-efficacy. Objects that provide effects contingent on child manipulation may increase the production of trained infant motor behaviors (i.e., operant conditioning of a trained response), a generalized expectation that the child's behavior affects the environment (i.e., self-efficacy), and greater exploration of the environment (Brinker & Lewis, 1982a). With normally developing 5-month-olds, Yarrow, Rubenstein, and Pedersen (1975) found that the extent to which the infants were exposed to responsive objects positively related to their level of goal-directed behavior, secondary circular reactions, and exploration, as well as their overall cognitive level. Providing responsive toys or mo-

biles to normally developing infants has been found to cause greater overall cognitive levels (Mohandessi, Ghodessi, & Akizama, 1976, as cited in Wachs & Gruen, 1982), increased use of the reinforced infant response in the training context (see Sameroff & Cavanagh, 1979, for a review), and generalization of the infants' awareness that their own behavior causes effects from objects not used in training (Finkelstein & Ramey, 1977). In addition, research with normally developing infants also tells us that children who are functioning at or under age 6 months may more rapidly learn the connection between their acting on an object and a contingent effect if the effect comes from the object they are manipulating, not a person holding the object (Millar, 1976).

Regarding the research on handicapped children, Bambara, Spiegel-McGill, Shores, and Fox (1984) presented experimental single-subject data on three severely to moderately retarded children to support the notion that reactive toys elicit longer engagement with the toy than do nonreactive toys. Brinker and Lewis (1982a; 1982b) presented experimental single-subject data to demonstrate that computer-mediated contingent reinforcement of specific motor responses increased the frequency of use of these trained responses in some very young handicapped and at-risk infants. However, it has not been demonstrated that responsive computers or objects facilitate handicapped children's exploration of and operation of untrained objects.

There are at least two possible future research questions concerning reactive objects and development in handicapped infants. Do handicapped infants who are provided with response-contingent computers or toys generalize their learning to untrained objects and toys as seen in (a) more manipulation of untrained objects or (b) more rapid learning of how to operate untrained toys or

computer programs? These two outcomes are examples of the type of evidence we need if we are to infer that response-contingent toys or computers facilitate generalized cognitive skills.

Assumption: An optimal discrepancy between child ability and operative difficulty of toys facilitates cognitive, manipulative, and play skills. Another theory of how to get handicapped children to engage in toys in ways that may facilitate their development posits that using moderately difficult toys may motivate the child to resolve the problem that the object poses. In so doing, the infant learns manipulative, play, and cognitive skills (Hunt, 1961). Theoretically, when an optimal discrepancy is present, the child should persist in solving the problem posed by the object longer than with too easy or too difficult toys. Optimal complexity has been defined primarily in terms of observer judgment of the age appropriateness of toys or the behavioral complexity of child play with the toys.

With normally developing children, studies have found mixed results concerning the relationship of providing age-appropriate toys to later cognitive level. Bradley, Caldwell, and Elardo (1977) found that the availability of age-appropriate toys to 6-month-olds predicted general cognitive level at 36 months. However, others have found the relationship between availability of age-appropriate toys to child cognitive level to be nonsignificant (see Wachs & Gruen, 1982, for a review), while still others have found a significant negative relationship (Farran, Ramey, & Campbell, 1977).

It is still debatable whether handicapped children persist longer in goal-directed play when playing with toys that are slightly challenging than with easier or more difficult toys. In a sample of organically impaired mentally retarded infants, Schwethelm and Mahoney (1986) found task persistency was

longer when the infants played with toys that they could easily and quickly operate than when playing with toys that they did not operate quickly. These authors concluded that handicapped children persist with easy tasks, not challenging ones. However, acceptance of Schwethelm and Mahoney's interpretation depends on whether the toy that elicited the lower levels of persistence was not too challenging for the child. Perhaps, the "optimal discrepancy" hypothesis would be supported with toys that present only a slight challenge to the handicapped child. No research has been conducted on whether providing handicapped children with age-appropriate toys facilitates their cognitive, manipulative, or play development.

A suggested future research question is "Does providing handicapped infants with toys that require slightly more advanced skills than they currently possess result in (a) greater persistence in playing than when given less or more challenging toys and (b) greater cognitive, play, or manipulative skill development than control group children who receive toys that are too easy or too challenging?"

DIRECT INFANT INTERVENTION VIA SOCIAL MEANS

When using social means of providing development stimulation directly to the infant, the teaching methods tend to lie on a continuum on which there are two extremes: responsive interaction and direct skill instruction.

Specific Approach 1: Responsive Interaction

In the responsive interaction approach, the interventionist (i.e., the professional or the parent) differentially and contingently responds to the child's most developmentally

advanced behaviors that convey the child's presumed feelings, interests, or thoughts about his or her self-selected focus of attention (e.g., Mahoney & Powell, 1988). A slight departure from this responsivity model recommends arranging the environment in ways in which children can see interesting objects but not reach or interact with them without adult interaction (e.g., Hart, 1985). Such environmental manipulation is thought to increase the frequency of child communication. Another slight modification is helping the child to successfully achieve his or her self-selected goal by prompting the child to use slightly more advanced behaviors that convey his presumed meaning (Rogers-Warren & Warren, 1980).

Assumption: Responding to the child's behavior and focus of attention facilitates a myriad of child abilities. Although different causal mechanisms have been proposed, the responsive interaction model has been espoused as a facilitative style by proponents of behavioral (Hart & Risley, 1978), social interactionist (Goldberg, 1977), psychoanalytic/ethological (Ainsworth, 1979), and psycholinguistic (Snow, 1984) perspectives. The proposed results of such responsive interaction are increases in generalized cause-and-effect understanding and exploratory behavior (Riksen-Walraven, 1978), object engagement (Dunst, McWilliam, & Holbert, 1986), secure mother-infant attachment (Belsky, Rovine, & Taylor, 1984), convention and symbolic communicative behaviors and skills (Dunst & McWilliam, in press; Warren & Kaiser, 1986), and self-help and adaptive skills (Dunst et al., 1987).

In normally developing children, strong experimental evidence has suggested that responsive interaction facilitates exploratory behavior, cause-and-effect learning (Riksen-Walraven, 1978), and vocabulary development (Valdez-Menchaca, 1987). Responsivity is associated with future development of

secure mother–infant attachments (see Belsky et al., 1984, for a review) and developmentally advanced prelinguistic communication and language skills (Harding, 1984).

In samples of young handicapped children, well-controlled experimental evidence suggests that responsive interaction facilitates vocabulary and early semantic relation development (see Warren & Kaiser, 1986, for a review). Pre–post experimental evidence suggests that training parents to assume a responsive interactive style is associated with general sensorimotor (Mahoney & Powell, 1988) and general language development (Rogers, Herbison, Lewis, Pantome, & Reis, 1986). Concurrent correlational evidence suggests that responsive interaction is associated with more engagement with adults and peers (Dunst, McWilliam, & Holbert, 1986).

Suggestions for future research on responsive interaction include the following. (a) What are the effects of training responsive interaction styles on exploratory behavior, generalized contingency learning, general sensorimotor development, general language development, and engagement with adults and peers in handicapped infants? (b) If responsive interaction does facilitate the proposed outcomes in handicapped children, is this influence mediated through the assumed increase in object or people engagement? (c) What are the emotional consequences on the parent and child when parents are instructed to assume an interaction style that is very different from their pretreatment style? (d) What happens to the frequency of parent–child interaction after responsive interaction training? Logical and concurrent correlational evidence suggests that one reason that mothers vary in their interaction style is because they are responding to differences in their infants' behavior (see Mahoney & Powell, 1988, for a review). Therefore, it is quite possible that asking a

mother to assume an interaction style that is grossly different from that which her infant elicits may cause unintended negative side effects. If such negative side effects persist, then the intended, new interaction style would probably not be maintained after intervention ended. (e) The final suggested research question, then, is "Does the initial discrepancy between mothers' preintervention interaction style and the prescribed interaction style predict whether mothers maintain the trained interaction style after intervention ends?"

Specific Approach 2: Direct Skill Instruction

Direct skill instruction is on the other end of the continuum of socially mediated infant interventions. Put simply, this approach includes all programs that directly attempt to teach specific skills through planned interactions with the teacher or parent about adult-selected materials. Cognitively oriented programs train for generalization by teaching presumed underlying cognitive processes that apply to many tasks (e.g., Hohmann, Banet, & Weikart, 1979). Behaviorally oriented programs explicitly program for generalization by teaching a general response class to a variety of members of the stimulus class (e.g., Engelmann & Osborn, 1976) or by teaching in contexts in which the skill is expected to occur (e.g., Mulligan & Guess, 1984).

Assumption: Teacher-directed instruction on planned and specific skills facilitates generalized competence in the target skill area. A large analysis of 15 early intervention programs for impoverished young children indicated short-term benefits, as seen in experimental children having higher IQ scores than control children. The long-term benefits were higher arithmetic and reading achievement test scores, lower numbers of children in special education, higher self-

esteem, higher value for achievement, and increased labor market participation in late adolescence and early adulthood (e.g., Lazar & Darlington, 1982). Most, if not all, of the 15 original studies used the direct skill instruction approach to intervention.

However, similar reviews of early intervention programs for infants with identified handicaps include programs using both direct skill instruction and responsive interaction approaches. A recent meta-analysis (Shonkoff & Hauser-Cram, 1987) of 31 internally valid studies of intervention programs for infants (entry age less than 36 months) with biologically based handicaps found that programs with well-defined curricula were associated with significantly better child outcomes on mostly cognitive measures. A well-defined curriculum is one attribute of direct skill instruction. The Early Intervention Program (Bailey & Bricker, 1985) and the Infant/Parent Training Program (Wolery & Dyk, 1985) provide examples of direct skill instruction with handicapped infants. Although there are design problems with both evaluation studies, these two programs provide moderately strong support for the short-term benefits of their programs, as seen in pre-post differences in general cognitive level (Bailey & Bricker, 1985), developmental rates (Wolery & Dyk, 1985), and percentage of objectives mastered (Wolery & Dyk, 1985).

Suggested future research questions might be whether direct skill instruction results in (a) long-term, (b) generalized effects on the development of new skills in (c) infants with identified handicaps.

Comparing the Efficacy of the Two Socially Mediated Intervention Approaches

The question of which of the two socially mediated intervention approaches is the most effective is controversial. The propo-

nents of the direct skill instruction approach to early intervention claim that specific educational objectives and task-analyzed activities are necessary if handicapped children are to learn specific functional skills efficiently (Bailey & Wolery, 1984). However, direct skill instruction can be characterized as a directive interaction style because the intervention and materials are teacher-controlled. Directive interactive styles are correlated with slower rates of development in handicapped infants and preschoolers (see Mahoney & Powell, 1988, for a review). Unfortunately, there have been no well-controlled experiments that test the relative efficacy of the two socially mediated approaches to intervention with handicapped infants.

Such experiments *have* been conducted with parents and their nonhandicapped infants. In a sample of at-risk infants and their parents, an experimental comparison of the two treatment approaches indicated nonsignificant differences at 8, 12, and 16 months on measures of child behavior and development (Barrera, Rosenbaum, & Cunningham, 1986). With normally developing infants, Riksen-Walraven (1978) found that teaching mothers to be more responsive resulted in greater exploratory behavior and faster contingency learning than in the infants in the randomized control group. Teaching mothers to stimulate their children (i.e., a direct skill instructional style) resulted in quicker habituation rates (i.e., a measure of information-processing speed). Therefore, it is premature to suggest that interventions that encourage responsive interaction are superior for facilitating all aspects of infant development. A more probable conclusion is that different aspects of infant development are facilitated by the different treatment approaches (Wachs, 1985). We may also find that developmentally older infants are more likely to benefit from direct skill in-

struction, while developmentally younger infants develop faster when intervention is guided by the responsive interaction approach (Wachs, 1985).

Indirect support for this latter notion exists in a sample of older handicapped children. Using a sample of handicapped children ranging in age from 2 to 7 years old, Yoder, Kaiser, and Alpert (1989) found that the relative efficacy of a direct skill instructional approach (Waryas & Stremel-Campbell, 1983) and a responsive interaction approach (Kaiser & Alpert, 1987) depended on the children's initial skill level. Developmentally older preschoolers tended to perform better if taught in the direct skill instructional approach. The opposite result was found for the developmentally younger preschoolers. These results must be replicated with younger subjects and other skill areas before generalizing to infant intervention.

A suggested question for future research is whether the relative efficacy of direct skill instruction and responsive interaction approaches for handicapped infants is partly determined by (a) the type of developmental skill being taught or (b) the initial developmental level of the infant.

INDIRECT INFANT INTERVENTION VIA SOCIAL SUPPORT TO THE FAMILY

Rationale for Using Indirect Intervention

When the infant is intended to be the indirect beneficiary of intervention, the family (usually the parents) is the direct recipient of intervention. One reason infant interventionists began working directly with the parents instead of the children was because parents are usually the primary influences on their children's development. Current theories (Dunst, 1985) and concurrent correlational findings (Dunst, Leet, & Trivette, 1988) suggest that parents will be more will-

ing and able to positively affect their children's development when the parents' most pressing needs for personal well-being are met. Recent legislation promises to support state governments in setting up intervention programs that address these families' most pressing needs in order to indirectly affect the infants' development and present functioning (PL 99-457).

Description of the Approach

Trivette, Deal, and Dunst (1986) described and summarized the theoretical justification for this new approach to 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. These roles include advocacy, counseling, mediating, enabling, resourcing, consulting, and teaching. To avoid dependence on professionals and to enhance self-efficacy of the family, the interventionist helps the parents use their existing resources to meet their own needs and performs only those tasks the family is not able to do themselves.

Proposed Causal Model

Dunst and his colleagues (Trivette et al., 1986) have explicitly represented the proposed indirect influences of social support on child behavior and development. A simplified version of Dunst's model (see Figure 1) suggests that professional and nonprofessional social support may indirectly facilitate infant functioning by directly increasing the family members' personal health and well being. Physically and psychologically

healthy family members are assumed to be more capable of interacting with the child in ways that facilitate child present functioning and future development.

Parameters of the Review

The construct of social support has been measured in many different ways. Different types of social support are likely to have different effects (Tracy & Whittaker, 1987). For example, one taxonomy of social support indicates that there are at least six types of social support: material aid, behavioral assistance, intimate interaction, guidance, feedback, and positive social interaction (Barrera & Ainlay, 1983). Therefore, the decision was made to code some level of empirical support for the proposed model when any aspect of social support was shown to be related to the proposed dependent variable. This decision made possible a relatively concise review of a very complicated literature, but it should be noted that this review does not address the diverse effects of various types of support.

Much of the social support literature is correlational. Therefore, the review of the empirical support for the model will indicate the degree to which one may reasonably infer a causal relation between the variables of interest (i.e., internal validity concerns). In addition, many social support studies test literally hundreds of correlations, thus increasing the probability of finding a significant correlation by chance. The review will indicate whether the relation of interest has been replicated and whether the subjects in the studies were families with handicapped infants.

Although Trivette et al.'s (1986) model encompasses both professional and nonprofessional social support, it is the facilitative effect of professional support to the family or its nonprofessional support network that is most applicable to the infant intervention

field. Therefore, the research questions following the review of each assumption in the models will distinguish the role of professional support from that of nonprofessional support.

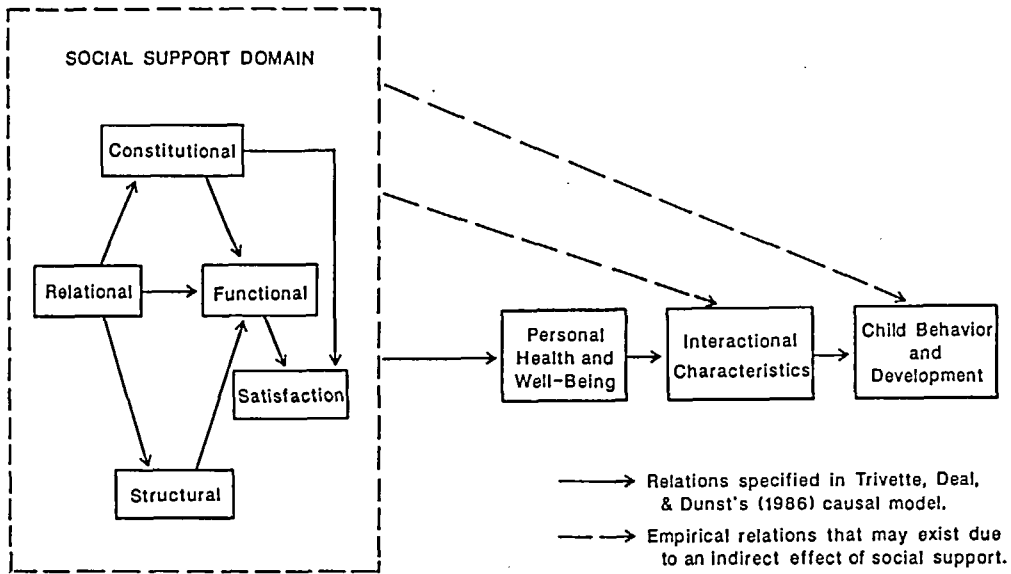
It should also be noted that the empirical support for a relation between maternal interaction style and child development and functioning was reviewed in the earlier section titled "Responsive Interaction." Supporting evidence for the other relations in Figure 1 will be reviewed below.

Assumptions and Research Questions

Assumption: Social support enhances family well-being and health. Social support enhances personal well-being and health in parents with normally developing or at-risk infants. Several studies have indicated that social support concurrently correlates with and longitudinally predicts personal well-being and health of parents of normally developing infants (Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983; Levitt, Weber, & Clark, 1986). In a sample of mothers of at-risk infants, Crnic and colleagues found social support concurrently correlates with (Crnic et al., 1983) and longitudinally predicts (Crnic, Greenberg, & Slough, 1986) maternal stress, life satisfaction, and satisfaction with parenting. Dawson, Robinson, and Johnson (1982) found that mothers of at-risk infants who were visited periodically by infant specialists trained to generally support the mothers perceived their children as less difficult than did their randomly assigned control group who received no systematic support. Stronger effects were seen in the Dawson et al. study with the most at-risk families. The Yale Child Welfare Research Program's findings indicate that, when compared to a matched control group, impoverished mothers receiving psychological support, child-care advice, and respite for their children had smaller families, had

FIGURE 1

A Model Proposing the Direct and Indirect Influences of Social Support on Parents, Family, Parent-Child Interaction, and Child Functioning



higher socioeconomic ratings, and were more likely to be employed 10 years after intervention ended (Seitz, Rosenbaum, & Apfel, 1985).

Families with handicapped infants and preschoolers tend to experience less stress when they have adequate social support. Dunst and his colleagues (Dunst, 1985; Dunst, Trivette, & Cross, 1986) found that social support concurrently correlates with maternal problems, family integration, and maternal well-being, especially in mothers of male children. Friedrich (1979) found that mothers reporting the least stress were those who felt they had a secure marriage relationship. All of these relations are in the direction predicted by the model. Although this replicated, correlational support is encouraging, future research should be experimental. The question to ask here is, "Does providing professional social support

enhance the physical or mental health of parents of handicapped children?"

Assumption: Social support enhances mother-child interaction styles. In one sample of families with normally developing infants and in another sample of families with handicapped infants, mothers who had potentially facilitative interaction styles tended to have adequate social support. Relevant to normally developing infants' families, Weinraub and Wolf (1983) found that parental perception of social support was concurrently related to measures of mother-child communication and maternal responsivity to infant distress. In his sample of mothers of handicapped infants and preschoolers, Dunst and his colleagues found positive concurrent correlations with social support and the assumed facilitative maternal interaction style (Dunst, 1985; Dunst & Trivette, 1986) and the number of different games the

mother and child played (Dunst, 1985; Dunst, Trivette, & Cross, 1986). They also found concurrent correlations between the lack of social support and the proposed negative maternal interaction styles (i.e., passivity and directiveness) (Dunst, 1985).

Replicated and strong evidence suggests that social support enables mothers of at-risk infants to use potentially facilitative maternal interaction styles more often. In a sample of mothers of at-risk infants, Crnic and his colleagues found that early social support to the parents predicted the proposed facilitating maternal interaction style 3 months later (Crnic et al., 1983) and 8 months later (Crnic et al., 1986). Dawson et al. (1982) found that mothers who were visited periodically by professional infant specialists had more reciprocal interactions with their infants than did a randomly assigned control group of mothers of at-risk infants. Olds, Henderson, Chamberlin, & Tatelbaum (1986) found that mothers of at-risk infants who were visited by a nurse throughout the infant's first year were less likely to use punishment, were less restrictive, and provided more appropriate toys to their children than did a randomized control group. Dawson et al. (1982) and Olds et al. (1986) found stronger effects for the families who were most at-risk. All of these relations are in the direction predicted by the model.

To strengthen the support for the indirect intervention model for handicapped infants, future research on the effect of social support on maternal interaction style should experimentally manipulate social support and measure maternal interaction styles that are presumed to facilitate handicapped infant development. Examples of possible research questions are as follows. (a) Does providing professional social support to the family or the family's social network facilitate the mothers' use of presumably facili-

tative interaction styles with their handicapped infants? (b) Do mothers with adequate social support learn more quickly and maintain newly acquired facilitative interaction styles longer than mothers with inadequate support?

Assumption: Maternal well-being enhances maternal interaction style. Mothers who are psychologically and physically healthy tended to use potentially facilitative interaction styles in a sample of mothers with normally developing infants and another sample of mothers with handicapped infants. Relevant to normally developing infants' families, Weinraub and Wolf (1983) found that stress concurrently correlated with the low occurrence of the supposed facilitative maternal interaction style. In a subsample of a larger sample of parents of handicapped children, Dunst and Trivette (1986) found that emotional and physical health was positively correlated with responsive maternal interaction and negatively correlated with imposing maternal interaction styles. They also found psychological well-being of the parent was negatively related to an imposing maternal interaction style.

Maternal well-being and health may have influenced maternal interaction style in at least one sample of parents of at-risk infants. Crnic and his colleagues found that early parental stress predicts low maternal sensitivity to infant cues 3 months later (Crnic et al., 1983) and low use of the proposed facilitating maternal interaction style 8 months later (Crnic et al., 1986). Again, all of these relations are in the same direction predicted by the model.

Because experimentally manipulating personal well-being is unethical, future research on this assumption must be restricted to correlational methods. It is important to replicate Dunst's findings before gen-

eralizing them to other families with handicapped infants. That is, "Can we replicate the positive relation between maternal well-being and maternal interaction style that are presumed to be facilitative of infant development?"

Assumption: Social support facilitates child behavior and development. Early social support predicts the development of later secure mother-infant attachments in families with normally developing infants and in at least one sample of families with at-risk infants. Security of attachment is considered an important child outcome because of its potential present emotional importance to the mother and child and its predictive validity to later child behavior in normally developing children (see Campos, Barrett, Lamb, Goldsmith, & Stenberg, 1983, for a review). Replicated evidence suggests a concurrent relation between presence and support from the father and secure attachment (Durrett, Otaki, & Richards, 1984; Goldberg & Easterbrooks, 1984). A reduction in the adequacy of social support predicts changes from secure to insecure attachment (Egeland & Farber, 1984). Increases in marital satisfaction predict later security of attachment (Belsky & Isabella, 1988). Early spousal support predicts later attachment security (Crockenberg, 1981). Similarly, families whose infants established secure attachments felt that their neighbors were more friendly and helpful than did families of insecurely attached infants (Belsky & Isabella, 1988). In a sample of mothers and their at-risk infants, Crnic et al. (1986) found that early nonprofessional support predicted mother-infant attachment 12 months later.

Strong evidence suggests that providing comprehensive social support facilitated child development in at least one sample of at-risk infants. Trickett, Apfel, Rosenbaum, and Zigler (1982) found that providing a

number of services to families of at-risk infants resulted in higher receptive language development and spelling ability 5 years after intervention had ended when compared to a matched group of at-risk infants not receiving such services. The services included psychological support and advice on child-raising to the mothers and, if needed, day care for the child. The results suggest that social support of impoverished families may facilitate girls' development more than that of boys and that this effect can maintain long after treatment. A 10-year follow-up of these groups (Seitz et al., 1985) indicated that intervention children had better school attendance and boys were less likely to require special education than were corresponding control children a decade after the intervention had ended. Measured pretreatment group differences could not, in most cases, have accounted for the posttreatment differences.

There is conflicting information about the direction of the relationship between social support and child progress in families of handicapped infants and children. Dunst (1985) cited three of his studies that apparently used overlapping subsets of one larger sample of families. These three studies reported a positive relationship between role satisfaction and social support satisfaction, and changes in children's developmental rate. However, he also reported one study using the entire sample of 138 families that found a negative relationship between role satisfaction and change in the children's developmental rate (i.e., a relationship in the opposite direction of that predicted by his model). The authors' practice of testing of the significance of literally hundreds of correlations may have resulted in a chance finding of a negative relationship. Alternatively, the subsamples for whom positive relationships were found may be sig-

nificantly different from the sample as a whole on some important, but unidentified, variable.

Dunst's exploratory work with one large sample of families with handicapped infants is a start. But to further the scientific basis for the belief that professional help to families directly or indirectly facilitates infant development, we need an experimental test of the effect of social support on handicapped infant development in new samples of families with handicapped infants. Possible research questions are as follows. (a) Can we replicate the positive relationship between adequacy of social support to the family and child development? (b) What factors influence the magnitude or direction of this correlation? (c) Does providing social support (as defined by the families' most pressing needs) in a well-controlled study result in lasting and superior changes in handicapped infant behavior and development? This last experiment would be quite difficult to conduct because families must be assessed according to their needs before designing the intervention. In addition, the number of families needed to experimentally test this hypothesis would likely require multiple experimental sites or years because only families who are willing and able to receive support would be predicted to benefit from it. If we do find that social support to the family facilitates development in handicapped infants, we would then need to know which types of support-family need matches affect which aspects of infant development. But that is a topic for future reviews.

CONCLUSION

The underlying assumptions of various approaches to infant intervention have been summarized in this review. In addition, future research questions concerning the ef-

ficacy of specific approaches to intervening on the development of handicapped infants were summarized. In general, there is a need for research that experimentally tests whether specific interventions affect specific areas of infant development in handicapped children of specific developmental periods. It is becoming clear that various intervention approaches probably affect different aspects of development and are appropriate for different developmental periods or degrees of handicapping condition. To further complicate the picture, the family context probably influences the magnitude or presence of intervention effects. While researchers are conducting this needed research, clinicians can probably best serve their clients by attempting to address the families' most pressing needs as they relate to the child's health and development. If this includes direct facilitation of infant development, knowledge of the underlying assumptions of the various intervention approaches and their level of support will help in the selection of which approaches to use for a specific child's developmental goal.

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