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## THE ROLE OF MATERNAL RESPONSIVITY IN THE DEVELOPMENT OF CHILDREN WITH INTELLECTUAL DISABILITIES

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### Abstract

There is growing evidence that cumulative exposure to highly responsive parenting styles throughout the early childhood period may provide a variety of important child benefits in terms of language, cognitive, social, and emotional development. We view maternal responsivity as a dynamic construct of central importance to the development of children with intellectual disabilities just as it is for typically developing children. In this study, we selectively review the theoretical and conceptual evidence for the effects of responsivity on development, discuss factors known to influence responsivity including the nature of a child's disability, and review intervention approaches intended to enhance maternal responsivity. We conclude with a set of recommendations for future research.

### Keywords

maternal responsivity; communication; language; cognition; social; emotional development

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There is a substantial and growing body of evidence that cumulative exposure to a stable, highly responsive parenting style throughout the early childhood period is associated with a variety of child benefits in terms of language, cognitive, emotional, and social development [Landry et al., 1998, 2001; Tamis-LeMonda et al., 2001]. More recently, some experimental evidence suggests a possible causal role for responsiveness in terms of growth in child social, emotional, communication, and cognitive competence [Landry et al., 2006]. Conversely, there is also substantial evidence that long-term exposure to a harsh, overly directive, or unresponsive parenting style is associated with sub-optimal outcomes across the same developmental domains [Bates et al., 1998; National Research Council, 2000]. Parenting style itself is related to a number of variables including parental emotional state (e.g., depression, stress), beliefs and values, maternal education level as well as variables such as the child's temperament and developmental level [Bornstein, 1995; Shapiro et al., 1998].

The focus of this study is the role in maternal responsivity in the development of young children with developmental delays, social-emotional disorders (e.g. autism spectrum disorders), and intellectual disabilities (e.g. Down syndrome). Because maternal responsivity

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is a dynamic construct we will first discuss its definition and then the transactional model of development, which provides a conceptual model for understanding the effects of maternal responsivity. In this section, we also selectively note the genetic and biological bases for the effects of responsivity. Next we selectively review research demonstrating relationships between responsivity and various aspects of child development. This is followed by a discussion of variables known to impact responsivity and alter it, either for the benefit or detriment of the child. We then review research on interventions intended to enhance maternal responsivity for children with developmental delays. We conclude with a brief discussion of future research directions.

## WHAT IS MATERNAL RESPONSIVITY?

Parental responsivity, or as it is more commonly referred to in the literature and therefore in this study—maternal responsivity—is one part of a parent’s parenting style. Responsivity refers to how a parent responds to and provides for a child. At the most general level, maternal responsivity refers to a “healthy, growth-producing relationship consisting of such caregiver characteristics as warmth, nurturance, stability, predictability, and contingent responsiveness” [Spiker et al., 2002]. Studies reflecting different theoretical orientations have focused on four distinct aspects of responsivity: contingent responding, emotional-affective support, joint attention with the child, and language input that is matched to the child receptive language level [Landry et al., 2006]. These are not in any sense mutually exclusive and have often been reported to correlate with each other. They also reflect, in part, the fact that responsivity as a form of human behavior can be defined and observed according to different continua.

At the most molar level, a parent might be viewed as “responsive” if she or he actively seeks out services and opportunities for their children and advocates for the child’s needs in the community. However, parents could be responsive at this most general level, yet interact with their children relatively infrequently and/or be relatively directive or insensitive in their moment-to-moment interactions with the child. At a societal level this parenting style is generally within the acceptable range. Indeed, in large families it may reflect the best a parent can do much of the time given the demands on them. From an historical perspective, the highly responsive parenting style manifested by dozens of rich conversations daily between parent and child in part may reflect very high levels of literacy combined with the small families characteristic of recent postindustrial societies found in Europe, North America, and now increasingly throughout the world [Williams, 1998].

At a less general but still molar level, parental behavior can be defined as “responsive” when characterized by general qualities such as “warmth” and “positive affect” [Landry et al., 2000]. Not surprisingly, a moderate to strong correlation has been shown between these general “qualities” of affective responsiveness and the more molecular definitions of contingent parental responsiveness to specific behaviors of the child [Landry et al., 2001]. However, it is important to note that a parent could be warm and generally pleasant to their child, but still not engage in very much of the contingent behavior by behavior responsiveness that may have the power to specifically drive for example, vocabulary acquisition.

On the molecular level, responsivity refers to “parental behavior that responds contingently to the child’s cues, follows the child’s lead, and provides input and support that build on the child’s focus of attention and activity” [Spiker et al., 2002]. Contingent responding such as this is often associated with positive developmental outcomes, but some responding may be contingent yet not necessarily facilitative of child development. For example, directive statements such as imitation prompts and questions can be responsive if they follow the child’s attentional lead. However, directive statements are seen as nonresponsive and potentially disruptive to some types of learning if they frequently redirect the child’s attention [McCathren et al., 1995]. We recognize of course that “redirection” may be a very useful behavior management technique and a valuable component of parents’ interactions in response to less desirable child behaviors.

The cumulative impact of responsivity on development likely grows from a contingent chain of events in which the child signals a need, state, or interest, the mother responds quickly, sensitively, and positively, and the infant or child experiences their needs being met in what across time becomes a highly predictable transaction. This predictability is important because it provides the child with both a sense of control and security necessary to venture out and explore both the object and social world and to initiate to the parent as discoveries are made (“look at this”) receiving in response both continued interest and support as well as further information (“yes, it is a red ball”) that is often linked closely to the leading edge of their receptive language development [National Research Council, 2000].

Responsivity as a multi-faceted construct has been defined and studied in different ways by researchers. This fact obviously makes synthesizing and comparing the relevant literature challenging. These differences may not be trivial because focusing on different aspects of responsivity may lead to different conclusions. For example, Davidov and Grusec [2006] differentiated responsiveness to distress from warmth in a sample of children between 6 and 8 years of age. They found that contingent responsiveness to distress significantly predicted children’s regulation of negative emotions, whereas warmth, a more general affective state, significantly predicted peer acceptance in boys. These authors were able to identify these relationships because they looked at the specific links between these indicators of responsivity and child behaviors, rather than collapsing them to create a more molar general measure. For the purposes of the present discussion, the term responsivity will be used to refer to all of these aspects of how the parent and child respond to each other. However, for a given study the specific aspects of responsivity under investigation will be described.

In sum, maternal responsivity is a broad construct that includes several specific forms of responsivity. These different forms of responsivity have rarely been studied together despite the fact that young children are likely to experience them in overlapping combinations (e.g. warmth, contingent responsive, and growth supporting language input all simultaneously). Indeed, it is probably these combinations, experienced thousands of times by the child from infancy onward that give maternal responsivity the broad cumulative impact that is has been shown to have.

## HOW CAN HIGHLY RESPONSIVE PARENTING IMPACT COGNITIVE AND LANGUAGE DEVELOPMENT?

A useful theoretical framework for understanding how highly responsive parenting may impact cognitive and language development, and by which low responsive parenting may hamper optimal cognitive and language development, is the transactional model of development [Sameroff and Chandler, 1975; Sameroff and Fiese, 2000]. This model presumes that early communication, social, emotional, and cognitive development is facilitated in a cumulative manner through bi-directional, reciprocal interactions between a young child and her caretakers. This process can be observed early in infancy in bouts of mutual gaze between the infant and parent as well as the kind of contingent responsiveness that occurs during breast-feeding and in parent response to indications of state by infants (hunger, irritation, discomfort, etc). This process typically becomes increasingly bi-directional as infancy proceeds. In essence a sensitive caretaker changes their behavior in response to child change in ways that directly support and scaffold further development. For example, the onset of intentional communication at around 8–9 months of age may trigger changes in the caretaker such as increased linguistic mapping contingent on child initiation in the context of joint attention episodes (linguistic mapping—or providing word labels for children’s prelinguistic and early linguistic communication). Increased linguistic mapping has been linked to receptive and productive language development [Gallaway and Richards, 1994; Warren and Walker, 2005]. These changes then support further development in the child (e.g., increased vocabulary), and subsequently further changes by caregivers (e.g., more complex language interactions with the child). In this way both the child and the parent change over time and affect each other in reciprocal fashion as early achievements pave the way for subsequent development [Warren and Walker, 2005].

Maternal responsiveness, operating through the reciprocally adjusting mechanism of the transactional model, affects emotional attachment [DeWolff and IJzendoorn, 1997] as well as language and cognitive development by directly supporting the child’s active exploration and engagement of the environment [Landry et al., 2000]. Unresponsive parenting on the other hand is strongly associated with insecure attachment [DeWolff and IJzendoorn, 1997] as well as poor social-emotional development [Bornstein and Tamis-LeMonda, 1989] including aggression and later behavior problems [Campbell, 2002]. The effects of insensitive parenting may be further magnified as the result of gene-environment interactions [e.g. Bakermans-Kranenburg and IJzendoorn, 2006]. In these cases, the co-occurrence of insensitive parenting and specific gene polymorphisms (e.g. a D4 or MAOA gene polymorphism) may lead to tendencies in social cognition that establish a trajectory of poor social development which over time leads to severe antisocial behavior in adolescence and adulthood [Moffitt, 2005].

Since the 1970s, proponents of the social interactionist perspective of language development [e.g., Bruner, 1975; Snow, 1984; Nelson, 1989; Tomasello, 1992; Gallaway and Richards, 1994; MacWhinney, 1999; Chapman, 2000] have been building the case that adults can play an important role in children’s language acquisition. They have noted that from birth onward children are exposed to an ocean of language. Hour after waking hour, day after day, month

after month, a child encounters the natural curriculum provided by exposure to his native language [Hart and Risley, 1999]. Furthermore, the millions of words and sentences that children experience are not just undifferentiated noise. Much of this natural curriculum is specifically adjusted and fine tuned [Bruner, 1975; Sokolov, 1993; Baumwell et al., 1997; Chapman, 2000] to the child's language comprehension level. A wide range of teaching devices have been detected in common use by adults including expansions, models, contingent imitations, growth recasts, use of concrete, simplified vocabulary, slower rate of articulation, use of higher pitch and exaggerated intonation, a focus on objects and events to which the child is attending, etc. [Hoff-Ginsburg, 1986; Snow et al., 1987; Menyuk, 1988; van Kleeck, 1994; Hart and Risley, 1999]. These adjustments to the child's communication level, termed infant directed speech, "parentese" or "motherese," aid the acquisition of linguistic and communicative competence in the short-term and cognitive and academic success in later childhood [Richards, 1994; Walker et al., 1994]. The rate at which adults talk to children [Huttenlocher et al., 1991; Wells, 1985; Hart and Risley, 1995], the rate at which children themselves talk [e.g., Hart and Risley, 1980, 1995] and the responsiveness of parents to their child's communication attempts [Yoder and Warren, 1999, 2001] have all been shown to correlate with faster acquisition of various components (e.g., vocabulary growth) of language acquisition.

A transactional model may be particularly well suited for understanding early cognitive and language development because caregiver-child interaction can play such a unique role during this period. During their first 2–3 years, children's relatively restricted behavior repertoire allows changes in their behavior to be more salient and easily observable to caregivers [Warren and Yoder, 1998]. This in turn may allow adults to be more specifically contingent with their responses to the child's developing interests and skills than is possible later in development after the child's behavioral repertoire has become far more expansive and complex. Consider, for example, the relative ease by which a responsive parent can identify instances of new learning in an infant or toddler (e.g., specifically acknowledging the expression of individual words and word attempts), and how unlikely it is that the same parent can accurately account for instances of new learning just 2 years later [Sokolov and Snow, 1994] when the child's repertoire has now become vastly more complex.

To appreciate the true potential of transactional effects, it is necessary to consider the relentless manner by which cumulative advantages and deficits in experience can develop across the first few years of life. For example, an input difference in positive affect expressed by a parent toward their child of 10 events per day (a difference of <1 event per waking hour on average) would result in a cumulative difference of 10,950 such events over a 3 year period. If a child who experiences less positive affect also experiences cumulatively more negative affect (e.g., "Stop that," "Get out of there," "Shut your mouth up," "You're a bad boy"), it becomes relatively easy to conceive of combinations of these qualitative and quantitative experiential differences contributing to deficits in attachment, exploratory behavior, self-concept, language, cognitive, and social development [Warren and Walker, 2005]. Furthermore, there is substantial evidence that such large cumulative deficits occur in typically developing young children and that these differences leave their mark on important indicators of development later in childhood (e.g., vocabulary size, I.Q., reading ability,

school achievement) [Feagans and Farran, 1982; Gottfried, 1984; Hart and Risley, 1992; Walker et al., 1994].

The biological mechanisms by which responsiveness may affect child outcomes are also transactional, and complex [Reiss and Neiderhiser, 2000] There is substantial evidence that early experiences bring about structural as well as functional changes in the ability of the brain to represent the world, coordinate information, and produce responses [National Research Council, 2000], Much of the evidence on the effect of experience on early neural development comes from animal models. For example, the effects of rodent maternal care on reactions to stressful conditions serves as a model for early social and adaptive behavioral development. Early care-giving interactions have been demonstrated to affect development of social behaviors across rats [e.g. Meaney, 2001] and mice [e.g. Cirulli et al., 2003]. The amount of maternal-care behaviors observed in rat mothers has been linked to the release of specific neurotrophins associated with stress reactions. Data suggest that increased neurotrophins are released in adults who were reared with relatively high frequencies of maternal caring behaviors. The brains of these rats show increased synaptic connectivity and other signs of long-term changes in neuronal plasticity. Behaviorally, these mature rats are more resilient to stressful conditions than are rats or mice that experienced less maternal-care behaviors. Thus, maternal care is viewed as a mediator for stress reactions to environmental adversity [Meaney, 2001].

Similar mechanisms may underlie human responses to differences in maternal care, but the picture is more complex in humans [Wachs, 2000]. For example, children may be differentially susceptible to the mediating affect of maternal care based on their genetic makeup. Bakermans-Kranenburg and van Ijzendoorn [2006] found that preschool children were differentially susceptible to insensitive parenting dependent on the presence of a polymorphism or a particular gene, the dopamine D4 receptor (DRD4). Children with seven repeats on the DRD4 receptor, who also had mothers with low sensitivity ratings, had significantly higher scores on the externalizing subscale of the Child Behavior Checklist than children without the DRD4 7-repeat. Risk and resilience to child abuse has also been tied to presence of different common polymorphisms of the MAOA gene [Caspi et al. 2002].

Other child variables that do not have a known genetic cause, such as child emotions and behaviors, are also related to various aspects of maternal responsivity. Deater-Deckard and Petrill [2004] found that lower levels of child behavior problems were associated with greater parent-child mutuality (comprised of emotional reciprocity, coresponsiveness, and cooperation) in both biologic and adoptive parent-child dyads within the same family. Such findings suggest that parent-child interactions reflect genetic and other child-specific behavioral characteristics.

Gene-environment interactions may be particularly evident for children with developmental disabilities because of known or suspected genetic disorders associated with these disabilities. For example, across 150 families having children with and without fragile X syndrome (FXS), maternal distress was significantly related to behavior problems reported in children with FXS and in their unaffected siblings [Hall et al., 2007]. The affects were similar across siblings.

Young children with developmental delays, such as those associated with Down syndrome, autism, FXS, and other disabilities are likely to experience relative deficits in various types of environmental input compared to typically developing children—despite the best intentions of their caregivers—in part because they often display low rates of initiation and responsiveness themselves [Yoder et al., 1994; Hauser-Cram et al., 2001]. Indeed, a recent study with mother-Down syndrome infant dyads revealed that at just 8 weeks of age, these infants were rated as having significantly poorer communication (e.g., less attentive to mother) and being less lively than typically developing infants. Mother's sensitivity, intrusiveness, remoteness, and depression were each measured using 5-point rating scales. At this very early point in development, ratings of mothers of children with Down syndrome were indistinguishable from ratings of mothers of typically developing children. But by 20 weeks of age, mothers were already significantly less sensitive and more remote than the mothers of typically developing children [Slonims et al., 2006]. Thus, very early on these children were already on different transactional and developmental paths in terms of their experiential histories of cumulative responsiveness. Similarly disrupted transactional processes are likely at work with children with other developmental disorders. We do know, for example, that the presence of autism typically disrupts mother-child interaction in general and maternal responsiveness specifically [van IJzendoorn et al., 2007].

## **WHAT ARE THE EFFECTS OF MATERNAL RESPONSIVITY ON DEVELOPMENT?**

There is a substantial body of research on the relationships between maternal responsiveness and child development. Viewed cumulatively, this body of research supports the contention that maternal responsiveness plays an important role in child development [National Research Council, 2000; Osofsky and Thompson, 2000; Landy, 2002; Landry et al., 2006]. Children whose mothers display more responsive behavior during the first several years of life achieve language milestones earlier [Landry et al., 2001; Tamis-LeMonda et al., 2001], score significantly higher on cognitive tests [Landry et al., 1996, 2000], develop better social skills [Calkins et al., 1998; Landry et al., 1998; Kochanska et al., 1999] and have fewer emotional and behavior problems [Goldberg et al., 1991]. Landry and her colleagues demonstrated in a longitudinal study of 282 young children (the sample included 103 full-term children, 102 low-risk preterm children, and 77 high-risk preterm children) that highly responsive parenting achieves its most substantial effects when it is sustained at least throughout the early childhood period (up to age 5 years). Children in this study who were exposed to highly responsive parenting early in development, but not later, or later but not earlier, scored significantly lower on measures of language, cognitive, and social development than children who experienced ongoing, consistently high levels of responsiveness as well as maternal warmth and positive affect over a period of several years [Landry et al., 2001]. This study demonstrated how the impact of maternal responsiveness may grow cumulatively over many years starting in infancy. It also demonstrated that the exposure to high responsiveness during the first 2 years did not bestow any special advantage to children—in other words there was no evidence of a critical period for responsiveness. Instead, cumulative experience over the full 5-year period was the key. Furthermore, the range of effects reported by Landry

and colleagues was quite broad and included measures of language, social, emotional, and cognitive development.

The cumulative effects of relatively high levels of maternal responsivity may also directly impact learning style and a child's sense of self efficacy [Hart and Risley, 1995]. That is, high levels of maternal responsivity convey to children that a parent is interested in what interests them and what they initiate. High responsivity may effectively reinforce children for being curious, exploratory, and creative. Not surprisingly, high levels of maternal responsivity have been linked to secure emotional attachment [Bakermans-Kranenburg et al., 2003]. At the opposite end of the continuum from warm, highly responsive parenting is unresponsive and/or harsh parenting. Unresponsive parenting has been associated with low maternal education [Hooper et al., 1998], depression [Rutter and Quinton, 1984], substance abuse [Osofsky and Thompson, 2000], and mild mental retardation [Miller et al., 1996]. Just as responsive parenting has been associated with accelerated growth in language, cognition, and social behavior, unresponsive parenting has been associated with lower growth trajectories [Tomasello and Todd, 1983; Tomasello and Farrar, 1986]. Harsh parenting, which sometimes co-occurs with unresponsive parenting, has been shown to have a markedly negative impact on development and behavior [Dodge et al., 1990; Whitman et al., 2001; Campbell, 2002].

The degree of parental sensitivity and responsiveness has also been shown to be predictive of outcomes in children with intellectual and developmental disabilities. In a large-scale longitudinal study of the development of children with mental retardation and parent well being, Hauser-Cram et al. [2001] found that when mental age was controlled, the quality and frequency of mother-child interaction was the only significant correlate of communication skills at age 3 years. By 10 years of age, children whose parents' interaction scores were more positive had an advantage of approximately 10 months in communication skills on average. On the other hand, Wasserman et al., [1985] found that infants with disabilities whose mothers ignored them for a proportion of a free play observation conducted when their children were 12 months of age had significantly lower intelligence scores at 24 months of age. Yoder and Warren [1998, 2000, 2001] also demonstrated that young children with mild to moderate levels of mental retardation who had highly responsive mothers at pretreatment achieved much greater gains in terms of later language development as a result of early prelinguistic communication intervention than did children with low responsive mothers. In the Yoder and Warren studies, responsivity was measured as contingent response to child communication bids. A number of other studies have demonstrated correlational relationships between maternal responsivity and style and the development of children with mental retardation [Shapiro et al., 1998; Wheeler et al., 2007]. However, the extent to which maternal responsivity and style observed across studies is an adaptive or maladaptive response to the behavior of the child with intellectual disabilities has been more the subject of speculation than research [Marfo et al., 1998; Osofsky and Thompson, 2000].

Another unanswered question at present is what level of responsivity constitutes "high" responsivity in general. In the literature high responsivity has been generally defined in by its effects as opposed to some absolute value or apriori definition. Thus, in the Yoder and Warren [1998] study, children of parents who were responsive to 57% or more or child



communication attempts were deemed as highly responsive because this was the point at which a positive interaction effect was discovered between parent responsivity and child outcome. Yoder and Warren's study focused on child language development and their measure of responsivity focused on contingent responses of the adult to the child. In contrast, Landry et al. [2001] measured responsivity on a 1–5 point rating scale. High responsivity on this measure was an average of 4.0 or a higher on the dimensions rated. It was this level of responsivity over time that was related to optimal outcomes on measures of language, cognition, social and emotional behavior. In short, "high" responsivity has been defined by effects achieved to date, not by a priori definitions. It is also conceivable that a parent might be too responsive to a child at least in certain ways. For example, when a child's message is not acknowledged or understood, this naturally encourages them to acquire and practice various conversational repair strategies, an obviously important pragmatic communication skill [Brady et al., 2004]. On the other hand, it's difficult to conceive that there could be a downside associated with a child's exposure to a consistently high level of a general characteristic such as "parental warmth." In any case, to date we are not aware of any research that has reported negative results associated with high parent responsivity however it has been conceptualized and measured.

## **HOW DOES CHILD BEHAVIOR AND DEVELOPMENTAL LEVEL IMPACT MATERNAL RESPONSIVITY?**

Maternal responsivity does not function independently of the child's behavior and responsiveness [Bell and Harper, 1977]. Either partner in the "dance" between parent and child is capable of disrupting the interaction and altering its very nature in ways that may extend out over a lifetime [Kelly and Barnard, 2000]. Initiating and maintaining a warm, responsive interaction style with a child with autism or any of a number of other developmental disorders can be highly challenging even for a parent with the very best of intentions [Stormont, 2001]. A number of child characteristics associated with developmental delays and disorders may be disruptive to parental responsivity alone or in combination with other characteristics. These include low initiation rates, slow response times, gaze avoidance or atypical eye gaze, hypersensitivity to sensory input, social anxiety and shyness, perseveration and repetitiousness, stereotypical behavior, unintelligible speech, and problems with conversational discourse, poor short term memory, and a wide range of behavior problems. Any one of these characteristics may be sufficient to disrupt parent efforts to be responsive and a given child may display many of these characteristics over long periods of time. For example, in a group of 24 mother-child dyads with FXS, Wheeler et al. [2007] found significant correlations between children's receptive language levels and maternal maintaining and scaffolding behavior. Furthermore, many children with autism spectrum disorders display particularly severe forms of the behaviors noted above [Rogers et al., 2001]. Over time, these characteristics can create a relatively stable interaction pattern that may be directive, rigid, and lacking the developmental progression of the transactional model in its optimal form. The cumulative effects of this interaction style in turn interacts with the child's underlying disability over many years in ways that further impede the child's development [Warren, 2004].

## WHAT PARENT CHARACTERISTICS AFFECT MATERNAL RESPONSIVITY

Many factors that are independent of child behavior and development are associated with lower or higher maternal responsivity. For example, low maternal education is strongly correlated with low maternal responsivity and high maternal education with high responsivity [Bornstein and Tamis-LeMonda, 1989; Yoder and Warren, 2001; Huttenlocher et al., 2007]. Maternal mental health problems, especially depression, have been repeatedly shown to negatively influence how mothers interact with their young children [Goldsmith and Rothbart, 1996; Murray et al., 1996]. Other factors that have been shown to correlate with low maternal responsivity include high levels of stress and anxiety, substance abuse, poverty, and mother's history of being abused and neglected [Kelly and Barnard, 2000; Wheeler et al., 2007]. High maternal education and high family resources may serve to mediate the effects of some of these variables (e.g. depression). However, very often these risk factors for low responsivity occur in one sort of combination or another and may create an unfortunate synergy of multiple risk factors (e.g. low maternal education, depression, poverty, substance abuse, history of child abuse). When these in turn occur in combination with already challenging child developmental disorders the result may be especially toxic in terms of the outcome for both parent and child.

## CAN PARENTS BE TAUGHT TO BE HIGHLY RESPONSIVE?

The answer to this question is a resounding “yes.” A number of training programs have been reported in the literature that either focus primarily on establishing a highly responsive parenting style or do this as a component of an overall early intervention approach that may also include other components. There is considerable evidence that these training programs can lead to enhanced parent responsivity in as few as eight 1-h training sessions [e.g. Girolametto, 1988; Wilcox and Shannon, 1998]. A meta-analysis by Bakermans-Kranenburg et al. [2003] of a relatively small number of maternal responsivity intervention studies primarily targeting social-emotional development and attachment security found generally positive effects. Studies intended to enhance maternal responsivity for high-risk children (e.g. premature, adopted, etc.) have reported positive evidence in terms of child cognitive and social skill development [e.g. Juffer et al., 1997]. Similarly a review by Yoder et al. [1998] indicated that although results vary in terms of strength of effect, the evidence overall supports the premise that maternal responsivity interventions with children with developmental delays and disorders can enhance these children's language, social, emotional, and cognitive development as well.

A widely disseminated approach that serves as an excellent example of “responsive parenting intervention” is the Hanen Program of Parents [Girolametto and Weitzman, 2006]. This approach is used in parent training throughout North America. Its major goals are to increase the child's social communication skills and language development by enhancing the quality of interaction between the parent and child. Parents are taught that interaction should usually be initiated and controlled by the child. They are explicitly taught to follow their child's attentional lead and respond contingently to the child's behavior in a manner that is congruent with the child's immediate interests. Methods of modeling, recasting, and expansions of the child's communication attempts are taught and of course strongly

encouraged while the use of directives such as imitation prompts and test questions, are discouraged because it is assumed that they will disrupt the flow of interaction and the child's attentional engagement [Harris et al., 1986]. Since 1986, the Hanen Program has offered workshops to train speech-language pathologists and more recently early intervention teachers so that they in turn can train parents.

Girolametto and his colleagues have conducted several investigations of the effects of the Hanen Parent Training Program [Girolametto and Weitzman, 2006]. This research has consistently demonstrated direct effects of this particular approach on various measures of communication and language development with young children with language delays including children with Down syndrome [Girolametto, 1988; Tannock et al., 1992; Girolametto et al., 1996]. The most substantial of effects in these studies have been on various measures of language *usage*, as opposed to measures of language *acquisition*. That is, it is clear that enhanced parent responsivity leads to more frequent communication and language use by young children with developmental delays, but it is not as clear that enhanced responsivity has a major impact on their acquisition of new language forms and functions. A limitation of all the studies by Girolametto and colleagues has been relatively small sample sizes that can make it difficult to discover real effects. Strength of these studies, however, is that each was a randomized controlled trial with strong internal validity [Yoder et al. 1998].

Another excellent example of a powerful responsive parenting intervention is the PALS program developed by Landry et al. [2006]. PALS stands for "playing and learning strategies." This home visiting program is designed to teach at-risk mothers of infants to engage in a highly responsive style that shares many similarities with the style taught by the Hanen Program. Its' goal is to establish a style that includes four different aspects of responsiveness supported by the literature (i.e. contingent responding, emotional-affective support, support for infant foci of attention, and language input match to developmental needs). The program is designed to be delivered in 10 weekly 90-min home visits. Landry et al. [2006] investigated the effects of this approach with mothers whose infants varied in terms of their early biological characteristics. The sample included 120 born-at-term infants and 144 very low-birth-weight (VLBW) infants. The families were randomized into a target group that received PALS or a developmental feedback comparison group. This study had very strong internal and external validity. All target versus comparison mothers showed greater increases across multiple responsiveness measures observed in four assessments conducted when infants were between 6 and 13 months of age. Increased maternal responsiveness facilitated significantly greater growth in target infants social, emotional, communication, and cognitive competence. There was evidence of a greater effect for VLBW infants on certain aspects of social and emotional skills, such as cooperation and negative affect Landry et al. [2006] posit that the results support a causal role for responsiveness on infant development. Furthermore, their results suggest that different aspects of responsiveness may bestow different effects on development.

Other intervention approaches have been developed that incorporate direct professional intervention with the child along with parent training designed to foster a highly responsive parenting style [McCauley and Fey, 2006]. For example, an approach titled "Responsivity

Education/Prelinguistic Milieu-Teaching” requires that practitioners work directly with a child for an hour a week to establish a repertoire of early communication skills and concurrently trains parents to be highly responsive using an approach that is very similar to the Hanen program [e.g. Yoder and Warren, 2002; Fey et al., 2006; Warren et al., 2006]. An underlying premise of this approach is that high parent responsivity is necessary but not sufficient to substantially enhance the communication development of young children with intellectual disabilities. It is assumed that the combination of the two approaches will result in the establishment of new skills in the child’s repertoire as a result of the direct professional intervention and that in turn the growth and generalization of these new skills will be insured by the contingent responsiveness and high rate of child centered engagement that are central components of a highly responsive parenting style.

## DIRECTIONS FOR FUTURE RESEARCH

Maternal responsivity has been the subject of a substantial amount of research over the past four decades. This work provides a strong foundation to pursue many important questions that remain. These questions include the following:

1. To what extent does maternal responsivity play a causal role in language, cognitive, social, and emotional development? Landry et al. [2006] provided perhaps the strongest indication to date for a causal contribution of responsivity, broadly defined, on aspects of infant development. Her design allowed her to examine the role of enhanced responsivity on both VLBW infants and full term infants and she found theoretically important results with both groups. However, despite a long history of theoretical support for a causal role, very few studies have been conducted in a way that that supports more than a correlational relationship.
2. There remains a clear need to determine how specific types of responsivity may benefit particular aspects of language, cognitive, social, or emotional development. For example, perhaps increases in specific contingent maternal responses directly facilitate early language or communication development, while enhanced maternal warmth has no specific impact on these behaviors. Furthermore, a clear picture of the specific effects of different forms of responsivity requires longitudinal research across different developmental periods. [e.g. Kochanska and Aksan, 2004].
3. Much of the research on responsivity has focused on its role and impact on infant development. In contrast, very little research has focused on the effects of early and/or continuing responsivity on middle or later childhood. While links between these periods are often inferred, in reality, empirical demonstrations have been few and far between. Expanded research on this issue would go a long way to determining just how much long-term influence responsivity may have and under what conditions.
4. Most of the research on mediators and moderators of responsivity has repeatedly focused on a small set of distal variables such as maternal education level, maternal depression, etc. Less is known about the effects of specific child

characteristics and especially the presence of developmental disorders. Child disorders are certainly known to impact maternal responsivity, but how early this begins, how extensive are the effects, etc. For especially problematic disorders such as autism, we still know relatively little about the impact of parent responsivity training with the exception of a handful of relatively small N intervention studies [e.g. Mahoney and Perales, 2005]. Particularly promising are gene-environment studies capable of revealing the biological mechanisms that may compromise the child's behavior [Rutter, 2006]. The complex nature of developmental disorders could lead eventually to interventions that combine pharmacological interventions, interventions that address parental behaviors (e.g. responsivity training), and interventions that address child behaviors (e.g., communication training).

## CONCLUSION

There remains a need for more internally valid treatment studies to examine potential causal relationships between responsivity and child development. Nevertheless, it is clear that maternal responsivity and child development are closely related and mutually influential. Theoretically important correlational relationships have been discovered and replicated for both typically developing children and children with developmental delays and disabilities. Maternal responsivity may be impacted by a wide range of variables capable of supporting or hampering optimal child development as well. Fortunately, it is also clear that parents, even those with challenging children, can be taught to be highly responsive in ways that may enhance their child's development.

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