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Caregiver Sensitivity, Contingent Social Responsiveness, and Secure Infant Attachment

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Abstract

Findings from two research syntheses of the relationship between caregiver sensitivity and secure infant attachment and one research synthesis of factors associated with increased caregiver use of a sensitive interactional style are presented. The main focus of analysis was the extent to which different measures of caregiver contingent social responsiveness were important determinants of attachment outcomes. Results showed that caregiver interactional behavior that included some aspect of explicit contingent responsiveness was the best predictor of secure infant attachment, and that behavioral interventions that specifically targeted changes in this type in interactional style were most effective in changing caregiver behavior. Implications for practice are described.

Key words: Secure infant attachment, caregiver sensitivity, contingent social responsiveness, interventions

A World Health Organization report (e.g., Richter, 2004) on the importance of caregiver-child relationships as a context for the growth and development of young children throughout the world noted that:

> Sensitive and responsive caregiving is a requirement for the healthy neurophysiological, physical and psychological development of a child. Sensitivity and responsiveness have been identified as key features of caregiving behavior related to later positive health and development outcomes in young children. (p. 1)

One of the developmental consequences of sensitive and responsive caregiving is secure infant/adult attachment (Bowlby, 1988). Secure attachment is generally understood to be an affectional bond between an infant and an adult caregiver[1] that has two elements: (1) the infant seeking out the attachment figure in times of distress and need and (2) the infant having the ability and confidence to engage in activities separate from the attachment figure (Ainsworth, 1989). The development of the attachment relationship is recognized as one of the most important aspects of human social and emotional development (e.g., Lamb, Ketterlinus, & Fracasso, 1992). This is the case, in part, because secure attachment has been found to be related to enhanced cognitive, social, and emotional development throughout childhood and early adolescence (Bukatko & Daehler, 2001; Fagot & Kavanagh, 1993; Hazen & Durrett, 1982; Matas, Arend, & Sroufe, 1978; Sroufe, Egeland, & Kreutzer, 1990).

Many theories as well as variations of theories have been posited for explaining the *sources* and *consequences* of secure infant attachment (see e.g., Cassidy & Shaver, 1999; Egeland & Erickson, 1993). John Bowlby (1969) is credited with the original formulation of attachment theory, and Mary Ainsworth (Ainsworth & Wittig, 1969) is credited with highlighting the importance of caregiver sensitivity as a determinant of secure attachment. Gewirtz and his colleagues proposed a behavioral, or operant learning analysis, perspective of secure infant attachment that considers caregiver sensitivity and responsiveness as

[1] The term caregiver rather than mother or parent is used to describe the adult attachment figure because in many cultures adult caregivers are not the child's biological parents (Richter, 2004).

having reinforcement properties and infants' responses to caregivers' behavior as having differential consequences on caregivers' reactions (e.g., Gewirtz, 1972a, 1991; Gewirtz & Boyd, 1977; Gewirtz & Peláez-Nogueras, 1991). According to Gewirtz, attachment is parsimoniously explained by the fact that child behavior is cued and reinforced by caregiver responses and may have either positive or negative effects on child behavior that in turn is directed toward the caregiver (e.g., type of attachment). In Gewirtz's (1991) own words, "the dyadic functional relations between the cue and reinforcing stimuli from the attachment figure/object person and the child's responses they control that connote attachment of the child to the attachment figure may occur in any segment of life from infancy onward" (p. 250).

The purposes of this article are to summarize findings from: (a) two practice-based research syntheses of the relationships between caregiver sensitivity and secure infant attachment (Kassow & Dunst, 2004, 2005) and (b) one practice-based research synthesis of interventions for strengthening caregiver sensitivity to child behavior (Dunst & Kassow, 2004). A practice-based research synthesis involves the review and integration of research evidence where the focus of investigation is the same or similar environmental (intervention) *characteristics* and how variations in the characteristics are related to variations in *consequences* of the different events or experiences. These kinds of research syntheses differ from more traditional research reviews and syntheses by disentangling and unpacking ***what matters most*** in terms of explaining the relationship(s) between different environmental experiences and their consequences (Dunst, 2007; Dunst, Trivette, & Cutspec, 2002). The particular research syntheses constituting the focus of this paper included attempts to isolate those features of caregiver sensitivity and responsiveness, and the characteristics of interventions fostering adoption of these caregiver behaviors, associated with secure infant attachment.

The Kassow and Dunst (2004) research synthesis included studies that specifically investigated the manner in which different aspects of caregiver contingent social responsiveness were associated with later secure infant attachment. Kassow and Dunst (2005) conducted a secondary synthesis of a meta-analysis conducted by DeWolf and van Ijzendoorn (1997) which focused on the relationship between different features of caregiver sensitivity and later secure infant attachment. Dunst and Kassow (2004) conducted a secondary synthesis of a meta-analysis conducted by Bakermans-Kranenburg (2003) which included studies of the effectiveness of interventions designed to promote increased caregiver sensitivity to children's behavior (see also Broberg, 2000). This paper includes additional analyses and findings from the Dunst and Kassow (2004) and Kassow and Dunst (2004, 2005) syntheses with a focus on the implications of the results for informing practices aimed at affecting child attachment patterns. More specifically, we were interested in ascertaining the relative importance of contingent social responsiveness as a determinant of secure infant attachment and identifying the kinds of interventions that were effective in increasing caregiver use of responsive interactional styles.

Caregiver Sensitivity and Responsiveness

Richter (2004) noted that the terms *sensitivity* and *responsiveness* are "fuzzy" constructs, and that their precise meanings have yet to be clearly articulated. van den Boom (1997) pointed out that sensitivity and responsiveness are sometimes defined as unitary constructs and sometimes defined as collections of related characteristics. The extent to which different measures of caregiver sensitivity and responsiveness were differentially related to secure attachment was the focus of analysis reported in this paper.

Kassow and Dunst (2005), in their secondary analysis of the relationship between sensitivity and attachment, examined the relationship between nine characteristics and features of sensitivity and infant attachment. Kassow and Dunst (2004), in a meta-analysis of the relationship between caregiver contingent responsiveness and secure attachment, examined three different types of contingent responsiveness. The definitions, to a large degree, are based on ones proposed by DeWolf and van Ijzendoorn (1997).

Table 1 shows the sensitivity and responsiveness constructs and definition of measures included in the Kassow and Dunst (2004, 2005) syntheses. In the context of our reanalysis of the data in these two syntheses, sensitivity was considered an umbrella term (van den Boom, 1997) and each characteristic, including caregiver contingent responsiveness, was considered a feature or element of sensitivity. The different measures of sensitivity have all been considered aspects of a caregiver interactional style that has been hypothesized to influence infant attachment patterns (e.g., Peck, 2003; Tracy & Ainsworth, 1981).

The 10 characteristics were grouped on an *a priori* basis into two categories that included either *explicit* or *implicit* features of contingent social responsiveness. The features were considered explicit if the measures included indices where caregiver responsiveness to child behavior was contingent on child behavior and the caregiver behavior presumably functioned as reinforcement. The features were considered implicit if caregiver behavior was intended to affect the child's behavior but it could not be inferred that it was contingent on the child's behavior.

Five of the 10 features of sensitivity included some explicit operationally defined aspect of caregiver contingent responsiveness: Caregiver/child synchrony, caregiver/child mutuality, response quality, caregiver responsiveness, and response contiguity. Both mutuality and synchrony involve reciprocal interactions between the caregiver and infant where the behavior of each interactive partner reinforces and maintains the behavior of the other partner (DeWolf & van Ijzendoorn, 1997). Response quality, often implicated as the most important aspect of sensitivity, involves caregiver contingent responsiveness where the amount, type, and pacing of caregiver behavior is appropriate and in proportion to the infant's behavior (Ainsworth et al., 1974). Both caregiver responsiveness and response contiguity are quantitative measures of sensitivity. Kassow and Dunst (2004) differentiated between the two measures in terms of whether or not it could be discerned that caregiver behavior was responsiveness to the child's behavior or occurred contiguously with the infant's behavior (Gewirtz & Peláez-Nogueras, 1992).

The five measures that implicitly assessed caregiver responsiveness were physical contact, cooperation, support, positive attitude, and stimulation. They are mostly qualitative features of caregiver interactional styles, and include efforts to communicate encouragement, help, and assistance when needed. Any one of the caregiver behaviors may or may not have been used in response to the infant's behavior, and therefore in all probability included both contingent and non-contingent caregiver responsiveness.

Antecedents of Secure Infant Attachment

The extent to which the 10 different sensitivity measures were differentially related to secure infant attachment are summarized in this section of the paper. Data reported in the Kassow and Dunst (2004, 2005) and DeWolf and van Ijzendoorn (1997) reports were further analyzed to ascertain the relative importance of contingent social responsiveness as determinants of infant attachment.

Procedure

Studies were identified by the authors of the primary research syntheses by searching different electronic databases (PsychInfo, ERIC, MEDLINE, SSCI, etc.) and by conducting hand searches of relevant journals and the reference lists of retrieved studies. DeWolf and van Ijzendoorn (1997) also searched conference proceedings and contacted noted attachment experts to identify additional studies.

Table 1
Caregiver Interactional Behavior Examined in Two Meta-Analyses[a] of the Relationship Between Caregiver Sensitivity and Secure Infant Attachment

Caregiver Sensitivity Behavior	Definition
Explicit Contingency Measures	
Caregiver/Child Synchrony	Synchrony is characterized by caregiver-child interactions that are reciprocal and rewarding to both the caregiver and child (Isabella, Belsky, & von Eye, 1989).
Caregiver/Child Mutuality	Mutuality is characterized by positive caregiver-infant interactions where both the caregiver and child are attending to the same thing simultaneously. Caregiver mutuality is also characterized by the caregiver's ability to modulate infant arousal and his or her responsiveness to infant behavior cues (Kiser, Bates, Maslin, & Bayles, 1986).
Response Quality	Caregiver response quality is characterized by the caregiver's ability to perceive infant signals accurately, interpret signals accurately, and respond to signals promptly and appropriately (Ainsworth, Bell, & Strayton, 1974; Ainsworth, Blehar, Waters, & Wall, 1978).
Responsiveness	Caregiver responsiveness is characterized by the caregiver's response to the infant's behavior where the response functions as a reinforcement maintaining or sustaining infant behavior directed toward the adult (Gewirtz, 1991).
Response Contiguity	Caregiver response contiguity is characterized by the caregiver's promptness and frequency or rate of response to the infant's signals (DeWolf & van Ijzendoorn, 1997).
Implicit Contingency Measures	
Physical Contact	Caregiver physical contact is characterized by the caregiver's quality and quantity of physical contact with the infant (DeWolf & van Ijzendoorn, 1997).
Cooperation	Caregiver cooperation is characterized by the caregiver's presence or absence of intrusive or interfering behaviors toward the infant whether the caregiver respects the infant's autonomy, if the caregiver avoids interrupting the infant's activities or demonstrates skill when interruption is necessary, and/or does not exert direct control over the infant (Ainsworth et al., 1974).
Support	Caregiver support is characterized by caregiver attentiveness and availability, supportiveness of the infant's efforts, providing a secure base for the infant, and being involved with the infant by attending to both the infant and the task at which both parties are engaged (Matas et al., 1978).
Positive Attitude	Caregiver positive attitude is characterized by the caregiver's expression of positive affect, warmth, empathy, and affection toward the infant (Zaslow, Rabinovich, Suwalsky, & Klein, 1988).
Stimulation	Caregiver stimulation is characterized by any caregiver action toward the infant (Miyake, Chen, & Campos, 1985). Stimulation typically includes caregiver encouragement, affective-stimulation, and stimulation/arousal of the infant.

[a] Kassow and Dunst (2004, 2005).

Studies were identified by DeWolf and Ijzendoorn (1997) using *attachment, childrearing practices, infant, mother, mothering, mother-child interactions, mother-child relations, parenting, responsiveness,* and *sensitivity* in different combinations to identify studies. Kassow and Dunst (2004) used *contingent, contingency, responsiveness, contingent responsiveness, contingent pacing, operant learning, expectancy,* and *responsive parenting* in combination with *attachment* to identify studies.

Seventy-five (75) studies were identified and included in either or both research syntheses. Studies were included if one or more of the characteristics listed in Table 1 were measured, infant attachment was subsequently assessed, and the effect sizes for relationship between the predictor and outcome measures were reported or could be calculated. The 75 studies included more than 4500 caregiver/child dyads.

Table 2 shows the number of sensitivity measures examined in the studies. One or more sensitivity measures were assessed in any one study (Range = 1 to 7). The number of studies that included any one sensitivity measure ranged from four (caregiver/child synchrony) to 36 (response quality).

The majority of studies assessed attachment security using the standard Strange Situation procedure (Ainsworth & Wittig, 1969) or a modified version of the procedure. All the studies in the Kassow and Dunst (2004) synthesis used the Strange Situation and all but five studies in the DeWolf and van Ijzendoorn (1997) synthesis used the Strange Situation for assessing infant attachment.

The metric used for determining the strength of the relationship between sensitivity and attachment was Cohen's *d* effect size. Procedures described by Dunst et al. (2004) were used to calculate the effect sizes and to convert correlation coefficients between the sensitivity measures and attachment outcomes to *d*s.

The average effect size for each sensitivity characteristic included in Table 1 was used as the measure of the strengths of the relationship between measures. The 95% confidence intervals for the average effect sizes were used as the measure of consistency of impact across studies; the smaller the confidence interval, the more consistent are the results across studies. A confidence interval not including zero indicates that the average effect size is statistically different from zero.

Table 2
Number of Studies Measuring the 10 Caregiver Sensitivity Characteristics

Sensitivity Characteristics	N	%	Sensitivity Characteristics	N	%
Response Quality	36	48	Cooperation	10	13
Response Contiguity	11	15	Physical Contact	10	13
Responsiveness	5	7	Support	24	32
Caregiver/Child Synchrony	6	8	Positive Attitude	21	28
Caregiver/Child Mutuality	4	5	Stimulation	9	12

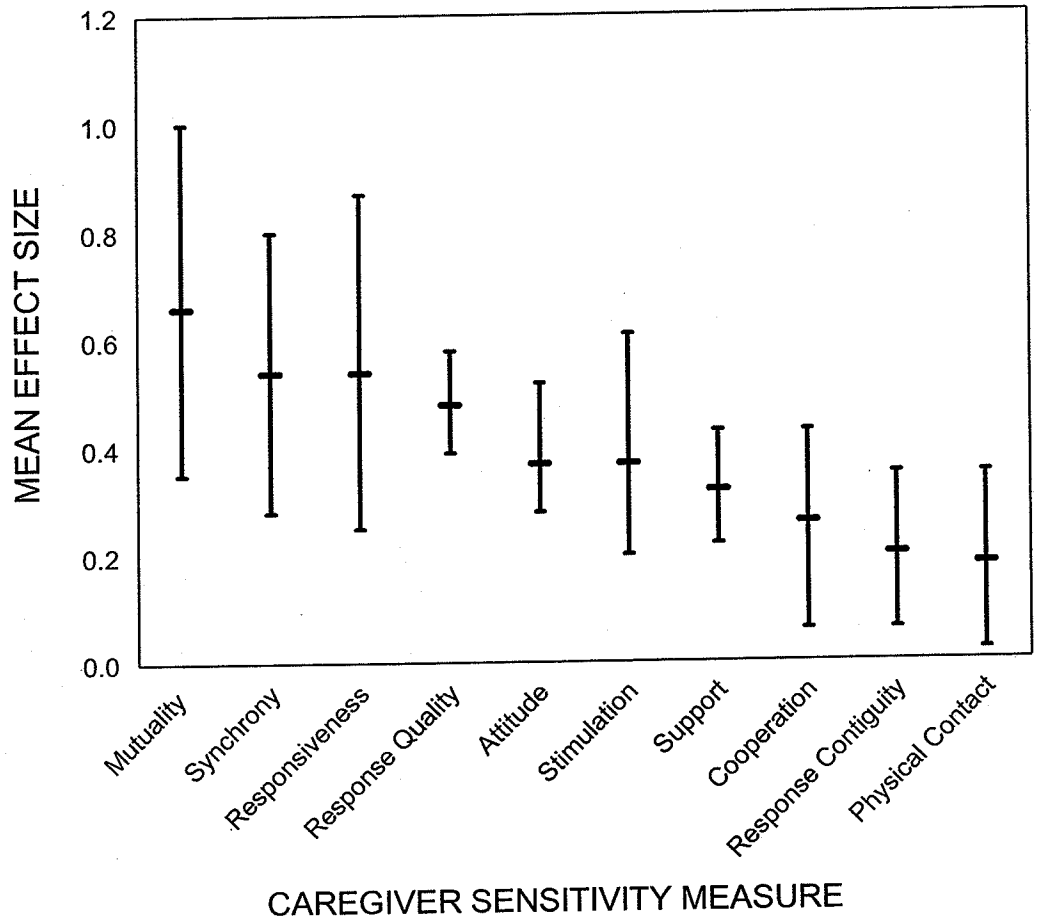

Figure 1. Mean Cohen's *d* effect sizes and 95% confidence intervals for the relationship between the 10 caregiver sensitivity measures and secure infant attachment.

Results

Figure 1 shows the relationships between the 10 sensitivity measures and secure infant attachment. Taken together, all the correlates of secure attachment were statistically significant as evidenced by the sizes of effects and the 95% confidence intervals not including zero. There were, however, certain sensitivity measures that proved more important determinants of secure infant attachment.

The average effect size for the five sensitivity measures including some explicit aspect of caregiver contingent responsiveness (mutuality, synchrony, responsiveness, response quality, and response contiguity) was $d = .46$ (95% CI = .31 to .62)[2]. In comparison, the average effect size for the five sensitivity measures including only implicit features of caregiver contingent responsiveness was $d = .31$ (95% CI = .19 to .46). These results highlight the relative importance of different aspects of caregiver contingent responsiveness as determinants of secure infant attachment.

[2] The average effect sizes and 95% confidence intervals were adjusted based on the study sample sizes so that studies with larger Ns contributed more to the combined effect sizes.

Among the five explicit measures of caregiver contingent responsiveness, the two measures including the assessment of reciprocal caregiver/infant responsiveness (mutuality and synchrony) showed the strongest relationship with secure infant attachment (d = .59, 95% CI = .31 to .89). Two of the three measures including some aspect of caregiver contingent social responsiveness (response quality and responsiveness) also showed a strong relationship with secure infant attachment (d = .49, 95% CI = .36 to .63).

Discussion

Findings showed that sensitivity measures that included some explicit aspect of caregiver contingent social responsiveness were most strongly related to secure infant attachment, and that this was especially the case for sensitivity measures that included reciprocal caregiver/child contingent responsiveness to each interactive partner's behavior. The results provide support for Gewirtz's (1961, 1972a, 1992) operant learning model of attachment with the caveat that the quality of contingent social responsiveness appears to heighten the reinforcing consequences of caregiver responsiveness to child behavior influencing attachment patterns. This qualifying statement is based on the fact that 3 of the 4 caregiver contingent social responsiveness measures most strongly related to secure infant attachment (mutuality, synchrony, response quality) all include some qualitative aspect of caregiver interactional behavior.

Both Richter (2004) and van den Boom (1997) noted that sensitivity and attachment are not unidirectional, but rather involve caregiver responsiveness to infant behavior and infant responsiveness to adult behavior in a manner that is mutually reinforcing. As noted by Emde and Easterbrooks (1985), " If the [caregiver/child] relationship is going well, there should be some indication of sustained pleasure and mutual interest, as well as a well-modulated range of emotional expressions [between the caregiver and child]" (p. 80). This type of well-modulated, reciprocal behavior is influenced, in part, by a sensitive and responsive caregiver interactional style. The extent to which, and conditions under which, this type of interactional style is influenced by interventions aimed at changing caregiver behavior is the focus of the next section of the paper.

Interventions Aimed at Changing Caregiver Sensitivity and Responsiveness

Dunst and Kassow (2004), in a secondary analyses of a research synthesis originally conducted by Bakermans-Kranenburg et al. (2003), attempted to *disentangle* and *unpack* the conditions under which different kinds of interventions were effective in increasing caregivers' use of sensitive and responsive interactional styles. The meta-analysis included studies investigating three different kinds of interventions or combinations of the three interventions. The interventions included: (1) behavior interventions aimed specifically at enhancing and promoting caregiver sensitivity (awareness, interpretation, responsiveness, etc.) to their children's behavior, (2) providing social support (advice, guidance, emotional assurance, etc.) aimed at strengthening caregivers' feelings of confidence and competence, and (3) changing caregivers' understanding and awareness of their roles influencing children's behavior (cognitive representation). The criteria for classifying an intervention as one of the three types was based on descriptions in Egeland et al. (2000).

Procedure

PsycLIT, Dissertation Abstracts International, and MEDLINE were the three electronic databases used by Bakermans-Kranenburg et al. (2003) to conduct their search. Hand searches of all identified studies and other relevant references were conducted to identify additional studies. The investigators also contacted noted experts to identify intervention studies that were missed by the above methods.

Relevant studies were identified using the key words *attachment*, *sensitivity*, *responsiveness*, and *intervention*, *preventative*, and *therapeutic* as search terms. The search terms *attachment and intervention**, *attachment and prevent**, *attachment and therapeut**, *sensitive** and *parent**, *mother**, or *father** with *intervention** or *prevent** or *therapeut** were also used as phrases or truncated terms for locating studies.

Eighty-one (81) studies including nearly 8000 caregiver/child dyads were included in the synthesis. Fifty one (51) of the studies were randomized design investigations and the other 30 studies (e.g., Ainsworth et al., 1974; Barnard et al., 1988; Erickson, Sroufe, & Egeland, 1985; Lieberman, Weston, & Pawl, 1991).were nonrandomized, comparative group investigations. The outcomes measured in each of the studies included either observational assessments or behavior ratings of some aspect of caregiver sensitivity

In addition to the three interventions constituting the focus of investigation, Bakermans-Kranenburg et al. (2003) also coded studies according to five variables: (a) child age at start of the intervention (prenatal, six months of age and younger, older than 6 months of age), (b) number of intervention sessions (less than 5 sessions, 5 to16 sessions, and more than 16 sessions), (c) intervention setting (child's home or out-of-home), (d) use of video feedback (yes or no), and (e) type of intervener (professional, nonprofessional, neither). Dunst and Kassow (2004) also examined the use of video-tape models of sensitive parental interactions as a factor influencing study outcomes. This was done because evidence indicates that modeling in general (Dunst, Vance, & Cooper, 1986), and video modeling more specifically (Gordon, 2000), is effective for demonstrating parental interactive styles that are difficult to describe orally or in writing.

Cohen's *d* effect sizes for the posttest differences between the intervention vs. nonintervention groups was used as the metric for ascertaining the factors associated with variations in study outcomes. The 95% confidence intervals for the average effect sizes was used to ascertain if the sizes of effect were statistically different than zero.

Results

The manner in which the different interventions and combinations of interventions were related to posttest differences between the experimental and control/comparison groups is shown in Figure 2. Behavioral interventions that focused specifically on enhancing parental sensitivity to their children's behavior were most effective. The focus of these interventions included parental *awareness* of their children's behavior, accurate *interpretation* of these behavior, and contingent social *responsiveness* to the children's behavior (Bakermans-Kranenburg et al., 2003; Egeland et al., 2000).

Neither support nor cognitive representation interventions were effective in increasing caregiver use of contingent social responsiveness as evidenced by confidence intervals including zero. Moreover, the use of either intervention strategy in combination with the sensitivity interventions had little or no value added benefits[3].

[3]The fact that the confidence interval for the cognitive representation interventions was large indicates that some interventions were effective and some interventions were not effective. This suggests that further analyses of these kinds of interventions are warranted and might isolate the conditions under which this intervention was differentially effective.

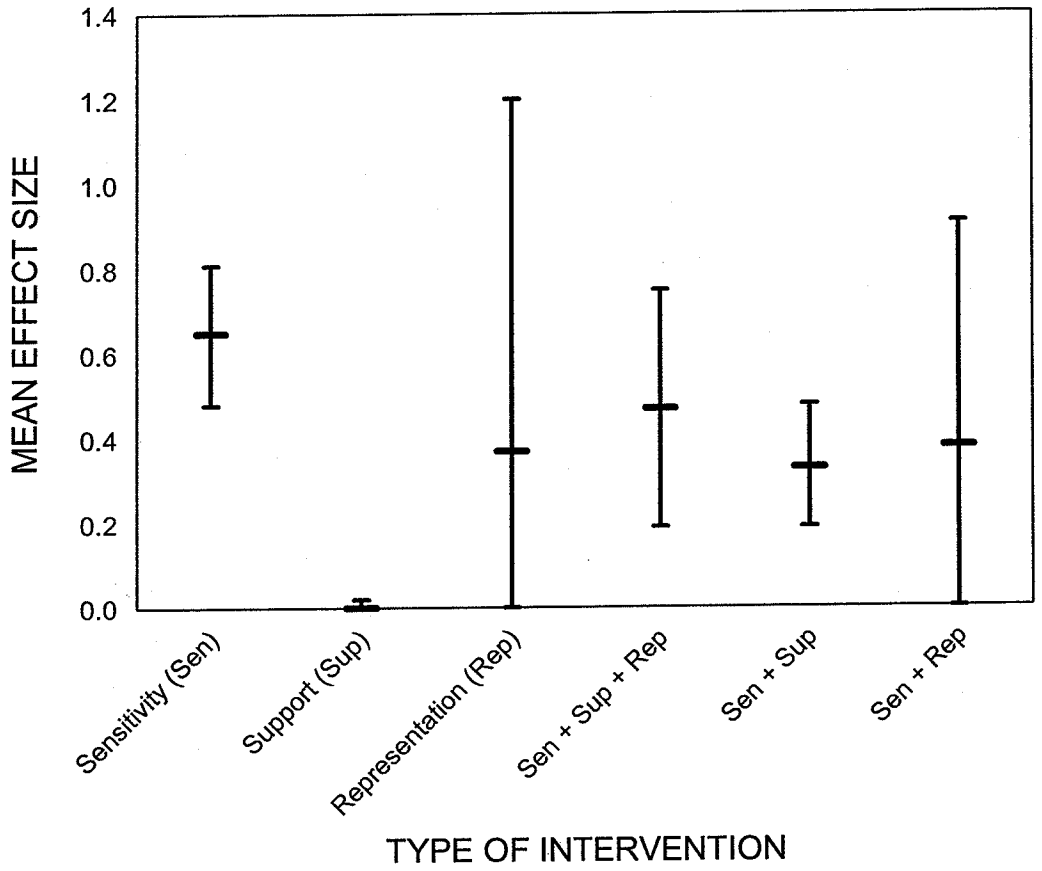

Figure 2. Mean Cohen's *d* effect sizes and 95% confidence intervals for the posttest intervention vs. control/comparison group differences on the caregiver sensitivity outcome measures.

Table 3 shows the characteristics of the interventions that were associated with differences in the study outcomes. The results indicated that interventions were most effective when they were implemented with children older than six months of age and included as few as five highly focused intervention sessions. The effectiveness of the interventions was enhanced considerably when video tapes were used either to illustrate sensitive caregiver/child interactional styles or to provide feedback to caregivers about their own interactional behavior.

Discussion

The results taken together indicate that explicit attempts to modify caregiver sensitivity to their children's behavior using behaviorally-based interventions that specifically targeted changes in caregiver contingent social responsiveness were most effective. The effectiveness of the interventions was heightened when video tapes were used to illustrate caregivers' use of this kind of interactional style. The three studies that used video tapes for this purpose, all employing behaviorally-based interventions (Black & Teti, 1997; Lambermon & van IJzendoorn, 1989; Scholz & Samuels, 1992), had effect sizes of .54, .58, and 1.60 respectively.

Table 3
Influence of Five Study Characteristics on Promoting the Increased Use of Caregiver Sensitivity to Child Behavior

Study Characteristics	Effect Sizes	
	Mean	CI (95%)
Intervention Sessions		
<5	.58	.30-.72
5-16	.44	.31-.58
>16	.38	.22-.54
Child Age		
Prenatal	.35	.19-.52
<6 Months	.35	.24-.47
>6 Months	.58	.35-.81
Video Feedback		
Yes	.74	.42-1.06
No	.36	.26-.46
Intervenor		
Professional	.44	.33-.56
Nonprofessional	.32	.10-.53
Intervention Setting		
Child's Home	.40	.27-.52
Out-of-Home	.52	.36-.68

The fact that the social support and cognitive representation interventions were not associated with positive study outcomes deserves comment for two reasons. First, the findings do not necessarily mean that the interventions were not effective but rather they had no *direct effect* on the study outcomes. Second, the extent to which the interventions had *indirect effects* would require the conduct of either or both mediated analyses (Shadish & Sweeney, 1991) or effects decomposition (Kline, 2005), neither of which were done in the primary or secondary meta-analyses. Results from one of our own meta-analyses, for example, indicate that the influence of social support on parent/child interaction is indirectly mediated by self-efficacy beliefs (Dunst, Trivette, & Hamby, 2006). This suggests that perhaps social support or cognitive representation interventions set the stage so to speak for caregivers to be more receptive to interventions aimed specifically at affecting changes in their interactional behavior.

General Discussion

Taken together, the results from the different sets of analyses described in this paper indicate that behaviorally-based interventions that promote caregiver/child reciprocal and mutually reinforcing interactions are most likely to contribute to improved caregiver/child relationships, including, but not limited to secure infant attachment (Chak, 2001; Eisenberg, Fabes, & Murphy, 1996; NICHD Early Child Care Research Network, 1999). More specifically, findings indicate that interventions that emphasize caregiver attunement to child behavior, interpretation of the behavior as some intent to affect environmental consequences, and caregiver contingent responsiveness that both reinforces child behavior and sets in motion reciprocal your turn/my turn interactions, are the conditions under which the interactions will optimally influence both caregiver and child competence and confidence. Broberg (2000) made similar observations about the kind of interventions that are most likely to be effective in changing caregiver interactional behavior.

The fact that providing caregivers (video-taped) examples of responsive interactional styles had value-added benefits in terms of affecting changes in caregiver behavior deserves comment because it is such a simple yet effective strategy for producing desired effects. Some years ago as part of an intervention study designed to increase teenage mothers' use of responsive interactional behavior with their children, we used a "work study" approach for affecting changes in their interactional styles by having the teenagers work with childcare providers and early childhood educators known to interact with young children in a positive, responsive manner. The teenagers were observed interacting with their own children separate from their work study assignments to assess their interactional behavior. Findings showed that the study participants increased their use of both responsive and elaborative interactional behavior and decreased their use of intrusive and directive interactional behavior (Cooper, Dunst, & Vance, 1990; Dunst et al., 1986).

At least one methodological consideration should be noted in terms of the findings from the studies of the determinants of secure infant attachment. The largest majority of antecedent studies (de Wolff & van IJzendoorn, 1997; Kassow & Dunst, 2004, 2005) measured caregiver sensitivity on a single occasion and related variations in sensitivity to later secure infant attachment. It is important to recognize that caregiver sensitivity measured under such conditions is a proxy measure for the ways in which caregivers typically interact with their children. In all probability, the influences of caregiver sensitivity on secure infant attachment as well as other developmental outcomes (e.g., Altman & Mills, 1990; Beckwith & Cohen, 1989; Eisenberg et al., 1996; Estrada, Arsenio, Hess, & Holloway, 1987) is most likely realized when a responsive interactional style is used consistently day in and day out across many caregiver/child interactive episodes (Egeland & Farber, 1984).

Implications for Practice

The use of caregiver contingent social responsiveness, and interventions designed to promote increased use of this interactional style, is indicated for any number of conditions, including, but not limited to, situations where infant behavior is difficult to read or interpret (e.g., Brisch et al., 2005; Cicchetti & Serafica, 1981; Gaensbauer & Harmon, 1982; Rutgers, Bakermans-Kranenburg, van IJzendoorn, & van Berckelaer-Onnes, 2004), situations where caregivers' behavior may not be attuned to child signals (e.g., Lounds, Borkowski, Whitman, Maxwell, & Weed, 2005; Martins & Gaffan, 2000; Nagata et al., 2000), situations where there are disruptions in caregiver/child interactions (e.g., Irons, Gilbert, Baldwin, Baccus, & Palmer, 2006; Nichols, Gergely, & Fonagy, 2001; Thompson, Flood, & Lundquist, 1995), and situations where children have identified disabilities that interfere with attachment patterns (e.g., Capps, Sigman, & Mundy, 1994; Cicchetti & Serafica, 1981; Stengel, 1981). Findings reported in this paper can inform efforts to change or improve caregiver/child interaction by using focused behavioral interventions by targeting increased use of mutually reinforcing child and caregiver behavior. The consequences of promoting adoption and use of caregiver contingent social responsiveness is likely to include a host of positive developmental consequences (e.g., Eisenberg et al., 2003; Keller, Lohaus, Volker, Elben, & Ball, 2003; Yoder & Warren, 1998).

Conclusion

The use of meta-analyses for isolating the factors most important in accounting for variations in outcomes of interest has special appeal. This is the case because results which replicate across many different studies make the findings especially robust. Making sense of the results from different studies is a labor intensive process but in the end, one is more likely to have stronger confidence in the patterns of relationships among the study variables. The process we used to pinpoint sources of variations in secure infant attachment, and to identify interventions having the highest probability of affect changes in caregiver behavior influencing attachment patterns, is an example of one such approach. The yield

hopefully is a better understanding of the ecology of secure infant attachment, and some, but certainly not all, the factors influencing attachment patterns.

References

Ainsworth, M. D. S. (1989). Attachments beyond infancy. *American Psychologist, 44*, 709-716.

Ainsworth, M. D. S., Bell, S. M., & Strayton, D. J. (1974). Infant-mother attachment and social development: "Socialization" as a product of recriprocal responsiveness to signals. In M. R. Richards (Ed.), *The integration of the child into a social world*. London: Cambridge University Press.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.

Ainsworth, M. D. S., & Wittig, D. (1969). Attachment and exploratory behavior of one-year-olds in a strange situation. In B. M. Foss (Ed.), *Determinants of infant behavior: Vol. 4* (pp. 111-136). London, UK: Metheun.

Altman, J. S., & Mills, B. C. (1990). Caregiver behaviours and adaptive behavior development of very young children in home care and daycare. *Early Child Development and Care, 62*, 87-96.

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin, 129*, 195-215.

Barnard, K. E., Magyary, D., Sumner, G., Booth, C. L., Mitchell, S. K., & Spieker, S. (1988). Prevention of parenting alterations for women with low social support. *Psychiatry: Journal for the Study of Interpersonal Processes, 51*, 248-253.

Beckwith, L., & Cohen, S. E. (1989). Maternal responsiveness with preterm infants and later competency. In M. H. Bornstein (Ed.), *New directions for child development: Vol. 43. Maternal responsiveness: Characteristics and consequences* (pp. 75-87). San Francisco: Jossey-Bass.

Black, M. M., & Teti, L. O. (1997). Promoting mealtime communication between adolescent mothers and their infants through videotape. *Pediatrics, 99*, 432-437.

Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.

Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*. New York: Basic Books.

Brisch, K. H., Bechinger, D., Betzler, S., Heinemann, H., Kachele, H., Pohlandt, F., Schmucker, G., & Buchheim, A. (2005). Attachment quality in very low-birthweight premature infants in relation to maternal attachment representations and neurological development. *Parenting: Science and Practice, 5*, 311-331.

Broberg, A. G. (2000). A review of interventions in the parent-child relationship informed by attachment theory. *Acta Paediatrica, 434*, 37-42.

Bukatko, D., & Daehler, M. W. (2001). *Child development: A thematic approach* (4th ed.). Boston: Houghton Mifflin.

Capps, L., Sigman, M., & Mundy, P. (1994). Attachment security in children with autism. *Development and Psychopathology, 6*, 249-261.

Cassidy, J., & Shaver, P. R. (Eds.). (1999). *Handbook of attachment: Theory, research and practical applications*. New York: Guilford Press.

Chak, A. (2001). Adult sensitivity to children's learning in the zone of proximal development. *Journal for the Theory of Social Behaviour, 31*, 383-395.

Cicchetti, D., & Serafica, F. C. (1981). Interplay among behavioral systems: Illustrations from the study of attachment, affiliation, and wariness in young children with Down's syndrome. *Developmental Psychology, 17*, 36-49.

Cooper, C. S., Dunst, C. J., & Vance, S. D. (1990). The effect of social support on adolescent mothers' styles of parent-child interaction as measured on three separate occasions. *Adolescence, 25*, 49-57.

de Wolff, M. S., & van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development, 68*, 571-591.

DeWolf, M. S., & van Ijzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Journal of Marriage and the Family, 68*, 571-591.

Dunst, C. J. (2007). Making sense of school readiness research for informing practice. *Early Childhood Services: An Interdisciplinary Journal of Effectiveness, 1*(1), 1-15.

Dunst, C. J., Hamby, D. W., & Trivette, C. M. (2004). Guidelines for calculating effect sizes for practice-based research syntheses. *Centerscope, 2*(2), 1-10. Available at http://www.researchtopractice.info/centerscopes/centerscope_vol2_no2.pdf.

Dunst, C. J., & Kassow, D. Z. (2004). Characteristics of interventions promoting parental sensitivity to child behavior. *Bridges, 2*(5), 1-17. Available at http://www.researchtopractice.info/bridges/bridges_vol2_no5.pdf.

Dunst, C. J., Trivette, C. M., & Cutspec, P. A. (2002). Toward an operational definition of evidence-based practices. *Centerscope, 1*(1), 1-10. Available at http://www.researchtopractice.info/centerscopes/centerscope_vol1_no1.pdf.

Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2006). *Family support program quality and parent, family and child benefits*. Asheville, NC: Winterberry Press.

Dunst, C. J., Vance, S. D., & Cooper, C. S. (1986). A social systems perspective of adolescent pregnancy: Determinants of parent and parent-child behavior. *Infant Mental Health Journal, 7*, 34-48.

Egeland, B., & Erickson, M. A. (1993). Attachment theory and findings: Implications for prevention and intervention. In H. Parens & S. Kramer (Eds.), *Prevention in mental health: Now, tomorrow, ever?* (pp. 21-50). Northvale, NJ: Aronson.

Egeland, B., & Farber, E. A. (1984). Infant-mother attachment: Factors related to its development and changes over time. *Child Development, 55*, 753-771.

Egeland, B., Weinfield, N. S., Bosquet, M., & Cheng, V. K. (2000). Remembering, repeating, and working through: Lessons from attachment-based interventions. In J. D. Osofsky & H. E. Fitzgerald (Eds.), *WAIMN handbook of infant mental health: Vol. 4. Infant mental health in groups at high risk* (pp. 36-89). New York: Wiley.

Eisenberg, N., Fabes, R. A., & Murphy, B. C. (1996). Parents reactions to children's negative emotions: Relations to children's social competence and comforting behavior. *Child Development, 67*, 2227-2247.

Eisenberg, N., Valiente, C., Morris, A. S., Fabes, R. A., Cumberland, A., Reiser, M., Gershoff, E. T., Shepard, S. A., & Losoya, S. (2003). Longitudinal relations among parental emotional expressivity, children's regulation, and quality of socioemotional functioning. *Developmental Psychology, 39*, 3-19.

Emde, R. N., & Easterbrooks, M. A. (1985). Assessing maternal emotional availability in early development. In W. K. Frankenburg, R. N. Emde, & J. W. Sullivan (Eds.), *Early identification of children at risk: An international perspective* (pp. 79-101). New York: Plenum Press.

Erickson, M. F., Sroufe, L. A., & Egeland, B. (1985). The relationship between quality of attachment and behavior problems in preschool in a high-risk sample. In I. Bretherton & B. Waters (Eds.), *Growing oints of attachment: Theory and research* (Monographs of the Society for Research in Child Development: Vol. 50, Nos. 1-2, Serial No. 209) (pp. 147-166). Chicago: University of Chicago Press.

Estrada, P., Arsenio, W. F., Hess, R. D., & Holloway, S. D. (1987). Affective quality of the mother-child relationship: Longitudinal consequences for children's school-relevant cognitive functioning. *Developmental Psychology, 23*, 210-215.

Fagot, B. I., & Kavanagh, K. (1993). Parenting during the second year: Effects of children's age, sex and attachment classification. *Child Development, 64*, 258-271.

Gaensbauer, T. J., & Harmon, R. J. (1982). Attachment behavior in abused/neglected and premature infants: Implications for the concept of attachment. In R. N. Emde & R. J. Harmon (Eds.), *The development of attachment and affiliative systems* (pp. 263-279). New York: Plenum Press.

Gewirtz, J. L. (1961). A learning analysis of the effects of normal stimulation, privation, and deprivation on the acquisition of social motivation and attachment. In B. M. Foss (Ed.), *Determinants of infant behaviour* (pp. 213-229). New York: Wiley.

Gewirtz, J. L. (1972a). Attachment, dependence, and a distinction in terms of stimulus control. In J. L. Gewirtz (Ed.), *Attachment and dependency* (pp. 139-177). Oxford, UK: Winston.

Gewirtz, J. L. (1991). Identification, attachment, and their developmental sequencing in a conditioning frame. In J. L. Gewirtz & W. M. Kurtines (Eds.), *Intersections with attachment* (pp. 247-255). Hillsdale, NJ: Erlbaum.

Gewirtz, J. L., & Boyd, E. F. (1977). Experiments on mother-infant interaction underlying mutual attachment acquisition: The infant conditions the mother. In T. Alloway, P. Pliner, & L. Krames (Eds.), *Attachment Behavior* (pp. 109-143). New York: Plenum Press.

Gewirtz, J. L., & Peláez-Nogueras, M. (1991). The attachment metaphor and the conditioning of infant separation protests. In J. L. Gewirtz & W. M. Kurtines (Eds.), *Intersections with attachment* (pp. 123-144). Hillsdale, NJ: Erlbaum.

Gewirtz, J. L., & Peláez-Nogueras, M. (1992). B. F. Skinner's legacy to human infant behavior and development. *American Psychologist, 47*, 1411-1422.

Gordon, D. A. (2000). Parent training via CD-ROM: Using technology to disseminate effective prevention practices. *Journal of Primary Prevention, 21*, 227-251.

Hazen, N. L., & Durrett, M. E. (1982). Relationship of security of attachment to exploration and cognitive mapping abilities in 2-year-olds. *Developmental Psychology, 18*, 751-759.

Irons, C., Gilbert, P., Baldwin, M. W., Baccus, J. R., & Palmer, M. (2006). Parental recall, attachment relating and self-attacking/self-reassurance: Their relationship with depression. *British Journal of Clinical Psychology, 45*, 297-308.

Isabella, R. A., Belsky, J., & von Eye, A. (1989). Origins of infant-mother attachment: An examination of interactional synchrony during the infant's first year. *Developmental Psychology, 25*, 12-21.

Kassow, D. Z., & Dunst, C. J. (2004). Relationship between parental contingent-responsiveness and attachment outcomes. *Bridges, 2*(4), 1-17. Available at http://www.researchtopractice.info/bridges/bridges_vol2_no4.pdf.

Kassow, D. Z., & Dunst, C. J. (2005). Characteristics of parental sensitivity related to secure infant attachment. *Bridges, 3*(2), 1-13. Available at http://www.researchtopractice.info/bridges/bridges_vol3_no2.pdf.

Keller, H., Lohaus, A., Volker, S., Elben, C., & Ball, J. (2003). Warmth and contingency and their relationship to maternal attitudes toward parenting. *Journal of Genetic Psychology, 164*, 275-292.

Kiser, L. J., Bates, J. E., Maslin, C. A., & Bayles, K. (1986). Mother-infant play at six months as a predictor of attachment security at thirteen months. *Journal of the American Academy of Child Psychiatry, 25*, 68-75.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.

Lamb, M. E., Ketterlinus, R. D., & Fracasso, M. P. (1992). Parent-child relationships. In M. Bornstein & M. E. Lamb (Eds.), *Developmental psychology: An advanced textbook* (3rd ed., pp. 465-518). Hillsdale, NJ: Erlbaum.

Lambermon, M. W. E., & van IJzendoorn, M. H. (1989). Influencing mother-infant interaction through videotaped or written instruction: Evaluation of a parent education program. *Early Childhood Research Quarterly, 4*, 449-458.

Lieberman, A. F., Weston, D. R., & Pawl, J. H. (1991). Preventive intervention and outcome with anxiously attached dyads. *Child Development, 62*, 199-209.

Lounds, J. J., Borkowski, J. G., Whitman, T. L., Maxwell, S. E., & Weed, K. (2005). Adolescent parenting and attachment during infancy and early childhood. *Parenting: Science and Practice, 5*, 91-118.

Martins, C., & Gaffan, E. A. (2000). Effects of early maternal depression on patterns of infant-mother attachment: A meta-analytic investigation. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 41*, 737-746.

Matas, L., Arend, R. A., & Sroufe, L. A. (1978). The relationship between quality of attachment and later competence. *Child Development, 49*, 547-556.

Miyake, K., Chen, S. J., & Campos, J. J. (1985). Infant temperament, mother's mode of interaction, and attachment in Japan: An interim report. In I. Bretherton & E. Waters (Eds.), *Growing points of attachment: Theory and research* (Monographs of the Society for Research in Child Development, Vol. 50 No. 1-2, Serial No. 209) (pp. 276-297). Chicago: University of Chicago Press.

Nagata, M., Nagai, Y., Sobajima, H., Ando, T., Nishide, Y., & Honjo, S. (2000). Maternity blues and attachment to children in mothers of full-term normal infants. *Acta Psychiatrica Scandinavica 101*, 209-217.

NICHD Early Child Care Research Network. (1999). Chronicity of maternal depressive symptoms, maternal sensitivity, and child functioning at 36 months. *Developmental Psychology, 35*, 1297-1310.

Nichols, K., Gergely, G., & Fonagy, P. (2001). Experimental procotols for investigating relationships among mother-infant interaction, affect regulation, physiological markers of stress responsiveness, and attachment. *Bulletin of the Menninger Clinic, 65*, 371-379.

Peck, S. D. (2003). Measuring sensitivity moment-by-moment: A microanalytic look at the transmission of attachment. *Attachment and Human Development, 5*, 38-63.

Richter, L. (2004). *The importance of caregiver-child interactions for the survival and healthy development of young children: A review*. Geneva, Switzerland: World Health Organization, Department of Child and Adolescent Health and Development.

Rutgers, A. H., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & van Berckelaer-Onnes, I. A. (2004). Autism and attachment: A meta-analytic review. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 45*, 1123-1134.

Scholz, K., & Samuels, C. A. (1992). Neonatal bathing and massage intervention with fathers: Behavioral effects 12 weeks after birth of the first baby. The Sunraysia Australia Intervention Project. *International Journal of Behavioral Development, 15*, 67-81.

Shadish, W. R., Jr., & Sweeney, R. B. (1991). Mediators and moderators in meta-analysis: There's a reason we don't let dodo birds tell us which psychotherapies should have prizes. *Journal of Continuing and Clinical Psychology, 59*, 883-893.

Sroufe, L. A., Egeland, B., & Kreutzer, T. (1990). The fate of early experience following developmental change: Longitudinal approaches to individual adaptation. *Child Development, 61*, 1363-1373.

Stengel, T. J. (1981). Developmental and nondevelopmental obstacles to blind infant-sighted mother attachment. *Physical and Occupational Therapy, 1*(4), 1-19.

Thompson, R. A., Flood, M. F., & Lundquist, L. (1995). Emotional regulation: It's relationship to attachment and developmental psychopathology. In D. Cicchetti & S. L. Toth (Eds.), *Rochester symposium on developmental psychopathology: Vol 6. Emotion, cognition, and representation.* Rochester, NY: University of Rochester Press.

Tracy, R. L., & Ainsworth, M. D. S. (1981). Maternal affectionate behavior and infant-mother attachment patterns. *Child Development, 52*, 1341-1343.

van den Boom, D. C. (1997). Sensitivity and attachment: Next steps for developmentalists. *Child Development, 64*, 592-594.

Yoder, P. J., & Warren, S. F. (1998). Maternal responsivity predicts the prelinguistic communication intervention that facilitates generalized intentional communication. *Journal of Speech, Language, and Hearing Research, 41*, 1207-1219.

Zaslow, M. J., Rabinovich, B. A., Suwalsky, J. T. D., & Klein, R. P. (1988). The role of social context in the prediction of secure and insecure/avoidant infant-mother attachment. *Journal of Applied Developmental Psychology, 9*, 287-299.

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