

Influences of a Responsive Interactional Style on Young Children's Language Acquisition

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The relationships between the characteristics of a responsive interactional style and young children's communication and language abilities were the focus of the research synthesis described in this paper. The parenting interactional styles that were the focus of investigation are the key characteristics of a particular approach to naturalistic instruction (Dunst, Raab, & Trivette, 2011) called responsive teaching (Raab & Dunst, 2009). Which particular characteristics were associated with different child communication and language abilities was the major focus of the analyses of the research synthesis.

Responsive teaching is one of four components of a caregiver-mediated approach to child language learning developed by staff at the *Center for Everyday Child Language Learning (CECLL)* (Dunst, Trivette, & Raab, 2013a, 2013b). The model, which is shown in Figure 1, includes interest-based child learning opportunities (Raab, Dunst, & Hamby, 2013), everyday family and community activities as contexts for child language learning (Dunst, Valentine, Raab, & Hamby, 2013), methods and strategies for increasing child participation in interest-based everyday language learning activities (Trivette, Dunst, Simkus, & Hamby, 2013), and the use of caregiver responsive teaching for supporting and strengthening children's communication and language competence in everyday activities, all of which were the focus of this research synthesis.

Table 1 shows the particular interactional behaviors that were the focus of investigation. The six types of parenting behavior included sensitivity to a child's behavioral cues, following a child's lead and interpreting behavior as intents to communicate, contingent responsiveness to the child's behavior in ways that are prompt and appropriate, and engaging the child in interactive episodes in a reciprocal *your turn-my turn* manner, and encouraging child elaborations in his or her communication and language abilities. Research syntheses of studies of the different parenting interactional behaviors have found that the different characteristics are associated with variations in child behavioral outcomes (e.g., Allen, 2000; de Wolff

The relationships between six different parenting interactional behaviors and child communication and language development were examined in 46 studies including more than 5800 infants, toddlers, and preschoolers with and without disabilities or delays. The interactional behaviors constituting the focus of investigation, taken together, are the key characteristics of a responsive teaching instructional practice. Results showed that all six interactional behaviors were related to the children's nonverbal communication and expressive and receptive language development. Results also showed that the relationships between the interactional behaviors and the child outcomes were similar for children with and without disabilities. Implications for practice are described.

& van IJzendoorn, 1997; Dunst & Kassow, 2008; Kassow & Dunst, 2007a, 2007b; Nievar & Becker, 2008; Trivette, 2007). The manner in which the behavioral characteristics were related to infants, toddlers, and preschoolers with and

without disabilities or delays was examined in the meta-analysis described in this paper.

Search Strategy

Studies were located using *respons** OR *sensit** OR *intersubject** OR *contingen** OR *joint attent** OR *modeling* (and more than 50 other interactive style terms) AND *language* OR *nonverbal communicat** OR *gestures* OR *speech* OR *verbal* (and more than 20 other language-related terms) OR *mother* OR *father* OR *caregiver* OR *maternal* OR *paternal* AND *infant* OR *infancy* OR *toddler* OR *preschool** as search terms. The primary search was supplemented by a secondary search using *parent-child interact** OR *parent child interact** OR *respons* teach** OR *incidental teach** OR *milieu teach** or *natural* instruct** AND *nonverbal communic** OR *non-verbal communic** OR *verbal* OR *gesture* OR *vocaliz** OR *verbal communic** OR *oral communic** OR *verbal ability* OR *verbal fluen** OR *speech develop** OR *language develop** OR *language** OR *communic** AND *infan** OR *toddler* OR *preschool** OR *baby* were used as search terms. PsychInfo, ERIC, MEDLINE, Education Research Complete, Academic Search Premier, OCLC First Search, National Library of Education, CINAH, and Health Source: Nursing Academic Edition were searched for studies. These were supplemented by Google Scholar, Scirus, Ingenta Connect, and Google searches, as well as a search of an EndNote library maintained by our Institute. Hand searches of the reference sections of research syntheses of interactional behav-

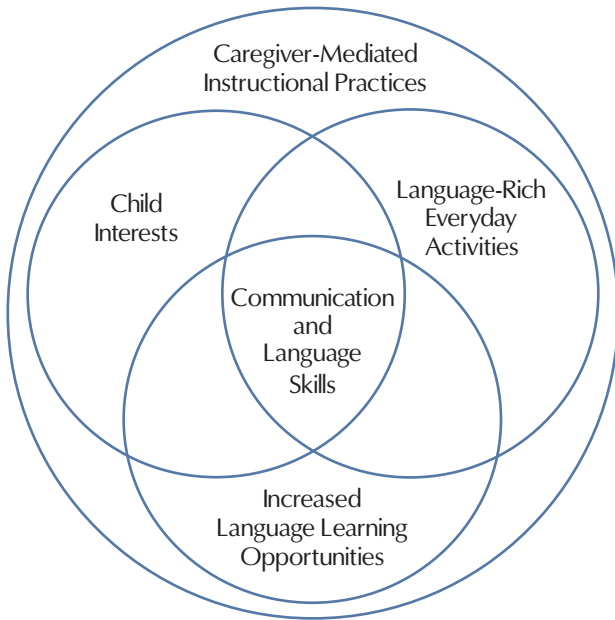


Figure 1. Four major components of the caregiver-mediated everyday language intervention model for facilitating early communication and language skill acquisition.

Table 1
Types of Parenting Interactional Behavior That Were the Focus of Investigation

Type of Parenting Behavior	Definition
<i>Caregiver Sensitivity</i>	Caregiver sensitivity refers to how well the caregiver reads the child’s cues. A caregiver high in sensitivity can differentiate among the child’s cues and decrease the frustration of both the child and the caregiver.
<i>Following Child’s Lead</i>	Caregiver follows the child’s lead when he or she observes where the child’s attention is focused, and shifts his or her attention to follow the child’s shift in attention.
<i>Contingent Responsiveness</i>	Caregiver contingent responsiveness is characterized by the caregiver’s response to the infant’s ongoing behavior where the response functions as a reinforcement maintaining or sustaining infant behavior directed toward the adult. This includes caregiver utterances and behaviors directed to the child with the goal of having the child repeat the utterance or behavior.
<i>Caregiver-Child Mutuality</i>	Mutuality is characterized by caregiver efforts to maintain positive reciprocal interactions between the child and the caregiver.
<i>Support/Encouragement</i>	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. This can include offers of assistance, praise, or appreciation, and it can be verbal, gestural, or behavioral.
<i>Behavior Elaboration</i>	Caregiver elaboration is characterized by the caregiver using behaviors that help the child expand (modify/change) his or her ongoing behavior. This includes such strategies as asking questions, repeating the child’s preceding utterances or behaviors with new information added, providing substitutions, corrections, or adding syntactic information to the child’s utterances that maintain the central meaning of the child’s utterances.

ior studies and all retrieved journal articles, book chapters, books, dissertations, and unpublished papers were used to locate additional studies. Studies were included if the majority of children were six years of age or younger and the correlations between one or more of the characteristics in Table 1 and the children's language development were reported by the investigators.

Search Results

Forty-six studies were located that included 5850 child participants. Appendix A includes the background characteristics of the children. The children's mean age was 20 months (Range = 1 to 72). Fifty-two percent of the children were male, and 48% of the children were female. Most of the adult participants whose interactional behavior was the focus of investigation were the children's mothers.

Appendix B includes the particular parenting behavior that was the focus of investigation in the primary studies and how the interactional behavior was coded using the definitions in Table 1. A single interactional behavior was the focus of investigation in 27 studies, two interactional behaviors were the focus of investigation in 8 studies, three interactional behaviors were the focus of investigation in 8 studies, and four interactional behaviors were the focus of investigation in 3 studies.

The outcome measures included children's nonverbal communication, expressive language, receptive language, or a combined measure of expressive and receptive language.

The scales or indices for the outcomes are listed in Appendix C. A combination of standardized measures and investigator-developed measures were used in the studies.

The weighted average correlations between the interactive behavior measures and the study outcomes were used as the sizes of effects between the interactive behavior and child communication and language development. The 95% confidence intervals for the average effect sizes were used for substantive interpretation of the relationship among measures. The Z-test was used to estimate the strength of the relationships between the interactional behavior and child outcomes.

Synthesis Findings

Table 2 shows the effect sizes for the relationships between each of the six interactional behaviors and the child outcomes. All six interactional behaviors were related to variations in the study outcomes as evidenced by the sizes of effect between measures and the *p* values for the average effect sizes. The strengths of the relationships were very similar as evidenced by Z-tests with *p*-values of .0000. In all cases, parents' use of the six types of behavior was associated with better child communication and language outcomes.

The relationships between the interactional behavior and the different categories of child outcomes are shown in Table 3. The sizes of effect were all statistically significant at the *p* = .0000 level and indicate that the interactional behaviors were associated with positive effects in terms of each of the different types of communication and language outcomes.

Table 2
Average Effect Sizes and 95% Confidence Intervals (CI) for the Relationships Between the Parenting Interactional Behaviors and the Study Outcomes

Interactional Behavior	Number		Mean Effect Size	95% CI	Z-test	p-value
	Studies	Effect Sizes				
<i>Caregiver Sensitivity</i>	12	74	.33	.31-.35	38.86	.0000
<i>Following Child's Lead</i>	6	50	.26	.24-.28	22.61	.0000
<i>Contingent Responsiveness</i>	26	168	.28	.26-.29	37.65	.0000
<i>Caregiver-Child Mutuality</i>	6	70	.31	.29-.32	33.53	.0000
<i>Support/Encouragement</i>	13	88	.28	.26-.29	33.77	.0000
<i>Behavior Elaboration</i>	16	99	.32	.30-.33	37.66	.0000

Table 3
Average Effect Sizes and 95% Confidence Intervals (CI) for the Relationship Between the Parenting Interactional Behaviors and the Different Communication and Language Outcomes

Outcome Measures	Number		Mean Effect Size	95% CI	Z-test	p-value
	Studies	Effect Sizes				
<i>Nonverbal Communication</i>	5	16	.25	.21-.28	13.21	.0000
<i>Expressive Language</i>	34	191	.31	.29-.33	39.85	.0000
<i>Receptive Language</i>	24	69	.34	.32-.36	34.76	.0000
<i>Expressive/Receptive Language</i>	15	58	.29	.27-.31	35.16	.0000

Figure 2 shows the relationships between the interactional behavior and the study outcomes for children with different conditions. The average effect sizes ranged between $r = .27$ and $r = .56$, $Z_s = 25.79$ to 48.74 , $p_s = .0000$. The strength of the relationships was smallest for children considered at-risk for poor outcomes and strongest for children with disabilities or delays.

Discussion

Results from the research synthesis described in this paper indicated that parents' use of interactional behaviors that are key characteristics of a particular responsive teaching procedure (Raab & Dunst, 2009) were associated with better child communication and language outcomes. The six behaviors, taken together, are the same parenting styles that have been known to be associated with other child behavioral consequences (e.g., Dunst & Kassow, 2008; Nievar & Becker, 2008; Warren & Brady, 2007). This research synthesis adds to the knowledge base by demonstrating how the interactional behaviors constituting the focus of investigation were associated with child nonverbal communication, expressive language, and receptive language development.

Naturalistic instructional strategies (Dunst et al., 2011), including responsive teaching (Raab & Dunst, 2009), are methods of choice when interventions are implemented in the context of naturally occurring everyday family and community activities to promote and strengthen child competence (Dunst, 2006; Dunst, Raab, Trivette, & Swanson, 2010; Raab, 2005). The instructional practice can be easily used by parents and other caregivers during nearly all kinds of child learning opportunities where sensitivity to and contingent responsiveness to child behavior interactions reinforce and sustain child behavior, and where parents' and caregivers' support and encouragement are used to enhance child behavior elaborations. Research shows that with practitioner use of evidence-based implementation practices (Raab, Dunst, &

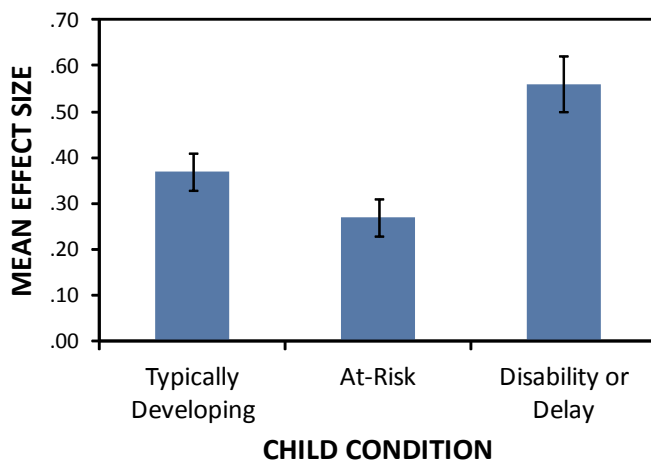


Figure 2. Average effect sizes and 95% confidence intervals for the relationships between the parenting interactional behaviors and the study outcomes for three groups of children.

Trivette, 2013), parents can learn to use the characteristics of responsive teaching and other naturalistic instructional practices with their children (e.g., Dunst & Kassow, 2007; Fey et al., 2006; Landry, Smith, & Swank, 2006). Parents' routine use of responsive teaching, in turn, would be expected to promote and enhance young children's communication and language competence, including children with identified disabilities or delays.

Conclusion

The parent-mediated instructional practices component of the *Center for Everyday Child Language Learning* intervention model includes parents' use of responsive teaching to promote, encourage, and support interest-based child communication and language development in the context of child participation in everyday family and community activities. Findings from the research synthesis described in this paper indicate that the use of the interactional behaviors that "make up" responsive teaching is related to better child communication and language outcomes.

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Appendix A

Background Characteristics of Child Participants

Study	Sample Size	Child Age (months)		Child Gender		Condition	Ethnicity (percent)	
		Mean	Range	Male	Female			
Ainsworth & Bell (1974) Bell & Ainsworth (1972)	26	NR	9-12	16	10	NR	Caucasian	100
Barnes et al. (1983)	32	24	18-33	16	16	NR	NR	
Baumwell et al. (1997)	40	9	9-10	17	23	Typically developing	Caucasian	100
Beckwith (1980)	126	1	NA	76	50	Preterm	NR	
Beckwith & Cohen (1989)	46	1	NA	30	16	Preterm	NR	
Beckwith & Rodning (1996)	51	13	NR	28	23	Preterm	Ethnic minorities	100
Bornstein et al. (1990)	31	5	NR	15	16	Typically developing	Asian	100
Bornstein & Tamis-LeMonda (1997)	36	5	NR	22	14	Typically developing	NR	
Brady et al. (2004)	18	56	36-72	13	5	Developmental disabilities	NR	
Burchinal et al. (2008)	1292	7	6-8	NR	NR	At risk	African American European American	31 69
Conti-Ramsden (1990) Sample 1	14	27	19-33	6	8	Typically developing	Caucasian	100
Conti-Ramsden (1990) Sample 2	14	50	42-64	11	3	Language delay	Caucasian	100
Cress et al. (2008)	27	18	12-27	18	9	Physical/neuromotor impairment	Caucasian African American Latino Asian American	78 15 4 4
Cusson (2003)	43	7	NR	NR	NR	Preterm	African American Caucasian	73 27
DesJardin (2006)	32	36	25-72	17	15	Hearing impaired	Caucasian Latino Asian American Other	53 35 6 6
Dieterich et al. (2006)	273	36	NR	144	129	At risk (Preterm 63%)	African American Caucasian Latino Other	63 16 18 3
Dodici et al. (2003)	27	14	NR	13	14	NR	Caucasian	100
Dunham & Dunham (1992)	38	13	NR	17	21	Typically developing	NR	
Fewell & Deutscher (2002)	543	30	NR	272	271	Preterm	African American Latino Caucasian	53 10 37
Fewell & Deutscher (2004)	571	30	NR	291	280	Preterm	Caucasian African American Other	37 53 10
Gartstein, et al. (2008)	65	9	NR	33	32	NR	Caucasian Asian American Latino Filipino African American	82 9 4 3 2
Girolametto et al. (2002) Sample 1	10	29	25-34	10	0	Language delay	Canadian	100
Girolametto et al. (2002) Sample 2	10	30	23-34	10	0	Language delay	Italian	100
Goldberg et al. (1989)	71	3	NA	NR	NR	Low birth weight	NR	
Hart & Risley (1992)	40	9	7-12	18	22	NR	African American Caucasian	37 63

Appendix A, continued.

Study	Sample Size	Child Age (months)		Child Gender		Condition	Ethnicity (percent)	
		Mean	Range	Male	Female			
Hirsh-Pasek & Burchinal (2006)	1097	6	NA	597	564	NR	European American	75
Karrass & Braungart-Rieker (2003)	102	12	NR	56	46	NR	European American	98
Kelly et al. (1996)	53	13	NR	30	23	At risk	Caucasian	93
Keown et al. (2001)	42	NR	36-59	21	21	NR	Caucasian	NR
Laakso et al. (1999)	111	14	NA	66	45	Typically developing	Caucasian	100
Lyytinen et al. (2003) Sample 1	49	14	NA	29	20	At risk	Caucasian	100
Lyytinen et al. (2003) Sample 2	49	14	NA	29	20	Typically developing	Caucasian	100
McDuffie & Yoder (2010)	32	41	27-60	27	5	Autism/PDD	NR	
Murray & Hornbaker (1997)	56	12	NA	27	29	Preterm (66%)	NR	
Nelson et al. (1984)	25	22	NA	NR	NR	NR	NR	
Roberts et al. (2005)	72	24	NR	33	39	At risk	African American	100
Rush (1999)	39	59	52-66	19	20	At risk	Anglo American African American Latino Asian American Indian Other/multi-ethnic	47 33 8 3 8 5
Saxon (1997)	24	6	NR	7	17	Typically developing	NR	
Shimpi & Huttenlocher (2007)	18	14	14-15	9	9	NR	Caucasian	100
Siller & Sigman (2002)	18	54	NR	14	4	Autism	NR	
Silvén et al. (2002)	66	12	NA	26	40	Typically developing	Caucasian	100
Spencer & Meadow-Orlans (1996)	43	12	NA	21	22	Deaf and hearing	Caucasian Asian American	98 2
Steelman et al. (2002)	360	12	NR	169	191	At risk (Preterm 63%)	African American Caucasian Latino Other	60 23 14 3
Tomasello & Todd (1983)	6	12	12-13	4	2	NR	NR	
Wallace et al. (1998)	92	12	NA	44	48	At risk	African American	100

Appendix B

Description and Coding of Parenting Interactional Behavior

Study	Measure of Parenting Behavior	Description	Type of Interactional Behavior
Ainsworth & Bell (1974); Bell & Ainsworth (1972)	Maternal unresponsiveness	Number of infant crying episodes ignored; duration of unresponsiveness to infant crying	Sensitivity (reversed)
	Sensitivity	Maternal awareness and accurate interpretation of child's signals, and prompt, appropriate response	Sensitivity Contingent responsiveness
Barnes et al. (1983)	Extend	Caregiver extension of child utterance, extension by contrast, extension of child's current activity	Elaboration
Baumwell et al. (1997)	Verbal sensitivity	Maternal verbal response to child vocal or exploratory act; description of child activity with toy; verbal attempts to focus child's attention on toy	Caregiver/child mutuality Contingent responsiveness
Beckwith (1980)	Attentiveness	Caregiver social interaction with infant involving touch, hold, talk, toy presentation, mutual gaze	Support/encouragement Caregiver/child mutuality
	Face-to-face talk	Caregiver vocalization to infant during mutual gazing	Caregiver/child mutuality Contingent responsiveness
	Mutual gaze	Both caregiver and infant looking simultaneously at each other's eyes	Caregiver/child mutuality
	Contingency to distress	Caregiver prompt response to infant fuss-cry episodes	Sensitivity
	Contingency to nondistress vocalization	Caregiver imitation of or vocal response to infant nondistress vocalization	Contingent responsiveness
Beckwith & Cohen (1989)	Contingent vocalization	Maternal prompt vocal or verbal response to infant nondistress vocalizations	Contingent responsiveness
	Contingency to distress	Maternal response to infant fuss/cry episodes	Sensitivity
	Mutual visual regard	Shared glances between mother and infant.	Caregiver/child mutuality
	Contingent verbalization	Maternal utterances of acceptance, expansion, elaboration, or imitation made immediately after child vocalizations or verbalizations	Contingent responsiveness Elaboration
Beckwith & Rodning (1996)	Dyadic verbal reciprocity	Mother vocal response to the child	Contingent responsiveness
	Maternal sensitivity	Degree to which the mother followed or adopted the child's topic in play	Follow child's lead
	Dyadic fit	Extent to which maternal and child behavior meshed with each other	Caregiver/child mutuality
Bornstein et al. (1990)	Responsiveness to nondistress activity	Maternal contingent response to infant nondistress behavior	Contingent responsiveness
	Responsiveness to distress vocalization	Maternal contingent response to infant distress behavior	Sensitivity
Bornstein & Tamis-LeMonda (1997)	Maternal responsiveness	Maternal prompt, contingent, appropriate response to child's exploration or vocalization	Contingent responsiveness
Brady et al. (2004)	Response contingency	Caregiver change in behavior in response to change in child behavior or attention focus	Sensitivity Contingent responsiveness Follow child's lead
Burchinal et al. (2008)	Maternal engagement	Level of mother's emotional uninvolved (reversed), positive regard toward child, animation, and scaffolding of activities with child	Support/encourage Elaboration
	Maternal harshness	Level of maternal responsiveness to child's needs, gestures, and expressions (reversed); intrusiveness; and negative regard toward child	Contingent responsiveness Sensitivity Follow child's lead (reversed)
Conti-Ramsden (1990) Sample 1, Sample 2	Simple recasts	Maternal replies that provide a slight change to a component of a preceding child utterance	Elaboration
Cress et al. (2008)	Contingent responsiveness	Parent verbal or nonverbal behavior in response and directly related to child needs, desires, or ongoing activity	Contingent responsiveness

Appendix B, continued.

Study	Measure of Parenting Behavior	Description	Type of Interactional Behavior
Cress et al. (2008) continued	Noncontingent behavior	Parent behavior that ignores or redirects child to a new activity not related to child initiations	Follow child's lead (reversed)
Cusson (2003)	Responsiveness	Degree to which the mother modifies the pacing, content, and/or intensity of the interaction in response to infant cues	Contingent responsiveness Sensitivity
DesJardin (2006)	Recast	Maternal repetition of preceding child utterance in a question format	Elaboration
	Directive	Maternal instructions telling the child to do something or commanding a behavior	Follow child's lead (reversed)
Dieterich et al. (2006)	Verbal scaffolding	Maternal verbalizations providing conceptual links between objects, persons, activities, or functions related to child behavior	Elaboration
Dodici et al. (2003)	Interaction quality	Amount of developmentally appropriate language used with child; emotional tone; parent-infant joint attention; parental guidance; and responsiveness to child cues	Caregiver/child mutuality Contingent responsiveness Support/encouragement
Dunham & Dunham (1992)	Maternal utterance	Maternal utterance referring to an object, action, or attribute at the child's focus of attention	Contingent responsiveness
Fewell & Deutscher (2002)	Responsiveness	Maternal positive response to child bids, attention, and sensitivity to child's communicative behaviors (e.g., mothers' smiles, enjoyment of interactions, effectiveness facilitating child's development)	Sensitivity Contingent responsiveness Support/encouragement
Fewell & Deutscher (2004)	Language facilitation	Maternal interactive conversation at the child's level; expansion of child's language (e.g., modeling new language, labeling, asking questions); following child's lead	Caregiver/child mutuality Follow child's lead Elaboration
Gartstein et al. (2008)	Responsiveness/sensitivity	Maternal prompt, contingent, warm, and supportive responses to child; interest, empathy, emotional availability toward child; accurately interpreting child's communication; motivating, affectively encouraging, reinforcing, extending child activity	Sensitivity Contingent responsiveness Support/encouragement Elaboration
	Synchrony/reciprocity	Maternal efforts to maintain a smooth flow of behavior and match between mother and infant patterns of interactive behavior	Caregiver/child mutuality
Girolametto et al. (2002) Sample 1, Sample 2	Labels	Maternal provision of a label for an object the child is touching, looking at, or playing with	Contingent responsiveness
	Imitations	Maternal repetition of child's preceding vocalization or verbalization	Contingent responsiveness
	Interpretations	Maternal verbal interpretation of the child's intended message based on contextual clues	Elaboration
	Expansions	Maternal repetition and completion of child's preceding word approximation or verbalization	Elaboration
Goldberg et al. (1989)	Sensitivity	Maternal awareness and correct interpretation of infant signals; prompt and appropriate response	Contingent responsiveness Sensitivity
	Cooperation	Maternal avoidance of interfering with infant activity; encouragement and furthering of infant's interests	Support/encouragement
	Accessibility	Maternal attention to infant's communications and needs despite demands of other daily activities	Sensitivity
Hart & Risley (1992)	Responds	Parent verbal response to child-initiated vocalizations	Contingent responsiveness
	Repeats	Parent's repetitions, expansions, or extensions of a preceding child utterance	Contingent responsiveness Elaboration
	Questions	Parent questions serving to maintain interaction, indicating to the child to take a turn	Caregiver/child mutuality
Hirsh-Pasek & Burchinal (2006)	Sensitivity	Maternal sensitivity to child interest and provision of age-appropriate stimulation	Sensitivity Support/encouragement
Karrass & Braungart-Rieker (2003)	Maternal responsiveness	Maternal positive affect and supportive vocalizations; provision of stimulation based on infant cues; taking lead in interactions (reversed)	Sensitivity Support/encouragement Follow child's lead

Appendix B, continued.

Study	Measure of Parenting Behavior	Description	Type of Interactional Behavior
Kelly et al. (1996)	Dyadic verbal reciprocity	Maternal sensitive, appropriate response to infant vocalization	Contingent responsiveness
	Maternal sensitivity	Mother's ability to lead and follow the child in sensitive, responsive ways	Caregiver/child mutuality Follow child's lead
Keown et al. (2001)	Verbal stimulation	Variety and complexity of mother's vocabulary; extent to which mother directed appropriately stimulating language toward child	Elaboration
	Sensitivity	Extent to which mothers provided appropriate and contingent support to facilitate child functioning	Contingent responsiveness Support/encouragement
	Intrusiveness	Extent to which maternal behavior was ill-timed, excessively restrictive, directive of child's behavior	Follow child's lead (reversed)
Laakso et al. (1999)	Interactional sensitivity	Maternal actions to motivate/reinforce child play; promotion/enjoyment of joint activity; versatility of motivational strategies; emotional availability and attunement; affective encouragement; support of child's independent activity; sensitivity in guiding child activity; extending child's activity	Sensitivity Caregiver/child mutuality Support/encouragement Elaboration
Lyytinen et al. (2003) Sample 1, Sample 2	Symbolic play-related language	Maternal verbal cues to symbolic play and verbal response maintaining child-initiated symbolic play	Elaboration Contingent responsiveness Support/encouragement
McDuffie & Yoder (2010)	Follow-in comments	Parent comments describing child's focus of attention or play, without conveying expectation that child do something different	Contingent responsiveness
	Follow-in directives	Parent comment on child's engagement that suggests child modify some aspect of play with the object of his/her attention	Elaboration
	Linguistic mapping	Parent verbal representation of the meaning of child's intentional nonverbal communication	Contingent responsiveness
	Repetitions	Parent verbal repetition of all or part of child's previous utterance	Contingent responsiveness
	Expansions	Parent verbal additions of semantic or grammatical information to child's previous utterance	Elaboration
Murray & Hornbaker (1997)	Directiveness	Extent to which mother directed child behavior, used physical guidance, or demanded child response	Follow child's lead (reversed)
	Sensitivity	Extent to which mother recognized child cues, responded appropriately to child social initiations, and was willing to give up her own agenda	Sensitivity Contingent responsiveness Follow child's lead
	Elaborativeness	Extent to which mother's behavior followed child behavior and mother responded to child behavior by extending or expanding	Contingent responsiveness Elaboration
Nelson et al. (1984)	Simple recasts	Maternal response providing slight or moderate changes to preceding child utterance	Elaboration
	Imitations	Maternal complete or partial imitation of child utterance (same order)	Contingent responsiveness
	Continuations	Maternal response maintaining child topic without explicit overlap between child's and adult's words	Contingent responsiveness
	Topic changes	Maternal response changing child's topic, expressed in any syntactic form	Follow child's lead (reversed)
Roberts et al. (2005)	Sensitivity	Maternal warmth; awareness of child cues and capabilities; prompt, appropriate response to child behavior; encouragement of child self-directed behavior; provision of cognitive or linguistic stimulation; elaboration of child behavior	Sensitivity Contingent responsiveness Support/encouragement Elaboration
Rush (1999)	Shared activity	Active participation in a child-directed activity (i.e., following the child's lead)	Follow child's lead
	Positive feedback	Parent positive verbal response toward child	Contingent responsiveness
Saxon (1997)	Verbal following	Maternal reference to a toy by name or pronoun or a feature of the toy that the infant is looking at, reaching for, or touching	Contingent responsiveness Elaboration
	Verbal redirecting	Maternal reference to a different toy from one the infant is looking at, reaching for, or touching	Follow child's lead (reversed)
	Joint attention	Maternal interaction with the same object as the infant where the infant looks at mother and object	Caregiver/child mutuality

Appendix B, continued.

Study	Measure of Parenting Behavior	Description	Type of Interactional Behavior
Saxon (1997), continued	Joint attention duration	Duration of maternal interaction with the same object as the infant where the infant looks at mother and object	Caregiver/child mutuality
Shimpi & Huttenlocher (2007)	Follow-in labels	Maternal reference to objects already in the child's ongoing visual focus	Contingent responsiveness
	Lead-in labels	Maternal reference to objects not already in the child's ongoing visual focus	Follow child's lead (reversed)
Siller & Sigman (2002)	Indicating behavior	Caregiver pointing to, showing, or offering a toy to which the child already is attending	Contingent responsiveness
	Verbalizations	Caregiver verbalizations (either with or without suggestions for modification) that refer to a toy to which the child already is attending	Contingent responsiveness Elaboration
	Undemanding verbalizations	Caregiver utterances (e.g., reinforcement, comment) that maintained child's ongoing behavior/activity	Support/encouragement Contingent responsiveness
Silvén et al. (2002)	Motivating child to play	Mother's recognition of child's interest in playing, and her skill in helping child continue with task	Support/encouragement Sensitivity
	Timing of cognitive guidance	Mother's skill in recognizing, and timing/adjusting guidance of, child's cognitive states/goals	Sensitivity
	Versatility of cognitive guidance	Mother's skill in providing and stimulating the child with various means of guidance	Support/encouragement
Spencer & Meadow-Orlans (1996)	Maternal responsiveness	Maternal response to child's interests; willingness to continue child-initiated activity; acceptance of child's disinterest in proposed activity; consistency in affect, flexibility, and responsiveness	Contingent responsiveness Follow child's lead Support/encouragement
Steelman et al. (2002)	Warm acceptance	Praise and encouragement, physical affection, attention, enthusiasm during interaction with child	Support/encouragement
	Flexibility/responsiveness	Maternal ability to respond promptly, sensitively to child's needs; appropriate pacing of interactions	Contingent responsiveness Caregiver/child mutuality
Tomasello & Todd (1983)	Joint attention	Mother-child interaction, both focused on same object/activity; child looks at or vocalizes to mother	Caregiver/child mutuality
Wallace et al. (1998)	Sensitivity	Maternal awareness of child's verbal/nonverbal cues, signals, capabilities	Sensitivity
	Responsiveness	Maternal appropriate response to child's cues, signals, bids, behaviors	Contingent responsiveness
	Elaborativeness	Maternal prompt expansion/elaboration of child verbal and nonverbal behaviors	Elaboration

Appendix C

Effect Sizes for the Relationships Between Type of Parenting Interactional Behavior and Child Outcomes

Study	Type of Interactional Behavior		Child Outcomes			Effect Size (r)
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	
Ainsworth & Bell (1974); Bell & Ainsworth (1972)	Sensitivity	11	Infant communication	Nonverbal/expressive language	11	.63
	Sensitivity Contingent responsiveness	11	Griffith's Scales	Expressive/receptive	11	.46
Barnes et al. (1983)	Elaboration	24	Mean length of structured utterance	Expressive language	33	.37
		24	Mean length of longest utterance	Expressive language	33	.38
		24	Semantic range	Expressive language	33	.11
		24	Auxiliary meanings	Expressive language	33	.34
		24	Semantic complexity	Expressive language	33	.30
		24	Syntactic complexity	Expressive language	33	.24
		24	Pragmatic range	Expressive language	33	.21
		24	Lexical verbs per utterance	Expressive language	33	.17
Baumwell et al. (1997)	Caregiver/child mutuality Contingent responsiveness	9	Language comprehension	Receptive language	9	.29
		13	Language comprehension	Receptive language	13	.18
Beckwith (1980)	Support/encourage Caregiver/child mutuality	1	Bayley MDI	Expressive/receptive	25	.29
		8	Bayley MDI	Expressive/receptive	25	.30
		8	Gesell Scales	Expressive/receptive	24	.40
	Caregiver/child mutuality Contingent responsiveness	1	Bayley MDI	Expressive/receptive	25	.34
		1	Gesell Scales	Expressive/receptive	24	.35
		1	Language comprehension	Receptive language	24	.36
		8	Bayley MDI	Expressive/receptive language	25	.30
		8	Gesell Scales	Expressive/receptive	24	.40
		8	Language comprehension	Receptive language	24	.33
		8	Language comprehension	Receptive language	24	.33
	Caregiver/child mutuality	1	Bayley MDI	Expressive/receptive	25	.37
		1	Gesell Scales	Expressive/receptive	24	.31
		1	Language comprehension	Receptive language	24	.37
		8	Gesell Scales	Expressive/receptive	24	.36
	Sensitivity	1	Language comprehension	Receptive language	24	.42
Contingent responsiveness	8	Gesell Scales	Expressive/receptive	24	.30	
Beckwith & Cohen (1989)	Contingent responsiveness	1	Number of utterances	Expressive language	24	.06
		1	Mean length of utterance	Expressive language	24	-.02
		1	Responsiveness to mother's utterances	Expressive language	24	.10
		1	Vocabulary comprehension	Receptive language	24	.23
		1	Bayley MDI	Expressive/receptive	25	.18
		8	Number of utterances	Expressive language	24	.08
		8	Mean length of utterance	Expressive language	24	.11
		8	Responsiveness to mother's utterances	Expressive language	24	.24
		8	Vocabulary comprehension	Receptive language	24	.05

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes				
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)	
Beckwith & Cohen (1989), continued	Contingent responsiveness	8	Bayley MDI	Expressive/receptive	25	.07	
		1	Number of utterances	Expressive language	24	.13	
	Sensitivity	1	Mean length of utterance	Expressive language	24	.03	
		1	Responsiveness to mother's utterances	Expressive language	24	.44	
		1	Vocabulary comprehension	Receptive language	24	.34	
		1	Bayley MDI	Expressive/receptive	25	.20	
		8	Number of utterances	Expressive language	24	.21	
		8	Mean length of utterance	Expressive language	24	.24	
		8	Responsiveness to mother's utterances	Expressive language	24	.31	
		8	Vocabulary comprehension	Receptive language	24	.11	
		8	Bayley MDI	Expressive/receptive	25	.25	
		Caregiver/child mutuality	1	Number of utterances	Expressive language	24	.20
	1		Mean length of utterance	Expressive language	24	.08	
	1		Responsiveness to mother's utterances	Expressive language	24	.28	
	1		Vocabulary comprehension	Receptive language	24	.35	
	1		Bayley MDI	Expressive/receptive	25	.30	
	8		Number of utterances	Expressive language	24	.33	
	8		Mean length of utterance	Expressive language	24	.36	
	8		Responsiveness to mother's utterances	Expressive language	24	.60	
	8		Vocabulary comprehension	Receptive language	24	.23	
	8		Bayley MDI	Expressive/receptive	25	.18	
	Contingent responsiveness Elaboration	24	Number of utterances	Expressive language	24	.69	
		24	Mean length of utterance	Expressive language	24	.39	
		24	Responsiveness to mother's utterances	Expressive language	24	.84	
		24	Vocabulary comprehension	Receptive language	24	.61	
		24	Bayley MDI	Expressive/receptive	25	.46	
	Beckwith & Rodning (1996)	Contingent responsiveness	13	Bayley MDI	Expressive/receptive	24	.08
			13	RLS – Expressive	Expressive language	36	.49
			13	RLS – Receptive	Receptive language	36	.40
			13	MSCA	Expressive/receptive	60	.20
20			Bayley MDI	Expressive/receptive	24	.52	
Following child's lead		20	RLS – Expressive	Expressive language	36	.10	
		20	RLS – Receptive	Receptive language	36	.22	
		20	MSCA	Expressive/receptive	60	.17	
		20	Bayley MDI	Expressive/receptive	24	.34	
Caregiver/child mutuality		20	RLS – Expressive	Expressive language	36	.14	
		20	RLS – Receptive	Receptive language	36	.06	
		Caregiver/child mutuality	20	MSCA	Expressive/receptive	60	.13
			20	Bayley MDI	Expressive/receptive	24	.17
			20	RLS – Expressive	Expressive language	36	-.11

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Beckwith & Rodning (1996), continued	Caregiver/child mutuality	20	RLS – Receptive	Receptive language	36	-.10
		20	MSCA	Expressive/receptive	60	-.02
Bornstein et al. (1990)	Contingent responsiveness	5	Dyadic attention	Nonverbal communication	5	.30
		5	Nondistress vocalization	Expressive language	5	.45
		5	PPVT	Receptive language	32	.14
	Sensitivity	5	Dyadic attention	Nonverbal communication	5	.35
		5	Nondistress vocalization	Expressive language	5	.29
		5	PPVT	Receptive language	32	.37
Bornstein & Tamis-LeMonda (1997)	Contingent responsiveness	5	Language comprehension	Receptive language	13	.17
		13	Language comprehension	Receptive language	13	.25
Brady et al. (2004)	Sensitivity Contingent responsiveness Following child's lead	56	CSBS – Communication rate	Expressive language	56	.46
		56	CSBS – Pointing	Nonverbal communication	56	.54
Burchinal et al. (2008)	Support/encouragement Elaboration	6	Bayley II MDI	Expressive/receptive	15	.11
		15	Bayley II MDI	Expressive/receptive	15	.23
	Sensitivity Contingent responsiveness Following child's lead	6	Bayley II MDI	Expressive/receptive	15	-.13
		15	Bayley II MDI	Expressive/receptive	15	.23
Conti-Ramsden (1990) Sample 1	Elaboration	27	Speech intelligibility	Expressive language	27	.16
Conti-Ramsden (1990) Sample 2	Elaboration	50	Speech intelligibility	Expressive language	50	.58
Cress et al. (2008)	Contingent responsiveness	18	BDI - Expressive	Expressive language	18	.15
		18	BDI – Receptive	Receptive language	18	.35
	Following child's lead	18	BDI - Expressive	Expressive language	18	.01
		18	BDI – Receptive	Receptive language	18	.02
Cusson (2003)	Sensitivity Contingent responsiveness	7	RDLS – Receptive	Receptive language	26	.34
DesJardin (2006)	Elaboration	36	RDLS-3 – Receptive	Receptive language	36	.64
		36	RDLS-3 – Expressive	Expressive language	36	.63
	Following child's lead	36	RDLS-3 – Receptive	Receptive language	36	.54
		36	RDLS-3 – Expressive	Expressive language	36	.50
Dieterich et al. (2006)	Elaboration (during daily activities)	36	CELF-P – Expressive	Expressive language	36	.26
		36	CELF-P – Expressive	Expressive language	48	.31
		36	CELF-P – Receptive	Receptive language	36	.27
		36	CELF-P – Receptive	Receptive language	48	.30
		48	CELF-P – Expressive	Expressive language	48	.21
		48	CELF-P – Receptive	Receptive language	48	.19
	Elaboration (during toy play)	36	CELF-P – Expressive	Expressive language	36	.19
		36	CELF-P – Expressive	Expressive language	48	.17
		36	CELF-P – Receptive	Receptive language	36	.14
		36	CELF-P – Receptive	Receptive language	48	.16
		48	CELF-P – Expressive	Expressive language	48	.06
		48	CELF-P – Receptive	Receptive language	48	.07

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Dodici et al. (2003)	Caregiver/child mutuality Contingent responsiveness Support/encouragement	14	PPVT-3	Receptive language	54	.25
		24	PPVT-3	Receptive language	54	.33
		36	PPVT-3	Receptive language	54	.56
Dunham & Dunham (1992)	Contingent responsiveness	13	Infant vocal imitation	Expressive language	13	.17
		13	Lexical production	Expressive language	24	.44
Fewell & Deutscher (2002)	Sensitivity Support/encouragement Contingent responsiveness	30	PPVT-R	Receptive language	36	.40
		30	WPPSI-R Verbal IQ	Expressive/receptive	60	.48
Fewell & Deutscher (2004)	Caregiver/child mutuality Following child's lead Elaboration	30	VABS – Expressive	Expressive language	30	.34
		30	SBIS	Expressive/receptive	36	.47
		30	WPPSI-R Verbal IQ	Expressive/receptive	60	.51
Gartstein et al. (2008)	Sensitivity Contingent responsiveness Support/encouragement Elaboration	9	IBQ-R Vocal reactivity	Expressive language	9	.14
		9	IBQ-R – Vocal reactivity	Expressive language	9	.15
Girolametto et al. (2002) Sample 1	Contingent responsiveness	29	MCDI	Expressive language	29	.01
		29	Word types	Expressive language	29	.20
		29	Word combinations	Expressive language	29	.38
		29	Number of utterances	Expressive language	29	.07
	Contingent responsiveness	29	MCDI	Expressive language	29	-.34
		29	Word types	Expressive language	29	.54
		29	Word combinations	Expressive language	29	.24
		29	Number of utterances	Expressive language	29	.72
	Elaboration	29	MCDI	Expressive language	29	-.15
		29	Word types	Expressive language	29	.16
		29	Word combinations	Expressive language	29	.57
		29	Number of utterances	Expressive language	29	-.06
	Elaboration	29	MCDI	Expressive language	29	.16
		29	Word types	Expressive language	29	.61
29		Word combinations	Expressive language	29	.47	
29		Number of utterances	Expressive language	29	.18	
Girolametto et al. (2002) Sample 2	Contingent responsiveness	30	MCDI	Expressive language	30	.31
		30	Word types	Expressive language	30	.38
		30	Word combinations	Expressive language	30	.24
		30	Number of utterances	Expressive language	30	.04
	Contingent responsiveness	30	MCDI	Expressive language	30	.07
		30	Word types	Expressive language	30	.57
		30	Word combinations	Expressive language	30	.69
		30	Number of utterances	Expressive language	30	.91
	Elaboration	30	MCDI	Expressive language	30	.08
		30	Word types	Expressive language	30	.33
		30	Word combinations	Expressive language	30	.32
		30	Number of utterances	Expressive language	30	.21

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Girolametto et al. (2002) Sample 2, continued	Elaboration	30	MCDI	Expressive language	30	.16
		30	Word types	Expressive language	30	.51
		30	Word combinations	Expressive language	30	.56
		30	Number of utterances	Expressive language	30	.87
Goldberg et al. (1989)	Sensitivity Contingent responsiveness	6	SBIS	Expressive/receptive	48	.41
	Support/encouragement	6	SBIS	Expressive/receptive	48	.57
	Sensitivity	6	SBIS	Expressive/receptive	48	.37
Hart & Risley (1992)	Contingent responsiveness	23	SBIS	Expressive/receptive	36	.04
	Contingent responsiveness Elaboration	23	SBIS	Expressive/receptive	36	.33
	Caregiver/child mutuality	23	SBIS	Expressive/receptive	36	.54
Hirsh-Pasek & Burchinal (2006)	Sensitivity	6	PLS-3 Auditory	Receptive language	54	.54
		6	PLS-3 Expressive	Expressive language	54	.49
Karras & Braungart-Rieker (2003)	Sensitivity Support/encouragement Follow child's lead	12	Bayley MDI and SICD-R composite	Expressive/receptive	12	.20
		12	Bayley MDI and SICD-R composite	Expressive/receptive	16	.22
Kelly et al. (1996)	Contingent responsiveness	13	PLS – Expressive	Expressive language	36	.19
		13	PLS – Auditory	Receptive language	36	.41
		13	WPPSI	Expressive/receptive	60	.00
		20	PLS – Expressive	Expressive language	36	.18
		20	PLS – Auditory	Receptive language	36	.35
		20	WPPSI	Expressive/receptive	60	.10
	Caregiver/child mutuality Following child's lead	20	PLS – Expressive	Expressive language	36	.19
		20	PLS – Auditory	Receptive language	36	.33
		20	WPPSI	Expressive/receptive	60	.51
Keown et al.(2001)	Elaboration	43	CDI – Comprehension	Receptive language	43	.51
		43	CDI – Expressive	Expressive language	43	.53
	Contingent responsiveness Support/encouragement	43	CDI – Comprehension	Receptive language	43	.50
		43	CDI – Expressive	Expressive language	43	.51
	Following child's lead	43	CDI – Comprehension	Receptive language	43	.53
		43	CDI – Expressive	Expressive language	43	.62
Laakso et al. (1999)	Sensitivity Caregiver/child mutuality Support/encouragement Elaboration	14	MCDI – Comprehension	Receptive language	14	.32
		14	MCDI – Expressive	Expressive language	14	.18
		14	MCDI Communicative actions/gestures	Nonverbal communication	14	.23
Lyytinen et al. (2003) Sample 1	Contingent responsiveness Support/encouragement Elaboration	14	MCDI – Comprehension	Receptive language	14	.48
		14	MCDI – Expressive	Expressive language	14	.16
		14	RDLS – Receptive	Receptive language	18	.49
		14	RDLS – Expressive	Expressive language	18	.25
		14	RDLS – Receptive	Receptive language	30	.17
		14	RDLS – Expressive	Expressive language	30	.31

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Lyytinen et al. (2003) Sample 2	Contingent responsiveness Support/encouragement Elaboration	14	MCDI – Comprehension	Receptive language	14	.16
		14	MCDI – Expressive	Expressive language	14	.02
		14	RDLS – Receptive	Receptive language	18	.26
		14	RDLS – Expressive	Expressive language	18	.04
		14	RDLS – Receptive	Receptive language	30	.37
		14	RDLS – Expressive	Expressive language	30	.16
McDuffie & Yoder (2010)	Contingent responsiveness Elaboration	41	MCDI – Expressive	Expressive language	47	.47
		41	MCDI – Expressive	Expressive language	47	.44
	Contingent responsiveness	41	MCDI – Expressive	Expressive language	47	.17
	Contingent responsiveness Elaboration	41	MCDI – Expressive	Expressive language	47	.62
	41	MCDI – Expressive	Expressive language	47	.71	
Murray & Hornbaker (1997)	Following child’s lead	12	REEL – Expressive	Expressive language	24	.08
		12	REEL – Receptive	Receptive language	24	.22
		12	Bayley MDI	Expressive/receptive	24	.09
	Sensitivity Contingent responsiveness Following child’s lead	12	REEL – Expressive	Expressive language	24	.20
		12	REEL – Receptive	Receptive language	24	.25
	Contingent responsiveness Elaboration	12	Bayley MDI	Expressive/receptive	24	.37
		12	REEL – Expressive	Expressive language	24	.26
		12	REEL – Receptive	Receptive language	24	.30
		12	Bayley MDI	Expressive/receptive	24	.37
		12	Bayley MDI	Expressive/receptive	24	.37
Nelson et al. (1984)	Elaboration	22	Mean length of utterance	Expressive language	27	.34
		22	Longest utterance	Expressive language	27	.43
		22	Level of questions	Expressive language	27	.25
		22	Auxiliaries per verb	Expressive language	27	.35
		22	Verb complexity	Expressive language	27	.34
	Contingent responsiveness	22	Mean length of utterance	Expressive language	27	.03
		22	Longest utterance	Expressive language	27	-.15
		22	Level of questions	Expressive language	27	-.38
		22	Auxiliaries per verb	Expressive language	27	-.10
		22	Verb complexity	Expressive language	27	-.10
	Contingent responsiveness	22	Mean length of utterance	Expressive language	27	.36
		22	Longest utterance	Expressive language	27	.28
		22	Level of questions	Expressive language	27	.35
		22	Auxiliaries per verb	Expressive language	27	.12
		22	Verb complexity	Expressive language	27	.33
	Following child’s lead	22	Mean length of utterance	Expressive language	27	.26
		22	Longest utterance	Expressive language	27	.06
		22	Level of questions	Expressive language	27	-.11
		22	Auxiliaries per verb	Expressive language	27	.06
		22	Verb complexity	Expressive language	27	.09

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Roberts et al. (2005)	Sensitivity Contingent responsiveness Support/encouragement Elaboration	36	PPVT-R	Receptive language	36	.47
		36	PPVT-R	Receptive language	63	.26
		36	CELF – Receptive	Receptive language	48	.17
		36	CELF – Receptive	Receptive language	63	.19
		36	CELF – Expressive	Expressive language	48	.19
		36	CELF – Expressive	Expressive language	63	.29
Rush (1999)	Following child's lead	59	PPVT-R	Receptive language	59	.25
		59	EOWPVT – R	Expressive language	59	.24
	Contingent responsiveness	59	PPVT-R	Receptive language	59	.31
		59	EOWPVT – R	Expressive language	59	.27
Saxon (1997)	Contingent responsiveness Elaboration	6	MCDI - Vocabulary	Expressive language	17	.07
		6	MCDI – Vocabulary	Expressive language	24	.00
		8	MCDI – Vocabulary	Expressive language	17	-.12
		8	MCDI – Vocabulary	Expressive language	24	-.18
	Following child's lead	6	MCDI – Vocabulary	Expressive language	17	-.20
		6	MCDI – Vocabulary	Expressive language	24	-.08
		8	MCDI – Vocabulary	Expressive language	17	-.11
		8	MCDI – Vocabulary	Expressive language	24	.08
	Caregiver/child mutuality	6	MCDI – Vocabulary	Expressive language	17	.51
		6	MCDI – Vocabulary	Expressive language	24	.50
		8	MCDI – Vocabulary	Expressive language	17	.16
		8	MCDI – Vocabulary	Expressive language	24	.24
	Caregiver/child mutuality	6	MCDI – Vocabulary	Expressive language	17	.26
		6	MCDI – Vocabulary	Expressive language	24	.18
		8	MCDI – Vocabulary	Expressive language	17	.05
		8	MCDI – Vocabulary	Expressive language	24	.18
Shimpi & Huttenlocher (2007)	Contingent responsiveness	14	Vocabulary production	Expressive language	14	.12
		14	Vocabulary production	Expressive language	18	.24
		14	Vocabulary production	Expressive language	22	.11
		18	Vocabulary production	Expressive language	18	.17
		18	Vocabulary production	Expressive language	22	.08
		22	Vocabulary production	Expressive language	22	-.02
	Following child's lead	14	Vocabulary production	Expressive language	14	.05
		14	Vocabulary production	Expressive language	18	.02
		14	Vocabulary production	Expressive language	22	-.03
		18	Vocabulary production	Expressive language	18	.21
		18	Vocabulary production	Expressive language	22	.21
		22	Vocabulary production	Expressive language	22	.33
Siller & Sigman (2002)	Contingent responsiveness	54	ESCS – Response to joint attention bids	Nonverbal communication	66	.11
		54	ESCS – Joint attention initiations	Nonverbal communication	66	.67
		54	RDLS	Expressive/receptive	66	.15

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Siller & Sigman (2002), continued	Contingent responsiveness Elaboration	54	ESCS – Response to joint attention bids	Nonverbal communication	66	.63
		54	ESCS – Joint attention initiations	Nonverbal communication	66	.46
		54	RDLS	Expressive/receptive	66	.46
	Contingent responsiveness Support/encouragement	54	ESCS – Response to joint attention bids	Nonverbal communication	66	.57
		54	ESCS – Joint attention initiations	Nonverbal communication	66	.50
		54	RDLS	Expressive/receptive language	66	.33
Silvén et al. (2002)	Sensitivity Support/encouragement	12	Comprehension of expressions	Receptive language	12	.48
		12	Expressions	Expressive language	12	.31
		24	Two-word verb-sentences	Expressive language	24	.37
		24	Three-word verb-sentences	Expressive language	24	.36
		24	Multi-word verb-sentences	Expressive language	24	.32
	Sensitivity	12	Comprehension of expressions	Receptive language	12	.50
		12	Expressions	Expressive language	12	.41
		24	Two-word verb-sentences	Expressive language	24	.29
		24	Three-word verb-sentences	Expressive language	24	.26
		24	Multi-word verb-sentences	Expressive language	24	.32
	Support/encourage	12	Comprehension of expressions	Receptive language	12	.39
		12	Expressions	Expressive language	12	.32
		24	Two-word verb-sentences	Expressive language	24	.31
		24	Three-word verb-sentences	Expressive language	24	.34
		24	Multi-word verb-sentences	Expressive language	24	.30
Spencer & Meadow-Orlans (1996)	Contingent responsiveness Following child's lead Support/encouragement	12	Language level	Expressive language	12	.45
		18	Language level	Expressive language	18	.40
Steelman et al. (2002)	Support/encouragement	12	Joint attention	Nonverbal communication	12	.17
		12	Vocalizations	Expressive language	12	.12
		12	SICD – Receptive	Receptive language	24	.22
		12	SICD – Expressive	Expressive language	24	.16
		12	CELF-P – Receptive	Receptive language	40	.13
		12	CELF-P – Expressive	Expressive language	40	.12
		12	Gestures	Nonverbal communication	54	.20
		12	Verbalizations	Expressive language	54	.15
		12	Response to questions	Expressive/receptive	54	.26
		54	Gestures	Nonverbal communication	54	.29
		54	Verbalizations	Expressive language	54	.34
	54	Response to questions	Expressive/receptive	54	.54	
	Contingent responsiveness Caregiver/child mutuality	12	Joint attention	Nonverbal communication	12	.11

Appendix C, continued.

Study	Type of Interactional Behavior		Child Outcomes			
	Measure	Child Age (Months)	Measure ^a	Construct	Child Age (Months)	Effect Size (r)
Steelman et al. (2002), continued	Contingent responsiveness Caregiver/child mutuality	12	Verbalizations	Expressive language	12	.03
		12	SICD – Receptive	Receptive language	24	.16
		12	SICD – Expressive	Expressive language	24	.07
		12	CELF-P – Receptive	Receptive language	40	.07
		12	CELF-P – Expressive	Expressive language	40	.07
		12	Gestures	Nonverbal communication	54	.14
		12	Verbalizations	Expressive language	54	.10
		12	Response to questions	Expressive/receptive	54	.15
		54	Gestures	Nonverbal communication	54	.34
		54	Verbalizations	Expressive language	54	.38
		54	Response to questions	Expressive/receptive	54	.55
Tomasello & Todd (1983)	Caregiver/child mutuality	12	Vocabulary size	Expressive language	17	.84
Wallace et al. (1998)	Sensitivity	12	Bayley MDI	Expressive/receptive	12	.16
		12	SICD – Expressive	Expressive language	12	.07
		12	SICD – Receptive	Receptive language	12	.31
		12	CSBS Composite	Expressive language	12	.10
	Contingent responsiveness	12	Bayley MDI	Expressive/receptive	12	.14
		12	SICD – Expressive	Expressive language	12	.02
		12	SICD – Receptive	Receptive language	12	.38
		12	CSBS Composite	Expressive language	12	.15
	Elaboration	12	Bayley MDI	Expressive/receptive	12	.23
		12	SICD – Expressive	Expressive language	12	.13
		12	SICD – Receptive	Receptive language	12	.48
12		CSBS Composite	Expressive language	12	.24	

^aMeasures used to assess child outcomes:

- Bayley MDI = *Bayley Scales of Infant Development – Mental Development Index* (Bayley, 1969)
 Bayley II MDI = *Bayley II Scales of Infant Development – Mental Development Index* (Bayley, 1993)
 BDI = *Batelle Developmental Inventory* (Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984)
 CDI = *Child Development Inventory* (Ireton, 1992)
 CSBS = *Communications and Symbolic Behavior Scales* (Wetherby & Prizant, 1993)
 EOWPVT-R = *Expressive One-Word Picture Vocabulary Test – Revised* (Gardner, 1990)
 CELF-P = *Clinical Evaluation of Language Fundamentals-Preschool* (Wiig, Secord, & Semel, 1992)
 ESCS = *Early Social Communication Scale* (Seibert, Hogan, & Mundy, 1982)
 IBQ-R = *Infant Behavior Questionnaire-Revised* (Gartstein & Rothbart, 2003)
 MCDI = *MacArthur Communicative Development Inventory* (Fenson, et al., 1993)
 MSCA = *McCarthy Scales of Children's Abilities* (McCarthy, 1972)
 PLS = *Preschool Language Scale* (Zimmerman, Steiner, & Pond, 1979)
 PLS-3 = *Preschool Language Scale-Third Edition* (Zimmerman, Steiner, & Pond, 1992)
 PPVT = *Peabody Picture Vocabulary Test* (Japanese translation; Tanimoto, Nagano, & Tajima, 1975)
 PPVT-R = *Peabody Picture Vocabulary Test-Revised* (Dunn & Dunn, 1981)
 PPVT-3 = *Peabody Picture Vocabulary Test-Third Edition* (Dunn & Dunn, 1997)
 REEL = *Receptive-Expressive Emergent Language Inventory* (Bzoch & League, 1970)
 RLS = *Reynell Language Scales* (Reynell & Huntley, 1971)
 RDLS = *Reynell Developmental Language Scales* (Reynell & Huntley, 1987)
 RDLS-3 = *Reynell Developmental Language Scales-Third Edition* (Reynell & Gruber, 1990)

SBIS = *Stanford-Binet Intelligence Scale* (Terman & Merrill, 1973)

SICD-R = *Sequenced Inventory of Communication Development – Revised* (Hendrick, Prather, & Tobin, 1984)

VABS = *Vineland Adaptive Behavior Scales* (Sparrow, Balla, & Cicchetti, 1984)

WPPSI = *Wechsler Preschool and Primary Scale of Intelligence* (Wechsler, 1967)

WPPSI-R = *Wechsler Preschool and Primary Scale of Intelligence-Revised* (Wechsler, 1989)