Bridges Practice-Based Research Syntheses
Research and Training Center on Early Childhood Development

Volume 3, Number 2 May 2005

Characteristics of Parental Sensitivity Related to Secure Infant Attachment

Danielle Z. Kassow, Ph.D., and Carl J. Dunst, Ph.D.

A meta-analysis of 66 studies (De Wolff & van IJzendoorn, 1997) including 4,176 parent/child dyads was re-examined using a characteristics/consequences framework (Dunst, Trivette, & Cutspec, 2002) for identifying the parental interactional behavior most associated with subsequent attachment security. Nine different characteristics of parental sensitivity were examined by De Wolff and van IJzendoorn (1997) to discern which interactional behaviors best predicted attachment security. Findings showed that parental behaviors that included: (a) parent/child turn-taking interactions that are rewarding for both partners and influential of both partners' responsive behavior toward one another and (b) supportive and reassuring efforts to let the infant know that the parent is available for guidance and assistance when needed, were most associated with attachment security. Implications for practice are described in terms of parental behaviors that can strengthen the parent/child relationship.

Purpose

The purpose of this practice-based research synthesis is to ascertain the extent to which different characteristics of parental sensitivity are associated with secure infant attachment. Sensitivity refers to a parent's "ability to respond appropriately and promptly to the signals of the infant" (De Wolff & van IJzendoorn, 1997, p. 584). According to De Wolff and van IJzendoorn (1997), sensitivity is a multidimensional construct that includes different behavioral elements or components that either independently or in combination function as antecedents of subsequent secure infant attachment. Parental sensitivity has been implicated as a primary factor contributing to variations in child attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Tarabulsy, Tessier, & Kappas, 1996).

The synthesis was conducted using a framework that focused on the degree to which different characteristics of parental behavior were associated with variations in secure child outcomes (Dunst et al., 2002). Sixty six (66) studies reviewed by De Wolff and van IJzendoorn (1997) were re-examined using this characteristics/consequences framework with a focus on identifying the characteristics of parental sensitivity that could be used by early childhood practitioners and other interventionists (e.g., parent educators) to support and strengthen parents' use of interactional styles that would positively influence child behavior and functioning. More specifically, we examined the influences of a number of environmental variables (Bronfenbrenner, 1992) that could be operationalized as practice elements for promoting parent adoption and use of interactive styles to enhance child competence.

Background

The influence of caregiver sensitivity as a determinant of secure attachment was first recognized by Bowlby (1969) in his seminal book *Attachment and Loss*. Ainsworth and her colleagues (Ainsworth, Bell, & Strayton, 1974; Ainsworth et al., 1978; Ainsworth & Wittig, 1969) subsequently conducted the first empirical studies of the relationship between sensitivity and secure infant attachment. Parental sensitivity has been defined as "maternal

Bridges is a publication of the Research and Training Center on Early Childhood Development, funded by the U. S. Department of Education, Office of Special Education Programs, Research to Practice Division (H324K010005). The opinions expressed in this paper are those of the Research and Training Center on Early Childhood Development, an organizational unit of the Center for Evidence-Based Practices at the Orelena Hawks Puckett Institute, and do not necessarily represent the views of the U. S. Department of Education.

behavior, where mothers accurately perceive infant needs and emotional states and act on them in warm, coherent, and predictable ways" (Tarabulsy et al., 1996, p. 36).

According to Egeland, Weinfield, Bosquest, and Cheng (2000), "if the mother (or primary caregiver) has been available, sensitive, and comforting when the infant makes bids for comfort, the infant will continue to seek out the mother [or caregiver] when distressed, and will be calmed by contact with the mother" (p. 41) leading or contributing to secure infant attachment. The adult's tendency to provide appropriate, contingent, and consistent responses to infant signals or bids for comfort are several of the defining characteristics of parental sensitivity (Lamb & Easterbrooks, 1981).

Although it has generally been acknowledged that sensitivity is a multidimensional behavioral construct (e.g., Ainsworth et al., 1978; Lamb & Easterbrooks, 1981; Tarabulsy et al., 1996), this parental interactional behavior more often than not has been assessed globally rather than in terms of operationally distinct elements (see De Wolff & van IJzendoorn, 1997; Rosen & Rothbaum, 1993). De Wolff and van IJzendoorn (1997) specifically examined the possibility that different aspects of parental sensitivity might be differentially related to infant attachment by examining nine behavioral elements or characteristics (domains in their terminology) of the sensitivity construct. The elements of sensitivity examined in their review were identified in a multidimensional scaling study conducted with 19 attachment researchers. Through a series of data reduction methods, they reduced an initial list of 40 behavioral constructs to the nine characteristics of parental sensitivity (see Table 1). These nine characteristics were used in their meta-analysis to discern the magnitude of the relationship between the presence of these interactional behaviors and differences in attachment security.

Description of the Practice

In the context of our characteristics/consequences framework (Dunst et al., 2002) and a behavioral science perspective of human development (Bronfenbrenner, 1992), parental sensitivity manifested during parent/child interactions is conceptualized as an environmental (intervention) factor contributing to variations in behavioral and developmental outcomes. Accordingly, parental warmth, positive parental affect, and parental attention and prompt responsiveness to infant cues, etc. would be expected to be related to and influence child behavior (Ainsworth et al., 1978; Isabella, Belsky, & von Eye, 1989).

The nine characteristics examined by De Wolff and van IJzendoorn (1997) included: (1) parental ability to perceive and respond to infant signals (parental response quality) (Ainsworth et al., 1974; Ainsworth et al., 1978), (2) parental frequency of response to infant signals (parental response contiguity) (De Wolff & van IJzendoorn, 1997), (3) quality and quantity of parental physical contact with the infant (parental physical contact) (De Wolff & van IJzendoorn, 1997), (4) the presence or absence of intrusive parental behavior (parental cooperation) (Ainsworth et al., 1974), (5) parent/child interactions that are reciprocal and rewarding (parent/child synchrony) (Isabella et al., 1989), (6) positive parent-infant interactions where both partners are attentive to one another (parent/child mutuality) (Kiser, Bates, Maslin, & Bayles, 1986), (7) parental availability to her child (parental support) (Matas, Arend, & Sroufe, 1978), (8) parental demonstration of positive affect toward the infant (parental positive attitude) (Zaslow, Rabinovich, Suwalsky, & Klein, 1988), and (9) parental use of stimulation with her infant (parental stimulation) (Miyake, Chen, & Campos, 1985). In their meta-analysis, De Wolff and van IJzendoorn (1997) coded each of the nine parental sensitivity characteristics based on the focus of investigation in each individual study. Detailed descriptions of each of the parental sensitivity characteristics are included in Table 1.

Additional characteristics that could moderate the relationship between parental sensitivity and infant attachment security were also coded by De Wolff and van IJzendoorn (1997). These variables included: the procedure for measuring parental behavior during parent/child interactions, length of parent/child observation in minutes, location of the parent/child observations, age of the child at the time of the parent/child observation and attachment assessment, the procedure utilized for assessing attachment, the time interval in months between parent/child interaction observation and attachment assessment, whether the children had clinical or nonclinical symptomatology, and family socioeconomic status. The extent to which the relationship between parental sensitivity and secure attachment was influenced by these other factors is important because they can inform the implications for practice.

Search Strategy

Search Terms

De Wolff and van IJzendoorn (1997) identified relevant studies using the keywords attachment, childrearing practices, infant, mother, mothering, mother-child interactions, mother-child relations, parent-child relations, parenting, responsiveness, and sensitivity as search terms. In addition to the specific search terms, they also used combinations of the keywords to identify relevant studies.

Sources

To locate studies for inclusion in the meta-analysis, computerized searches were conducted by De Wolff and van IJzendoorn (1997) using the Psychological Abstracts,

Educational Resources Information Center (ERIC), Social Sciences Citation Index (SSCI), and World Catalog of the On-Line Contents Library Center databases. Manual searches of reference lists from existing reviews were conducted (Goldsmith & Alansky, 1987; Lamb, Gaensbauer, Malkin, & Schutz, 1985; Lambermon, 1991), as were searches of reference lists of reviewed articles. Unpublished research was located through a manual search of Dissertation Abstracts International. Several volumes of conference abstracts were also searched (International Conference on Infant Studies, Society for Research in Child Development) to locate relevant studies. The investigators also contacted two noted experts (M. Main and J. Belsky) to identify additional studies.

Selection Criteria

Studies were included in the De Wolff and van IJzendoorn (1997) meta-analysis if: (1) the study included a measure of the mother's behavior toward her infant, (2) the study assessed infant's attachment security, (3) the association between maternal behavior and infant attachment was reported in a way that effect sizes could be calculated, and (4) maternal behavior occurred naturally and was not experimentally manipulated.

Exclusion criteria. Studies were excluded if: (1) the Mother Attachment Q-Sort was utilized to assess attachment security because another meta-analysis (van IJzendoorn, Vereijken, & Riksen-Walraven, in press) found that the Mother Attachment Q-Sort had a poor convergent and discriminant validity, (2) the relationship between maternal behavior and infant attachment was not reported or could be computed, (3) maternal behavior was experimentally influenced, or (4) separate data for non-treated control groups was not reported for intervention studies.

Search Results

De Wolff and van IJzendoorn (1997) located 66 studies that met their selection criteria. This included 54 published articles and 12 unpublished conference presentations or dissertations.

Participants

The 66 studies included 4,176 mother-infant pairs. The study samples included parents from lower- and middle-class socioeconomic backgrounds (nonspecified), children less than and older than one year of age (nonspecified), both primipara and multipara mothers (nonspecified), and parent/child dyads with clinical and nonclinical symptomatology (nonspecified).

Maternal Behavioral Characteristics

Table 2 lists the studies included in the meta-analysis and the parental sensitivity characteristics included or measured in each study. Parental response quality was measured in 31 studies, parental support was assessed in 24 studies, parental attitude was measured in 21 studies, response contiguity was measured in 14 studies, and the other parental behaviors were each assessed in 10 or fewer studies.

Attachment Security

The majority of studies assessed attachment security using the Strange Situation procedure (Ainsworth & Wittig, 1969). Four studies utilized shortened versions of the Strange Situation procedure (Bohlin, Hagekull, Germer, Andersson, & Lindberg, 1989; Capps, Sigman, & Mundy, 1994; Lewis & Feiring, 1989; Persson-Blennow, Binett, & McNeil, 1988) and five studies utilized alternative assessments of attachment (Altman, Monk, Jones, & Sosa, 1993; Goodman, Andrews, Jones, Weissman, & Weissman, 1993; Kerns & Barth, 1995; Pederson & Moran, 1996; Pederson et al., 1990).

Secure attachment was the outcome of focus in the meta-analysis (using either a secure-insecure dichotomous grouping measure or ratings of the degree to which infants were securely attached). De Wolff and van IJzendoorn (1997) did not include the traditional split between insecure attachment classifications (i.e., avoidant, resistant, and disorganized) because not all of the studies included in the meta-analysis reported the difference between the insecure classifications.

Synthesis Findings

De Wolff and van IJzendoorn (1997) computed separate effect sizes for the relationship between each of the nine maternal behavioral characteristics and infant attachment using correlation coefficients as the size of effect for the association between variables. Effect sizes were also computed for the associations between the moderating variables, parental sensitivity measures, and infant attachment. For purposes of discerning the relative importance of each sensitivity characteristic as a determinant of secure attachment, we converted the correlation coefficient to Cohen's *d* effect sizes (Dunst, Hamby, & Trivette, 2004) to ascertain the magnitude of influence of each measure and used confidence intervals reported by De Wolff and van IJzendoorn (1997) to display the overlap (or nonoverlap) in the relationship of each variable to secure attachment.

Practice Characteristics

Table 3 summarizes the findings for the nine sensitivity measures examined by De Wolff and van IJzendoorn (1997). The findings are arranged in descending order from the sensitivity characteristics most associated (mutuality) to least associated (physical contact) with secure attachment. Figure 1 shows the same data displayed

graphically. Inasmuch as the parental sensitivity measures are not mutually exclusive, the findings are best interpreted in terms of *patterns of relationships* with secure attachment. Two major patterns of findings are evident in the results.

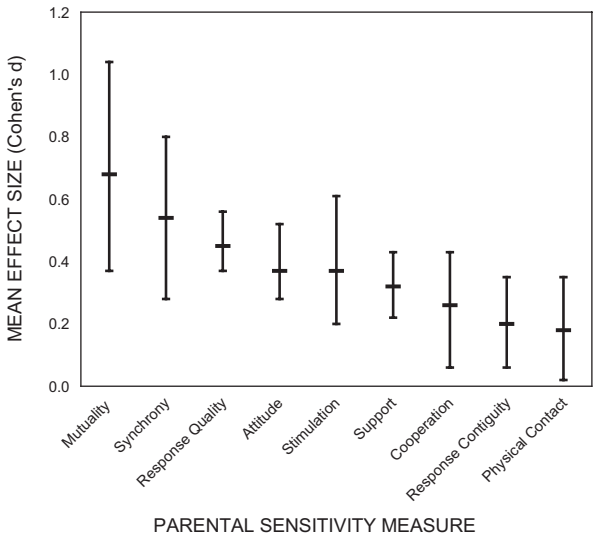

Figure 1. Mean effect sizes and 95% confidence intervals for the relationship between the nine sensitivity measures and secure infant attachment

Three parental behaviors (mutuality, synchrony, and response quality) proved to be particularly important determinants of secure attachment. All three behaviors involve parent/child *reciprocity* and reflect the mutually rewarding and reinforcing consequences of the bidirectional influences of parent behavior on child responsiveness and the influence of child behavior on parent responsiveness.

A second cluster of parental behavior (attitude, stimulation, and support) was also associated with secure attachment. Taken together, these three behavior characteristics are ones that parents use to initiate and sustain parent/child interactions and that provide infants the necessary assistance, guidance, and reassurance that the parent is available when needed.

Moderating Variable Influences

The particular moderating variables that were associated with the different parental behaviors are shown in Table 3. With the exception of response quality, few moderating variables were significantly related to the parental sensitivity measures. This indicates that the relationships between the parental sensitivity measures and secure attachment were minimally influenced by most moderating variables.

In instances where the moderating variables were associated with parental sensitivity, the findings were not unexpected. For example, research has consistently found that higher SES background parents display more positive interactions (response quality) with their children compared to lower SES background parents (Barnes, Gutfreund, Satterly, & Wells, 1983; Ramey, Farran, & Campbell, 1979; Tulkin & Cohler, 1973).

Rival Explanations

Several threats to the internal and external validity (Cook & Campbell, 1979) of the studies in this review may be present and explain the results. *Instrumentation* may be a threat to the independent variables due to possible unanticipated bias in scoring and rating parent behaviors by the observers during the parent/child interactions. The observers may have assigned favorable ratings to parents because they expected to see certain characteristics of sensitivity in parental behavior as a result of repeated parent/child interactions. However, it is not known to what extent *instrumentation* may be operating because the authors did not provide complete information regarding parent/child interaction assessments.

History is often a threat in the studies conducted over an extended period of time, allowing opportunities for other events to occur and possibly account for the reported relationships. Although De Wolff and van IJzendoorn (1997) noted that events other than the parental sensitivity were not related to observed or reported findings, they did not include sufficient information to rule out history as an explanatory factor. Findings from other research syntheses include mixed results (Atkinson et al., 2000; Kassow & Dunst, 2004). It is difficult to discern then if *history* is operating as a potential threat in the current synthesis.

The extent to which the findings may be generalized may confound the external validity of the results. De Wolff and van IJzendoorn (1997) noted, for example, that results may be less valid and may not be *generalizable* in lower socioeconomic and clinical samples because the measures of maternal behavior and attachment security were developed and validated with non-clinical and middle class samples (De Wolff & van IJzendoorn, 1997). Therefore the results of the meta-analysis may not be generalizable to populations that were not included in the meta-analysis.

Conclusions

Findings from this practice-based synthesis indicate that several clusters of parental behaviors emerged as important antecedents of secure infant attachment. More specifically, parent/child interactional behavior that was mutually rewarding and reinforcing and that encouraged bidirectional "your turn/my turn" interactions between a parent and child, proved an especially important determinant of secure attachment. Parental behavior that was supportive, encouraging, and reassuring was found to contribute to secure attachment as well. What the results

do not convey is the fact that it is the ongoing and accumulating influences of parental sensitivity that contribute to strong parent/child relationships. This point needs to be kept in mind when using the findings for informing practice. A nontechnical, reader-friendly summary of these findings is described in a *Bottomlines* (Vol. 3, Number 2) written specifically for parents and practitioners.

Implications for Practice

Our reanalysis of the De Wolff and van IJzendoorn (1997) meta-analysis indicate that three practice characteristics can be used to strengthen the parent/child relationship. The first is behavior characterized by parent/child turn-taking interactions that places primary emphasis on each partner interacting in a synchronous and mutually reinforcing manner. This might include parent/child interactional games or transactions that involve turn-taking where each partner plays a role that encourages one another in ways that are engaging and reinforcing. Interactions between parents and infants that involve turn-taking are highly likely to be rewarding for both the parent and infant.

The second is parental behavior that encourages and supports displays of child competence. This might include parental assistance during turn-taking interactions, being supportive and encouraging of the infant's efforts to interact or explore, providing a secure base to help the infant feel safe and comfortable when meeting new people or in new environments, and providing reassurance when the infant makes bids for support by picking up the child or giving him or her a reassuring nod and smile. Parental responses that include supportive and attentive efforts reinforce for the child that the parent is reliable and available to his or her bids for support and reassurance.

The third is behavior characterized by parental displays of affection and warmth that are reinforcing to the child and that function to maintain child interactive behavior, for instance, during turn-taking games. This might include smiling, vocalizing such as singing, and cuddling infants. Parental responses that include warmth and affection signal to the infant that the parent (or other caregiver) is enjoying their interaction with the infant, therefore encouraging the infant to seek out the parent to fulfill their needs.

Finally, to be maximally beneficial and effective, the above three practices must be infused into parent/child interactions as much as possible throughout the day and across the infancy and toddler periods of development. In instances where a majority of interactive episodes are characterized by the practices, the likelihood of a strong parent/child relationship being realized are increased immensely.

Our next step in bridging the research-to-practice gap is to use the results of this synthesis to develop practice guides that translate and operationalize the above three "implications for practice." This will be accomplished using a number of written and multimedia materials for making the practice characteristics as specific as possible so that practitioners and parents can use the practices to positively influence child behavior and development. More specifically, we plan to prepare a videotape illustrating the characteristics of a sensitive interactive style that can be used by practitioners and parents to better understand those aspects of sensitivity that are most likely to optimize child benefits. Additionally, we plan to prepare a number of practice guides that provide written examples of how a sensitive interactional style can be adopted to positively affect child behavioral and developmental benefits. These materials will become part of a tool kit that includes different methods and procedures that can be used to strengthen parent/child relationships.

References

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, England: Metheun.

Altman, S., Monk, C., Jones, P., & Sosa, L. (1993, March). *Children's working models of attachment at 42 months and maternal attitudes and behavior*. Poster session presented at the biennial meeting of the Society for Research in Child Development, New Orleans, LA.

Anisfeld, E., Casper, V., Nozyee, M., & Cunningham, N. (1990). Does infant carrying promote attachment? An experimental study of the effects of increased physical contact on the development of attachment. *Child Development, 61*, 1617-1627.

Antonucci, T. C., & Levitt, M. J. (1984). Early prediction of attachment security: A multivariate approach. *Infant Behavior and Development, 7*, 1-18.

Atkinson, L., Niccols, A., Paglia, A., Coolbear, J., Parker, K. C. H., Poulton, L., Guger, S., & Siteraneos, G. (2000). A meta-analysis of time between maternal sensitivity and attachment assessments: Implications for internal working models in infancy/toddlerhood.

Journal of Social and Personal Relationships, 17, 791-810.

Barnes, S., Gutfreund, M., Satterly, D., & Wells, G. (1983). Characteristics of adult speech which predict children's language development. *Journal of Child Language, 10*, 65-84.

Bates, J. E., Maslin, C. A., & Frankel, K. A. (1985). Attachment security, mother-child interaction, and temperament as predictors of behavior-problem ratings at the age of three years. In I. Bretherton & E. Waters (Eds.), *Monographs of the Society for Research in Child Development: Vol. 50, Nos. 1-2. Growing points of attachment: Theory and research* (pp. 167-193, Serial No. 209). Chicago: University of Chicago Press.

Belsky, J., Rovine, M., & Taylor, D. G. (1984). The Pennsylvania Infant and Family Development Project, III: The origins of individual differences in infant-mother attachment: Maternal and infant contributions. *Child Development, 55*, 718-728.

Benn, R. K. (1986). Factors promoting secure attachment relationships between employed mothers and their sons. *Child Development, 57*, 1224-1231.

Bohlin, G., Hagekull, B., Germer, M., Andersson, K., & Lindberg, L. (1989). Avoidant and resistant reunion behaviors as predicted by maternal interactive behavior and infant temperament. *Infant Behavior and Development, 12*, 105-117.

Booth, C. L., Rose-Krasnor, L., & Rubin, K. H. (1991). Relating preschoolers' social competence and their mothers' parenting behaviors to early attachment security and high-risk status. *Journal of Social and Personal Relationships, 8*, 363-382.

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

Bretherton, I., Biringen, Z., Ridgway, D., Maslin, C., & Sherman, M. (1989). Attachment: The parental perspective. *Infant Mental Health Journal, 10*, 203-221.

Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), *Six theories of child development: Revised formulations and current issues* (pp. 187-248). Philadelphia: Jessica Kingsley.

Burchinal, M. R., Bryant, D. M., Lee, M. W., & Ramey, C. T. (1992). Early day-care, infant-mother attachment, and maternal responsiveness in the infant's first year. *Early Childhood Research Quarterly, 7*, 383-396.

Butcher, P. R., Kalverboer, A. F., Minderaa, R. B., Van Doormaal, E. F., & Tenwolde, Y. (1993). Rigidity, sensitivity and quality of attachment. *Acta Psychiatrica Scandinavica, 88*(Suppl. 374), 4-38.

Camfield, E., Brownell, C., Taylor, P., Day, N., Brown, E., & Kratzer, L. (1991, April). *Mediators of relations between maternal behavior at 4-months and infant attachment at 12-months*. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Seattle, WA.

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

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Boston: Houghton Mifflin Company.

Cox, M. J., Owen, M. T., Henderson, V. K., & Margand, N. A. (1992). Prediction of infant-father and infant-mother attachment. *Developmental Psychology, 28*, 474-483.

Crockenberg, S. B. (1981). Infant irritability, mother responsiveness, and social support influences on the security of infant-mother attachment. *Child Development, 52*, 857-865.

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.

Del Carmen, R., Pedersen, F. A., Huffman, L. C., & Bryan, Y. E. (1993). Dyadic distress management predicts subsequent security of attachment. *Infant Behavior and Development, 16*, 131-147.

Dunst, C. J., Hamby, D. W., & Trivette, C. M. (2004). Guidelines for calculating effect sizes for practice-based research syntheses. *Centerscope, 3*(1), 1-10. Available at: http://www.evidencebasedpractices.org/centerscope/centerscopevol3no1.pdf.

Dunst, C. J., Trivette, C. M., & Cutspec, P. A. (2002). An evidence-based approach to documenting the characteristics and consequences of early intervention practices. *Centerscope, 1*(2), 1-6. Available at: http://www.evidencebasedpractices.org/centerscope/centerscopevol1no2.pdf.

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* (pp. 36-89). New York: Wiley.

Fagot, B. I., & Kavanagh, K. (1990). The prediction of antisocial behavior from avoidant attachment classifications. *Child Development, 61*, 864-973.

Fracasso, M. P., Busch-Rossnagel, N. A., & Fisher, C. G. (1994). The relationship of maternal behavior and acculturation to the quality of attachment in Hispanic infants living in New York city. *Hispanic Journal*

of Behavioral Sciences, 16, 143-154.

Frankel, A., & Bates, J. E. (1990). Mother-toddler problem solving: Antecedents in attachment, home behavior, and temperament. *Child Development, 61*, 810-819.

Frodi, A., Grolnick, W., & Bridges, L. (1985). Maternal correlates of stability and change in infant-mother attachment. *Infant Mental Health Journal, 6*, 60-67.

Goldberg, S., Perotta, M., Minde, K., & Corter, C. (1986). Maternal behavior and attachment in low-birth-weight twins and singletons. *Child Development, 57*, 34-46.

Goldsmith, H. H., & Alansky, J. A. (1987). Maternal and infant temperamental predictors of attachment: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 55*, 805-816.

Goodman, G., Andrews, T., Jones, S., Weissman, J., & Weissman, A. (1993). *Maternal play behavior and children's representations as mediator of developmental outcomes among high-risk dyads*. Manuscript in preparation.

Goossens, F. A. (1987). Kwaliteit van de hechtingsrelatie van jonge kinderen aan hun moeder, vader en creche-leidster [Quality of infants' attachment to father, mother, and caregiver in daycare]. *Nederlands Tijdschrift voor de Psychologie, 42*, 308-320.

Grossmann, K., Grossmann, K. E., Spangler, G., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborns' orientation responses as related to quality of attachment in northern Germany. In I. Bretherton & E. Waters (Eds.), *Monographs of the Society for Research in Child Development: Vol. 50, Nos. 1-2. Growing Points of Attachment Theory and Research.* (Serial No. 209, pp. 233-256). Chicago: The University of Chicago Press.

Gunnar, M. R., Brodersen, L., Nachmias, M., Buss, K., & Rigatuso, J. (1996). Stress reactivity and attachment security. *Developmental Psychobiology, 29*, 191-204.

Hoeksma, J. B., & Koomen, M. M. Y. (1991). *Development of early mother-child interactions and attachments*. (Unpublished doctoral dissertation, Free University of Amsterdam, The Netherlands).

Isabella, R. A. (1993). Origins of attachment: Maternal interactive behavior across the first year. *Child Development, 64*, 605-621.

Isabella, R. A., & Belsky, J. (1991). Interactional synchrony and the origins of infant-mother attachment: A replication study. *Child Development, 62*, 373-384.

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.

Izard, C. E., Heynes, O. M., Chisholm, G., & Baak, K. (1991). Emotional determinants of infant-mother attachment. *Child Development, 62*, 906-917.

Juffer, F. (1993). *Verbonden door adoptie: Een experimenteel onderzoek bij gezinnen met een adoptiebaby. [Attached through adoption: An experimental study on attachment and competence in families with an adopted baby.]*. Amersfoort, The Netherlands: Academische Uitgeverij.

Kassow, D. Z., & Dunst, C. J. (2004). Relationship between parent contingent-responsiveness and attachment outcomes. *Bridges, 2*(6), 1-17.

Kerns, K. A., & Barth, J. M. (1995). Attachment and play: Convergence across components of parent-child relationships and their relations to peer competence. *Journal of Social and Personal Relationships, 12*, 243-260.

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.

Krentz, M. S. (1982). *Qualitative differences between mother-child and caregiver-child attachment of infant in family day care*. Unpublished doctoral dissertation, California School of Professional Psychology.

Kveton, E. M. (1989). The quality of infant-parent attachment at 17 months as related to the quality of parent-infant interaction and prenatal parenting attitudes (Doctoral dissertation, Virginia Consortium for Professional Psychology, 1989). *Dissertation Abstracts International, 50*, 5884B.

Lamb, M. E., & Easterbrooks, M. A. (1981). Individual differences in parental sensitivity: Origins, components, and consequences. In M. E. Lamb & L. R. Sherrod (Eds.), *Infant social cognition: Empirical and theoretical considerations* (pp. 127-153). Hillsdale, NJ: Erlbaum.

Lamb, M. E., Gaensbauer, T. J., Malkin, C. M., & Schutz, L. A. (1985). The effects of child maltreatment on security of infant-adult attachment. *Infant Behavior and Development, 8*, 35-45.

Lamb, M. E., Hopps, K., & Elster, A. B. (1987). Strange situation behavior of infants with adolescent mothers. *Infant Behavior and Development, 10*, 39-48.

Lambermon, M. W. E. (1991). *Video of folder? Korte-en lange-termijneffecten van voorlichting over vroegkinderlijke opvoeding [Video or booklet? Short-term and long-term effects of information about early childhood education]*. Unpublished doctoral dissertation, Leiden University, Leiden, the Netherlands.

Lederberg, A. R., & Mobley, C. E. (1990). The effect of

hearing impairment on the quality of attachment and mother-toddler interaction. *Child Development, 61*, 1596-1604.

Lewis, M., & Feiring, C. (1989). Infant, mother, and mother-infant interaction behavior and subsequent attachment. *Child Development, 60*, 831-837.

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

Londerville, S., & Main, M. (1981). Security of attachment, compliance, and maternal training methods in the second year of life. *Developmental Psychology, 17*, 289-299.

Lyons-Ruth, K., Connell, D. B., Zoll, D., & Stahl, J. (1987). Infants at social risk: Relations among infant maltreatment, maternal behavior, and infant attachment behavior. *Developmental Psychology, 23*, 223-232.

Main, M., Tomasini, L., & Tolan, W. (1979). Differences among mothers of infants judged to differ in security. *Developmental Psychology, 15*, 472-473.

Malatesta, C. Z., Culver, C., Tesman, C., & Shepard, B. (1989). The development of emotion expression during the first two years of life. *Monographs for the Society for Research in Child Development, 54*(1-2, Serial No. 219).

Mangelsdorf, S., Gunnar, M., Kestenbaum, R., Lang, S., & Andreas, D. (1990). Infant proneness-to-distress temperament, maternal personality, and mother-infant attachment: Associations and goodness of fit. *Child Development, 61*, 820-831.

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

Meij, J. (1991). *Sociale ondersteuning, gehechtheidskwaliteit en vroegkinderlijke competentie-ontwikkeling / Social support, quality of attachment, and early development of competence in infants*. Unpublished doctoral dissertation, University of Nijmegen, The Netherlands.

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.), *Monographs of the Society for Research in Child Development: Vol. 50 Nos. 1-2. Growing points of attachment: Theory and research* (pp. 276-297, Serial No. 209).

Nakagawa, M., Lamb, M. E., & Miyaki, K. (1992). Antecedents and correlates of the strange situation behavior of Japanese infants. *Journal of Cross-Cultural Psychology, 23*, 300-310.

NICHD Early Child Care Research Network. (1996, April). *Infant child care and attachment security: Results of the NICHD study of early child care*. Symposium conducted at the meeting of the International Conference on Infant Studies, Providence, RI.

Pederson, D. R., & Moran, G. (1996). Expressions of the attachment relationship outside of the Strange Situation. *Child Development, 67*, 915-967.

Pederson, D. R., Moran, G., Sitko, C., Campbell, K., Ghesquire, K., & Acton., H. (1990). Maternal sensitivity and the security of infant-mother attachment: A Q-sort study. *Child Development, 61*, 1974-1983.

Persson-Blennow, I., Binett, B., & McNeil, T. F. (1988). Offspring of women with nonorganic psychosis: Antecedents of anxious attachment to the mother at one year of age. *Acta Psychiatrica Scandinavica, 78*, 66-71.

Ramey, C. T., Farran, D. C., & Campbell, F. A. (1979). Predicting IQ from mother-infant interactions. *Child Development, 50*, 804-814.

Roggman, L. A., Langlois, J. H., & Hubbs-Tait, L. (1987). Mothers, infants, and toys: Social play correlates of attachment. *Infant Behavior and Development, 10*, 233-237.

Rosen, K. S., & Rothbaum, F. (1993). Quality of parental caregiving and security of attachment. *Developmental Psychology, 29*, 358-367.

Rosenboom, L. G. (1994). Gemengde gezinnen, gemengde gevoelens? Hechting en competentie van adoptiebaby's in gezinnen met biologisch eigen kinderen [Mixed families, mixed feelings? Attachment and competence of adopted infants in families with biological children]. *Unpublished doctoral dissertation, Utrecht University, Utrecht, the Netherlands*.

Schneider-Rosen, K., & Rothbaum, F. (1993). Quality of parental caregiving and security of attachment. *Developmental Psychology, 29*, 358-367.

Seifer, R., Schiller, M., Sameroff, A. J., Resnick, S., & Riordan, K. (1996). Attachment, maternal sensitivity, and infant temperment during the first year of life. *Developmental Psychology, 32*, 12-25.

Shaw, D. S., & Vondra, J. I. (1995). Infant security and maternal predictors of early behavior problems: A longitudinal study of low-income families. *Journal of Abnormal Child Psychology, 23*, 335-357.

Smith, P. B., & Pederson, D. R. (1988). Maternal sensitivity and patterns of infant-mother attachment. *Child Development, 59*, 1097-1101.

Stifter, C. A., Couleham, C. M., & Fish, M. (1993). Linking employment to attachment: The mediating effects of maternal separation anxiety and interactive behavior. *Child Development, 64*, 1451-1560.

Tarabulsy, G. M., Tessier, R., & Kappas, A. (1996). Contingency detection and the contingent organization of behavior in interactions: Implications for socioemotional development in infancy. *Psychological*

Bulletin, 120, 25-41.

Teti, D. M., Nakagawa, M., Das, R., & Wirth, O. (1991). Security of attachment between preschoolers and their mothers: Relations among social interaction, parenting stress, and mothers' sorts of attachment Q-set. *Developmental Psychology, 27*, 440-447.

Tulkin, S. R., & Cohler, B. J. (1973). Childrearing attitudes and mother-child interaction in the first year of life. *Merrill Palmer Quarterly, 19*, 95-106.

Ungerer, J. A., Dolby, R., Waters, B., Barnett, B., Kelk, N., Lewin, V., & Blaszczynski, A. (1990). The early development of empathy: Self-regulation and individual differences in the first year. *Motivation and Emotion, 14*, 93-106.

van den Boom, D. C. (1988). *Neonatal irritability and the development of attachment: Observation and intervention.* Unpublished doctoral dissertation, Leiden University, Leiden, the Netherlands.

van IJzendoorn, M. H. (1990). Attachment in Surinam-Dutch families: A contribution to the cross-cultural study of attachment. *International Journal of Behavioral Development, 13*, 333-344.

van IJzendoorn, M. H., Kranenburg, M. J., Zwart-Woudstra, H. A., Van Busschbach, A. M., & Lambermon, M. W. E. (1991). Parental attachment and children's socio-emotional development: Some findings on the validity of the Adult Attachment Interview in the Netherlands. *International Journal of Behavioral Development, 14*, 375-394.

van IJzendoorn, M. H., Vereijken, C. M. J. L., & Riksen-Walraven, J. M. A. (in press). Is the Attachment Q-sort a valid measure of attachment security in young children? In B. E. Vaughn & E. Waters (Eds.), *Patterns of secure base behavior: Q-sort perspectives on attachment and caregiving*. Hillsdale, NJ: Erlbaum.

Wille, D. E. (1991). Relation of preterm birth with quality of infant-mother attachment at one year. *Infant Behavior and Development, 14*, 227-240.

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.

Acknowledgements

Appreciation is extended to Brian Vaughn, Ph.D., and Samera Baird, Ph.D., for their comments and suggestions on an earlier version of the paper. The opinions expressed in the paper, however, are solely those of the authors and do not necessarily reflect those of the reviewers or the U.S. Department of Education.

Authors

Danielle Z. Kassow, Ph.D., is a Research Associate at the Talaris Research Institute in Seattle, Washington (daniellek@talaris.org). Carl J. Dunst, Ph.D. is a Research Scientist and Co-Director of the Orelena Hawks Puckett Institute in Asheville, North Carolina, and the Research Director at the Family, Infant and Preschool Program, J. Iverson Riddle Developmental Center, in Morganton, North Carolina (dunst@puckett.org).

Table 1
Parental Interactional Behaviors Measured in the Different Studies Included in the De Wolff and van IJzendoorn (1997) Meta-analysis

Interactional Behavior	Definition
Parental Response Quality	Response quality is characterized by the parent's ability to consider things from infants' point of view, to be alert and perceive infant signals accurately, interpret signals accurately, and respond to signals promptly and appropriately (Ainsworth et al.,1974, 1978).
Parental Response Contiguity	Parental response contiguity is characterized by the parent's promptness and frequency or rate of response to the infant's signals (quantitatively speaking). Parental response contiguity varies from response quality because there is no qualitative assessment of parental behavior in response contiguity (De Wolff & van IJzendoorn, 1997).
Parental Physical Contact	Parental physical contact is characterized by the parent's quality and quantity of physical contact with the infant (De Wolff & van IJzendoorn, 1997).
Parental Cooperation	Parental cooperation is characterized by the parent's presence or absence of intrusive or interfering behaviors toward the infant, whether the parent respects the infant's autonomy, if the parent 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, 1978).
Parent/Child Synchrony	Parental synchrony is characterized by parent-child interactions that are reciprocal and rewarding for both the parent and child (Isabella et al., 1989).
Parent/Child Mutuality	Parental mutuality is characterized by positive parent-infant interactions where both the parent and child are attending to the same thing simultaneously. Parental mutuality is also characterized as the parent's ability to modulate infant arousal, and the parent's entertainment value (Kiser et al., 1986).
Parental Support	Parental support is characterized by parental attentiveness, availability, and 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 in (Matas et al., 1978).
Parental Positive Attitude	Parental positive attitude is characterized by the parent's demonstration of positive affect, warmth, empathy, and affection toward the infant.
Parental Stimulation	Parental stimulation is characterized by any parental action toward the infant (Miyake et al., 1985). Parental stimulation may include: encouragement, affective-stimulation, stimulation/arousal (De Wolff & van IJzendoorn,1997).

Table 2
Parental Behaviors Examined in the Studies included in De Wolff and van IJzendoorn (1997) Meta-Analysis

	Nine Elements of Parental Sensitivity[a]								
Study	Parental Response Quality	Parental Response Contiguity	Parental Physical Contact	Parental Cooperation	Parental Synchrony	Parent/ Child Mutuality	Parental Support	Parental Attitude	Parental Stimulation
Altman et al. (1993)							X		
Anisfeld et al.(1990)	X	X							
Antonucci & Levitt (1984)			X		X				
Bates et al. (1985)		X					X	X	
Belsky et al. (1984)		X			X		X		X
Benn (1986)	X							X	
Bohlin et al. (1989)	X	X	X	X					
Booth et al. (1991)							X		
Bretherton et al. (1989)	X								
Burchinal et al. (1992)							X	X	
Butcher et al. (1993)	X							X	
Camfield et al. (1991)		X					X		
Capps et al. (1994)	X								
Cox et al. (1992)			X				X	X	
Crockenberg (1981)		X							
Del Carmen et al. (1993)		X						X	X
Egeland & Farber (1984)	X								
Fagot & Kavanagh (1990)							X	X	
Fracasso et al. (1994)	X								
Frankel & Bates (1990)							X		
Frodi et al. (1985)	X								
Goldberg et al. (1986)	X	X	X	X			X	X	X
Goodman et al. (1993)	X								
Goossens (1987)	X								
Grossmann et al. (1985)	X								
Gunnar et al. (1996)	X								
Hoeksma & Koomen (1991)	X					X			
Isabella (1993)	X							X	X
Isabella & Belsky (1991)					X				
Isabella et al. (1989)					X				
Izard et al (1991)								X	
Juffer (1993)	X			X					
Kerns & Barth (1995)			X						
Kiser et al. (1986)						X			
Krentz (1982)		X					X		
Kveton (1989)	X								

Table 2, continued

Study	Nine Elements of Parental Sensitivity								
	Parental Response Quality	Parental Response Contiguity	Parental Physical Contact	Parental Cooperation	Parental Synchrony	Parent/ Child Mutuality	Parental Support	Parental Attitude	Parental Stimulation
Lamb et al. (1987)		X			X			X	X
Lambermon (1991)	X						X		
Lederberg & Mobley (1990)				X			X	X	X
Lewis & Feiring (1989)		X	X						
Lieberman et al. (1991)							X		X
Londerville & Main (1981)				X					
Lyons-Ruth et al. (1987)	X		X	X				X	
Main et al. (1979)	X		X					X	
Malatesta et al. (1989)								X	
Mangelsdorf et al. (1990)							X		
Matas et al. (1978)							X		
Meij (1991)	X								
Miyake et al. (1985)		X		X			X		X
Nakagawa et al. (1992)	X			X			X	X	
NICHD (1996)							X		
Pederson & Moran (1996)	X								
Pederson et al. (1990)	X								
Persson-Blennow et al. (1988)		X	X					X	
Roggman et al. (1987)					X				X
Rosenbloom (1994)	X						X		
Schneider-Rosen & Rothbaum (1993)							X	X	
Seifer et al. (1996)	X								
Shaw & Vondra (1995)		X							
Smith & Pederson (1988)				X		X			
Stifter et al. (1993)	X			X					
Teti et al. (1991)							X		
Ungerer et al. (1990)								X	
van den Boom (1988)	X								
van IJzendoorn (1990)	X								
van IJzendoorn (1991)	X								
Willie (1991)						X	X	X	
Zaslow et al. (1988)			X				X	X	
Totals:[b]	31	14	10	10	6	4	24	21	9

[a]See Table 1 for operational definitions of the above sensitivity measures.

[b]A recalculation of the totals reported in this table showed a discrepancy between our calculations and totals reported De Wolff and van IJzenddoorn (1997).

Table 3

Effect Sizes for the Relationships Between Parental Behavior and Secure Attachment (Main Results) and the Moderating Variables and Parental Behavior

Main Results					Moderating Variables Effect Sizes (*r*)													
					Family SES		Child Age		Child Age at time of Attachment Assessment		Child Clinical Diagnosis		Location of Observation		Sensitivity Assessment		Time Interval Between Parent/Child Interaction and Attachment Assessment	
Parental Behavior	Number of Studies	Number of Participants	Effect Size (*r*)	95% Confidence Interval	Middle	Low	> 1 year	< 1 year	> 1 year	< 1 year	Yes	No	Home	Lab	Global	Specific	Long	Short
Mutuality	3	168	0.32	.18—.46														
Synchrony	6	258	0.26	.14—.37														
Response Quality	30	1,666	0.22	.18—.27	.27	.15	.27	.20	.25	.19								
Attitude	21	1,092	0.18	.14—.25							.08	.23			.21	.06		
Stimulation	9	422	0.18	.10—.29														
Support	22	1,664	0.16	.11—.21														
Cooperation	9	493	0.13	.03—.21							.03	.20			.05	.32		
Response Contiguity	14	825	0.10	.03—.17			.06	.13							.08	.15	.16	.06
Physical Contact	9	637	0.09	.01—.17														