

# Assessing Father–Infant Interactions Using the NCAST Teaching Scale: A Pilot Study

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Key Words: assessment process, occupational therapy • infant • parent–infant bonding

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*This article was accepted for publication March 3, 1999, under the editorship of Elaine Viseltear.*

*Objective.* The purpose of this pilot study was to gather preliminary data on father–infant dyads using the Nursing Child Assessment Satellite Training (NCAST) Teaching scale, a parent–infant interaction measure, to determine whether and how fathers score differently than mothers from normative samples.

*Method.* Interactions between first-time fathers ( $N = 15$ ) and their infants, 3 months to 6 months of age, during the instruction of an unfamiliar play activity were rated using the NCAST Teaching scale. Scores were compared both with a normative database ( $N = 2,123$ ) of mother–infant dyads and with a subsample ( $n = 34$ ) of the normative database to control for demographic variables, including the age, gender, and birth parity of the child and the age, education, marital status, and ethnicity of the parent.

*Results.* The fathers scored significantly lower on items related to fostering the infants' cognitive growth than the mothers in the normative database. However, the infants in this study provided clearer behavioral cues and were more responsive to their fathers than the infants in the normative sample. These findings were also true for the subsample comparison. The fathers also scored significantly lower than the normative subsample on items measuring their ability to foster the social and emotional growth of their infants.

*Conclusion.* There may be important differences in the interactions of father–infant dyads compared with mother–infant dyads, but further research with a larger, more representative sample of fathers on this parent–infant interaction measure is warranted to support this. The development of normative scores for fathers and their infants is recommended to accurately interpret father–infant interactions when administering the NCAST Teaching scale.

Nakamura, W. M., Stewart, K. B., & Tatarka, M. E. (2000). Assessing father–infant interactions using the NCAST Teaching Scale: A pilot study. *American Journal of Occupational Therapy*, 54, 44–51.

The interactions between parents and their infants have been described as a dance, a dynamic and ongoing reciprocal exchange between the participants, and provide the basis for later motor (Barnard & Kelly, 1990), gender–role (Bronstein, 1988), social, cognitive, and language development (Barnard & Kelly, 1990; Comfort & Farran, 1994; Hanzlik, 1993; Lewis, Feiring, & Weinraub, 1981; Radin, 1981; Volling & Belsky, 1992). The elements of interaction that both parent and infant contribute build the foundation for a strong and enduring relationship (Sumner & Spietz, 1994a). In the Child Health Assessment Model (Barnard & Eyres, 1979), the parent–infant interaction is hypothesized to be a potent predictor of the child's subsequent development (Bee et al., 1982). Pediatric occupational therapists who strive to understand the factors that influence development must view the child as part of the family system and consider the relation-

ships between each member of the family. Through a better understanding of the interactions between parent and infant, therapists can improve parents' competence in fostering the social, emotional, and cognitive growth of their children, both with and without disabilities (Davis, 1994).

In early intervention, one of the assessments used to understand parent–infant interactions is the Nursing Child Assessment Satellite Training (NCAST) Teaching scale (Sumner & Spietz, 1994a). This observation tool assesses interactions during instrumental play and is based on the theory that each partner in the relationship has responsibilities to facilitate an ongoing dialogue of reciprocity (Barnard, 1976). The elements of interaction evaluated are (a) the parent's ability to recognize and respond to the infant's cues (Sensitivity to Cues), (b) the parent's ability to alleviate infant distress signals (Response to Distress), (c) the parent's ability to communicate a warm and positive feeling during the interaction (Social–Emotional Growth Fostering), (d) the parent's ability to make opportunities for growth and learning available to the infant (Cognitive Growth Fostering), (e) the infant's ability to provide clear clues to the parent (Clarity of Cues), and (f) the infant's ability to respond to the caregiver's attempts at communication (Responsiveness to Caregiver) (Sumner & Spietz, 1994a). Each of these elements must be present for an optimal interaction to occur. Administered to a parent–infant dyad when the infant is between birth and 36 months of age, the NCAST Teaching scale evaluates the adaptive patterns of both parent and infant at what Vygotsky (1978) described as the infant's zone of proximal development where the infant cannot perform emergent skills independently but requires the help of the parent (Case-Smith, 1996).

Customarily, interaction scales have been normed using only mother–infant dyads; however, infants interact with a wide variety of persons other than their mothers (Baird & Peterson, 1997). In particular, the number of fathers with preschool-age children who perform child care functions formerly performed by mothers has increased over the past several decades (Casper, 1997). Although the research on mother–infant dyads using the NCAST Teaching scale is extensive (Farel, Freeman, Keenan, & Huber, 1991; Gross, Conrad, Fogg, Willis, & Garvey, 1993; Koniak-Griffin, Verzemnieks, & Cahill, 1992; Lobo, Barnard, & Coombs, 1992), caregiving patterns have changed such that dyads other than mother–infant ones must be considered.

Occupational therapists working in early intervention programs should be aware of the unique ways in which mothers and fathers interact with their infants. The research literature reveals some general differences between father–infant and mother–infant interactions. Lamb (1977, 1981) observed that fathers were more likely to spend a greater percentage of the time engaged in play activities, whereas mothers were more likely to be engaged in caregiving activities. Fathers tended to play more physical games

(e.g., bouncing, lifting, rough-and-tumble activities), and mothers tended to engage in more “distal” games mediated by objects (e.g., play with toys, reading, attention-getting activities) (Clarke-Stewart, 1980; Lamb, 1981). Interaction styles may also be influenced by the infant's gender. Fathers engaged in physical play (lifting and tossing activities) with their sons, especially firstborn sons, and held their daughters closely and vocalized to them; mothers talked to and touched their daughters more than sons (Parke & Sawin, 1980). Fathers verbalized less, used different language forms, and were less able to adapt their speech patterns to match the cognitive abilities of the infant (Walker & Armstrong, 1995) than mothers. Bentley and Fox (1991) observed that although fathers and mothers shared similar developmental expectations and agreed on how to discipline their young children, mothers reportedly performed more nurturing behaviors that promote a child's psychological development (e.g., reading to the child at bedtime) than fathers. Additionally, although both parents were sensitive to reading the distressed infant's cues (Parke, 1981; Yogman, Dixon, Tronik, Als, & Brazelton, 1977), differences were observed in how fathers and mothers respond to these distress signals. Fathers were more likely to respond with soothing vocalizations, whereas mothers were more likely to respond with touch (Parke & Sawin, 1976).

Few studies have attempted to describe father–infant interactions using the NCAST Teaching scale, and the results are contradictory. Harrison (1990) compared the NCAST Teaching scale scores of mothers and fathers of both preterm ( $N = 28$ ) and full-term ( $N = 31$ ) infants at 3 months of age after hospital discharge and found no significant differences between mother–infant and father–infant scores for either preterm infants or full-term infants. In a follow-up study by Harrison and Magill-Evans (1996), in which families of preterm ( $N = 57$ ) and full-term ( $N = 57$ ) infants were matched according to infant gender, expected due date, and hospital of birth, and were administered the NCAST Teaching scale at 3 months after discharge, fathers scored lower than mothers in their ability to foster the infants' cognitive growth, regardless of the degree of parental stress or marital support reported by the parent. The authors suggested, however, that the NCAST Teaching scale scores may not reflect the full repertoire of interaction skills typically held by fathers.

The findings of these two studies do not reveal whether or how father–infant interactions and mother–infant interactions differ from each other nor how favorably these parent–infant interactions compared with the normative values of the NCAST Teaching scale. Because the quality of parent–infant interactions has a great impact on the overall development of the infant, information on the unique ways in which fathers interact with their infants would be important to pediatric occupational therapists. Therefore, we conducted a pilot study to gather preliminary data on father–infant interactions using the NCAST

Teaching scale. We compared the scores of father–infant dyads from first-time, two-parent families in which the child does not have a disability to the normative values of the NCAST Teaching scale database.

## Method

### *Participants*

The current study was embedded in the research of the Becoming Parents Project (BPP), conducted by the University of Washington School of Nursing. The purpose of the BPP was to investigate the efficacy of a parent education program offered during pregnancy to foster more positive parent–infant interactions. Two-parent families were recruited for the BPP through a local hospital in the Pacific Northwest region. Information about the BPP was distributed to parents in a prenatal care clinic; participation in the study was voluntary. Participants were married and living together, spoke English as their primary language, were expecting their first child, and did not have concerns that the marital relationship was in immediate danger of dissolution. Families in which the infant might be at risk for developing physical or cognitive disabilities were excluded from the study.

Families were randomly assigned to either an intervention or control group for the BPP. Before the birth of the child, the intervention group ( $n = 9$ ) was enrolled in a 6-week program designed to teach parents effective communication skills to promote marital satisfaction, to help parents explore roles other than that of a parent, and to educate parents about infant development and behavior. The control group ( $n = 6$ ) was not provided with the parent education program. Participants in both the experimental and control groups were requested not to participate in a parenting skills program at any time other than those indicated by the BPP protocol.

### *Instrument*

The quality of the interaction between fathers and their infants was measured using the NCAST Teaching scale. This scale was chosen as one method of measuring the caregiving environment of infants.

*NCAST Teaching scale database.* The database of normative scores for the NCAST Teaching scale is composed of a set of cases that were observed in person by health care professionals who were establishing interrater reliability toward certification in the NCAST Teaching scale from 1979 to 1994 (Sumner & Spietz, 1994a). The normative scores of the mother–infant dyads are provided in the instruction manual of the NCAST Teaching scale (Sumner & Spietz, 1994a) to guide the clinician in the evaluation process. Normative mean scores are provided on the basis of several demographic variables: infant gender, birth parity, parental education, and parental ethnicity. According to Sumner and Spietz (1994a), these variables may have an

impact on the NCAST Teaching scale scores of parent–infant dyads and must be considered when interpreting scores.

*Scoring the NCAST Teaching scale.* The teaching scale is constructed of 73 item subskills for interaction and marked either *yes* or *no* as observed by the clinician during the interaction; yes answers are totaled to provide a score. The subskills are divided into four subscales for the parent—Sensitivity to Cues, Response to Distress, Social Emotional Growth Fostering, and Cognitive Growth Fostering—and two subscales for the infant—Clarity of Cues and Responsiveness to Caregiver. Summary scores include the total scores for each subscale, the Parent Total Score, Child Total Score, and Parent/Child Total Teaching Score. Sumner and Spietz (1994a) identified items that require reciprocal interaction between parent and infant as “contingency items” (e.g., parent responds to the child’s vocalizations with verbal response). A separate contingency score is determined for both parent and infant—Parent Contingency Score and Child Contingency Score.

Sumner and Spietz (1994a) also identified clinically relevant cutoff scores for Parent Total, Child Total, and Parent/Child Total Teaching Scores. These cutoff scores “reflect the 10th percentile of the distribution of scores obtained by healthy full-term infants and their mothers who were 20 years or older and had 12 or more years education” (Sumner & Spietz, 1994a, p. 111). According to the instruction manual of the NCAST Teaching scale, scores that fall below the 10th percentile are considered “worrisome” and indicate cases that warrant further assessment and possible intervention.

*Reliability and validity.* As reported in the instruction manual of the NCAST Teaching scale (Sumner & Spietz, 1994a), reliability estimates, including internal consistency and test–retest reliability, are at acceptable levels. Studies on the validity of the teaching scale suggest that the NCAST scores correlate well with other measures of child development (Sumner & Spietz, 1994a), discriminate between low-risk and high-risk populations (Bee, Disbrow, Johnson-Crowley, & Barnard, 1981; Blackwell & Kaiser, 1994; Free, Russell, & Mills, 1989) and indicate a moderate level of predictive validity in infants who are typically developing (Sumner & Spietz, 1994a).

*NCAST Teaching scale certification training.* The teaching scale must be administered by a person who is certified in NCAST. From 1979 to 1994, examiners establishing interrater reliability in the administration of the teaching scale were tested using in-person observations of mother–infant interactions; professionals seeking certification in teaching scale administration after 1994 establish interrater reliability using videotaped interactions. Examiners using the NCAST for clinical purposes must demonstrate at least 85% interrater reliability, and examiners using the NCAST for research purposes must establish interrater reliability at 90% or greater.

## Procedure

The principal investigator of this pilot study underwent certification training in 1998, using videotaped interactions; obtained the required 90% interrater reliability; and was granted certification by the NCAST program.

When the infants were approximately 4 months old, the BPP participants were administered the NCAST Teaching scale; the interactions between the fathers and infants were videotaped and scored. To control for observer bias, the principal investigator of this pilot study was blind to the BPP intervention or control status of the father–infant dyad during data collection. Each videotaped interaction was reviewed, and the NCAST Teaching scale score sheet was completed according to the protocol established by the instruction manual (Sumner & Spietz, 1994a). Participant demographics and teaching scale scores for each father–infant dyad were entered into a database for statistical analysis.

## Data Analysis

Descriptive and inferential statistics were computed using the Statistical Package for the Social Sciences (SPSS, 1995) from the raw data obtained in observations. An alpha level of .05 was used for all statistical tests.

To determine the equivalency of the father–infant dyads of the BPP intervention and control groups, demographic variables and NCAST Teaching scale scores were compared using chi-square goodness-of-fit and Mann Whitney *U* tests. If equivalency was determined, data would be pooled, increasing the sample size and, thus, increasing the statistical power in comparisons made with the normative database.

Clinical interpretation of NCAST Teaching scale scores are made using the mean scores in tables provided in the instruction manual of the teaching scale (Sumner & Spietz, 1994a). To compare the father–infant dyads' demographic variables and scores with those of the mother–infant dyads of the normative database, chi-square goodness-of-fit and one-sample *t* tests were used. Additionally, the individual scores of the sample of father–infant dyads were compared with the “worrisome” scores for 1-month-old to 12-month-old infants to identify any potentially low interaction scores and at-risk dyads in the father–infant sample.

The demographics between the father–infant sample and the mother–infant database were significantly different on six variables: child's age, birth parity, parent's age, parent's education, marital status, and parent's ethnicity. As a result, further analysis was conducted to control for these variables. Post hoc comparisons were made between the sample of father–infant dyads and a subsample constructed from the electronic database of mother–infant dyads (Sumner & Spietz, 1994b). The complete normative database of mother–infant dyads was systematically reduced to

match the demographics of the father–infant sample. Cases that matched the six demographic criteria were selected by exclusion (constructed sample,  $n = 34$ ). Comparisons between the father–infant sample and the mother–infant constructed subsample were made using chi-square goodness-of-fit and one-way analysis of variance.

## Results and Discussion

For the purposes of this pilot study, 15 of the 23 original interactions of the father–infant dyads involved in the BPP were analyzed. The remaining 8 videotapes presented technical problems inherent in videotaping (e.g., poor sound, lighting, camera positioning).

### *BPP Intervention and Control Group Equivalency*

No significant differences in demographic variables were found between the BPP intervention ( $n = 9$ ) and control ( $n = 6$ ) groups for fathers' age, education, and ethnic identity or for children's age and gender. There were also no significant differences in teaching scale scores between the two groups. Because of the equivalency between the intervention and control groups, the father–infant dyads were grouped as a single sample ( $N = 15$ ) to make comparisons with the mother–infant dyad database.

### *Father–Infant Sample Versus Normative Mother–Infant Database*

The demographics of the father–infant dyads differed significantly from that of the entire database of mother–infant dyads on all variables except infant gender (see Table 1). On average, children of father–infant dyads were younger than children of mother–infant dyads,  $t(14) = -49.32, p < .001$ , and a greater percentage were firstborn [ $1, \chi^2(1, n = 15) = 16.12, p < .001$ ]. The fathers in this study were older,  $t(14) = 3.92, p = .002$ , and had more education,  $t(14) = 3.98, p = .001$ , than the mothers in the normative database. Additionally, a greater percentage were married,  $\chi^2(1, n = 15) = 4.43, p = .035$ , and identified themselves as European-American,  $\chi^2(2, n = 15) = 12.78, p = .002$ , than the mothers in the normative database.

Overall norms for the entire database of mothers are not provided by the NCAST Teaching scale instruction manual, but instead are provided according to important variables, including infant gender, birth parity, parental ethnic identity, and level of parental education. When compared with the norms based on these variables, father–infant scores on three of the subscales—Sensitivity to Cues, Response to Distress, and Social Emotional Growth Fostering—were not significantly different (see Table 2). These findings were consistent with observations of previous studies regarding sensitivity to infant cues (Yogman et al., 1977) and response to infant distress (Parke & Sawin, 1976). However, the father–infant scores for the Cognitive Growth Fostering subscale were found to be significantly lower than the norms for mothers.

**Table 1**  
**Comparison of Demographic Variables**

Demographics	Observed Sample of Father-Infant Dyad (N = 15)			Normative Database of Mother-Infant Dyads (N = 2,123)				Constructed Sample of Mother-Infant Dyads (n = 34)			
	M or %	SD	Range	M or %	SD	Range	p	M or %	SD	Range	p
Child's age (in months)	4.2	0.89	3-6	15.5	9.79	0-36	***	4.4	1.18	3-6	NS
Child's gender (% male)	46.7	—	—	52.3	—	—	NS	47.1	—	—	NS
Birth parity (% firstborn)	100.0	—	—	48.2	—	—	***	100.0	—	—	NS
Parent's age (years)	32.6	6.81	23-46	25.7	5.78	13-42	**	29.4	3.09	24-38	NS
Parent's education (years)	16.7	3.24	12-23	13.4	2.77	6-20	**	16.2	1.72	12-20	NS
Marital status (% married)	100.0	—	—	77.2	—	—	*	100.0	—	—	NS
Parent's ethnicity (% European-American)	100.0	—	—	54.0	—	—	**	100.0	—	—	NS

Note. Data for mothers from *NCAST Caregiver/Parent-Child Interaction Teaching Manual*, p. 106, by G. Sumner and A. Spietz, 1994, Seattle, WA: NCAST, University of Washington, School of Nursing. Copyright 1994 by NCAST Publications. Reprinted with permission. NS = Not significant.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

The items in the Cognitive Growth Fostering subscale “help assess whether the caregiver is aware of the child’s present level of understanding” (Sumner & Spietz, 1994a, p. 63) (e.g., caregiver uses at least two different sentences or phrases to describe the task to the child). Similar to findings in other studies (Bentley & Fox, 1991; Harrison & Magill-Evans, 1996), our data revealed that fathers scored lower than mothers in their ability to provide an environment most conducive to the cognitive development of the infant, as measured by the NCAST Teaching scale. Walker and Armstrong (1995) observed that fathers may use different language forms in interacting with their infants, which supports the hypothesis proposed by Harrison and Magill-Evans (1996) that parent-infant interaction measures that are developed using mothers may not fully assess the unique interaction skills typically presented by fathers.

The results of this pilot study also indicate that the sample of infants scored higher on the Clarity of Cues and Responsiveness to Caregiver subscales than the infants in the normed study (see Table 2). The items in the Clarity of Cues subscale demonstrate the clarity and skill with which the child is able to communicate. The items in the Responsiveness to Caregiver Subscales demonstrate the child’s ability to respond to the cues sent by the caregiver. These results suggest that the infants in this pilot study were clearer and more skillful in providing cues to their fathers and were more responsive to the cues sent by their fathers than the infants in the normed study in interactions with their mothers. A correlation analysis revealed no significant linear correlation between fathers’ and infants’ scores. Because the interactions between parent and infant are part of complex relationships and may be influenced by many envi-

**Table 2**  
**Comparison of Mean NCAST Teaching Scale Scores Between Dyad Samples and Databases**

NCAST Teaching Scale Subscale Scores	Mean Scores of Observed Sample of Father-Infant Dyads (N = 15)			Normative Mean Scores of Mother-Infant Dyads in NCAST Teaching Scale Database													
	Range	M (SD)	p <sup>a</sup>	Infant Gender				Birth Parity		Parent Ethnicity		Parent Education > 12 years					
				Male	Female	Firstborn	European-American	M	SD	M	SD						
Parent Subscales																	
Sensitivity to Cues	0-11	9.33 (0.90)	—	9.41 (0.98)	—	9.35 (1.58)	—	9.31 (1.67)	—	9.72 (1.30)	—	9.16 (1.62)	—				
Response to Distress	0-11	10.20 (1.42)	—	10.16 (1.65)	—	10.24 (1.55)	—	10.18 (1.56)	—	10.31 (1.53)	—	10.04 (1.78)	—				
Social Emotional Growth Fostering	0-11	9.00 (1.31)	*	9.22 (1.70)	—	9.22 (1.68)	—	9.19 (1.71)	—	9.56 (1.37)	—	8.99 (1.83)	—				
Cognitive Growth Fostering	0-17	10.53 (2.86)	*	12.90 (3.34)	*	12.96 (3.28)	*	12.78 (3.50)	*	13.82 (2.64)	**	12.51 (3.39)	*				
Parent Total Score	0-50	39.07 (4.68)	*	41.69 (6.53)	—	41.77 (6.37)	—	41.46 (8.44)	—	43.41 (5.09)	**	40.69 (6.85)	—				
Child Subscales																	
Clarity of Cues	0-10	8.87 (0.99)	—	8.11 (1.44)	—	8.04 (1.49)	**	8.03 (1.52)	**	8.20 (1.34)	*	7.99 (1.49)	**				
Responsiveness to Caregiver	0-13	9.67 (2.02)	**	7.73 (3.12)	—	7.54 (3.21)	**	7.58 (3.17)	**	7.95 (2.88)	**	7.45 (3.16)	**				
Child Total Score	0-23	18.53 (2.56)	**	15.84 (4.20)	—	15.58 (4.28)	**	15.61 (4.30)	**	16.15 (3.84)	**	15.44 (4.29)	***				
Parent/Child Total Teaching Score	0-73	57.60 (5.88)	—	57.53 (8.67)	—	57.35 (8.81)	—	57.07 (9.09)	—	59.56 (6.95)	—	56.13 (8.88)	—				
Contingency Scores																	
Parent Contingency	0-20	14.33 (2.92)	**	16.57 (3.56)	*	16.64 (6.43)	—	16.34 (3.68)	*	17.35 (2.90)	**	16.09 (3.64)	*				
Child Contingency	0-12	8.73 (1.87)	**	7.02 (2.91)	—	6.85 (2.99)	**	6.88 (2.95)	**	7.21 (2.68)	**	6.76 (2.95)	**				

Note. Data for mothers from *NCAST Caregiver/Parent-Child Interaction Teaching Manual*, p. 106, by G. Sumner and A. Spietz, 1994, Seattle, WA: NCAST, University of Washington, School of Nursing. Copyright 1994 by NCAST Publications. Reprinted with permission.

<sup>a</sup>Based on comparisons made between observed sample of fathers (N = 15) and constructed sample of mothers (n = 34). <sup>b</sup>Based on comparisons made between observed sample of fathers with their sons (n = 7) and the normative mean scores for mothers with their sons (n = 1,111). <sup>c</sup>Based on comparisons made between observed samples of fathers with their daughters (n = 8) and the normative mean scores for mothers and their daughters (n = 1,012). <sup>d</sup>Based on comparisons made between observed sample of first-time fathers (n = 15) and the normative mean scores of first-time mothers (n = 1,019). <sup>e</sup>Based on comparisons made between observed sample of European-American fathers (n = 15) and the normative mean scores of European-American mothers (n = 963). <sup>f</sup>Based on comparisons made between observed sample of fathers with high education (n = 15) and the normative mean scores for mothers with high education (n = 469).

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

ronmental and interactional factors, neither association nor causation should be inferred between parent scores and infant scores.

Conversely, the Parent/Child Total Teaching Scores of the father–infant dyads were not significantly different from the normative scores of the mother–infant dyads in the database of the NCAST Teaching scale (see Table 2). These results suggest that when interaction scores are totaled, the overall performance of the fathers and their infants was similar to the overall performance of the mothers of the normative database and their infants. All father–infant dyads in this study scored higher than the “worrisome” Parent/Child Total Teaching Scores identified by Sumner and Spietz (1994a) for European-American mothers and infants who were 1 month to 12 months of age, suggesting that the father–infant interactions of this study were within the range of scores established for healthy interactions.

#### *Father–Infant Sample Versus Constructed Mother–Infant Sample*

Demographic variables were controlled using a constructed sample ( $n = 34$ ) from the NCAST Teaching scale normative database (see Table 1). The parent subscale scores of the father–infant sample were not significantly different from those of the mother–infant constructed subsample for two of the subscales—Sensitivity to Cues and Response to Distress (see Table 2). However, significant differences were observed between the father–infant sample and the mother–infant subsample for the Social Emotional Growth Fostering and Cognitive Growth Fostering subscales. These observations remain fairly consistent with the comparisons between the father–infant sample and the entire normative database. As measured by the NCAST Teaching scale, the fathers in this study scored significantly lower than mothers on their ability to communicate a warm and positive feeling during the interaction and to make opportunities for growth and learning available to the infant. It is hypothesized that because fathers more typically engage their infants in “physical” play activities and less in “distal” activities, such as those required by the NCAST Teaching scale (e.g., squeeze a squeeze toy, turn pages of a book, string a set of beads), fathers may not have the opportunity to demonstrate the range of their parenting skills.

The infant scores for the father–infant sample were not significantly different than those of the mother–infant subsample for the Clarity of Cues subscale (see Table 2). Interestingly, the results indicate that the infants in both the father–infant sample and the mother–infant subsample provided clearer cues to their respective caregivers than the infants in the entire mother–infant database. The scores for the Responsiveness to Caregiver subscale were significantly higher for the father–infant sample compared with the mother–infant subsample. These findings suggest that even when demographic variables were controlled, the infants in

this study were more responsive to their fathers’ attempts to communicate and interact than were the infants in the normative database.

Comparisons of the Parent/Child Total Teaching Scores indicate no significant differences between the father–infant sample and the mother–infant subsample (see Table 2). As in comparisons made with the entire database of mother–infant dyads, the results suggest that the overall interactions between the fathers in this sample and their infants is very similar to the interactions between the mothers in the normative database and their infants, even when demographic variables are controlled.

The findings indicate that although the overall interactions of the father–infant sample and the normative mother–infant database are very much the same as scored using the NCAST Teaching scale, even when demographic variables were controlled, there may be some important interactional differences between both members of the dyad. The results of this study provide evidence for building a normative database of NCAST Teaching scale scores for father–infant dyads and are supported by recent studies that compare the scores of father–infant dyads and mother–infant dyads using the NCAST Teaching scale (Harrison, Magill-Evans, & Benzies, in press).

#### *Limitations*

Several factors may affect the generalizability of the results of this pilot study. The small sample size of father–infant dyads may significantly affect the power of statistical comparisons made between the intervention and control subsamples of the BPP study as well as the comparisons made between this study’s sample of fathers and the sample of mothers in the normative database. Additionally, the sample of fathers—older and more educated, European-American fathers from a single geographic region—may not be representative of the population of fathers.

Because participants were sampled by convenience, a selection bias may have been introduced. There may be inherent differences in interaction styles between those fathers who responded to the invitation to participate in the BPP study and the general population of fathers.

The method of data collection—videotaped observation—differed from that used in the normative database, in-person observation. Because a study on the equivalency of scoring through videotaped versus in-person observations has not been conducted, the results of this pilot study should be viewed as preliminary.

A final limitation is that the principal investigator was newly certified in the administration and scoring of the NCAST Teaching scale. Although 90% interrater agreement was established at the beginning of data collection, reliability checks during data collection could not be conducted, resulting in possible examiner drift. Periodic reliability checks with another NCAST-certified observer would strengthen this study.

## Directions for Future Research

The results of this study warrant further exploration of the interaction patterns of fathers with their infants, particularly the developmental influences during “physical” play interactions. Studies that include a large and diverse sampling of fathers and infants who have been stratified on the basis of important and potentially confounding variables (e.g., infant gender, infant age, birth parity, parent age, parent education, marital status, parent ethnicity) would be important in investigating the application of the NCAST Teaching scale on this population.

Sumner and Spietz (1994a) also noted a variance in the distribution of scores on the basis of the infant’s age. Studies that examine the distribution of normative scores of the NCAST Teaching scale on the basis of the infant’s age may be helpful in investigating how parent–child interactions change over the course of a child’s development and may assist occupational therapists in reevaluating intervention strategies over time.

## Implications for Occupational Therapy

The results of this study may have important implications for occupational therapy in family-centered early intervention services. Occupational therapists who examine parent–infant interactions in early intervention programs should be cautious when using standardized measures on populations for which the tests have not been developed and normed. Until a normative database of father–infant dyads can be developed, evaluations of fathers using the normative scores of mothers should be performed judiciously. Additionally, as the authors of the NCAST measures advise no single assessment should be used to evaluate parent–infant interactions (Sumner & Spietz, 1994a). Instead, a variety of assessments should be administered to identify problems in varying environments and under different circumstances.

## Conclusion

On the basis of comparisons of this pilot study, there may be interactional differences between fathers and mothers with respect to their abilities to foster the social-emotional and cognitive growth of their infants, as measured by the NCAST Teaching scale. Because of these interactional differences, mother-normed measures such as the NCAST Teaching scale may not provide an accurate evaluation of the unique ways in which fathers and their infants interact. Normative studies of the similarities and differences between fathers’ and mothers’ interactions with their infants are important in providing information to occupational therapists involved in early intervention programs. This information may assist those who assess and plan intervention strategies for children with disabilities and their families and those who identify potential problems for children who are at risk for developing disabilities. As fathers become

increasingly involved in providing care to their infants, the development of normative scores for fathers and their infants will help occupational therapists involved in early intervention programs better understand the relationship-focused mechanisms that influence child development. ▲

## Acknowledgments

We thank the families who generously agreed to participate in the Becoming Parents Project; Pamela Jordan, PhD, RN, the primary investigator for the Becoming Parents Project (Department of Family and Child Nursing, Box 357262, University of Washington, Seattle, WA 98195-7262), whose collaboration and support made this research endeavor possible; and Anita Spietz, RN, MN, Assistant Director of NCAST Programs (Box 357920, University of Washington, Seattle, WA 98195-7920), who assisted with NCAST certification and clarification of test items.

This work was supported by a grant from the University of Puget Sound Enrichment Committee (Grant # 2.2433.003). We thank the University Enrichment Committee for its support of student and faculty research.

This study was completed in fulfillment of the first author’s Master of Occupational Therapy degree at the University of Puget Sound.

Mary E. Tatarka, PhD, PT, who contributed substantially to the research project’s completion, passed away unexpectedly during the final writing of this article. The remaining authors sincerely acknowledge her contributions and commitment to student and faculty collaborative research in the area of pediatrics and infant behavior.

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