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Caregiver Interaction Behavior With Prenatally Cocaine-Exposed and Nonexposed Preschoolers

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This study examined the quality of caregiver-child interaction as measured by the Parent/Caregiver Involvement Scale (PCIS), with a sample of 41 preschoolers who were prenatally exposed to cocaine and 39 nonexposed preschoolers. Within the cocaine group, 19 children were in the care of relatives or foster caregivers and 22 were in the care of their biological mothers. Results suggest that mothers of nonexposed children were significantly more emotionally and developmentally appropriate than caregivers of prenatally cocaine-exposed children, and no significant differences in interaction behavior were found between biological mothers and foster caregivers of prenatally cocaine-exposed children. The importance of conceptualizing this population of children within the context of their environment is stressed.

Approximately 10 years of research has suggested that cocaine use during pregnancy increases a number of pre- and post-natal risks such as spontaneous abortion, abruptio placentae, premature delivery, sudden infant death syndrome (SIDS), as well as neonatal developmental and neurobehavioral difficulties such as tremors, poor behavioral state control, and abnormal sleeping and feeding patterns (Chasnoff, Burns, Schnoll & Burns, 1985; Finnegan, 1988; Gottwald & Thurman, 1994; Griffith, 1988; Howard, Beckwith, Rodning & Kropenske, 1989; Hurt, Brodsky, Braitman & Giannetta, 1995; Keith, MacGregor & Sciarra, 1988; MacGregor et al., 1987; Oro & Dixon, 1987; Schneider, 1988; Schneider, Griffith & Chasnoff, 1989; Weston, Ivins, Zuckerman, Jones & Lopez, 1989). Prospective, longitudinal developmental outcome studies of this population of children, however, have failed to identify consistent differences from nonexposed, socioeconomic status matched peers in areas such as cognitive development (Chasnoff; 1993; Chasnoff, Griffith, Freier & Murray, 1992; Hurt, Brodsky, Betancourt, et al., 1995), language (Hurt, Malmud, Betancourt, Brodsky & Giannetta, 1997), and play (e.g., Hurt et al., 1996). As such, research has been unable to conclusively identify a set of characteristics that represent a prenatal drug exposure syndrome (Chasnoff et al., 1992). Schutter and Brinker (1992) have argued that because there is no clearly delineated constellation of characteristics that defines this population of children, there is no justification for the cocaine-child label.

A number of studies examining the developmental outcome of young children prenatally exposed to drugs suggest that environmental and caregiving factors may have an influential or mitigating effect on outcome. Rodning, Beckwith, and Howard (1989) found that prenatally drug-exposed toddlers performed worse on measures of intelligence,

play, and attachment, although, toddlers who were in the care of a relative or foster parent performed no differently than control children on some measures. The National Association for Perinatal Addiction Research and Education (NAPARE) has followed one of the largest samples of prenatally cocaine-exposed children and similar controls from birth (Chasnoff et al., 1992). Although 3-year-old children in the exposed and control groups performed similarly on the Stanford-Binet Intelligence Scale (Fourth edition), Chasnoff (1993) stated that path analysis revealed:

> Environmental and behavioral factors, as measured on the Home Screening Questionnaire and the Achenbach Child Behavior Checklist, had just as great an impact on intellectual performance at 3 years of age as did the fact that the child was prenatally exposed to substances of abuse (p. 288).

Thus, in more recent years, the mood and direction of prenatal cocaine exposure research has shifted away from the bleak and panicked view that this population of children was irreparably damaged by their pre-birth experiences. Systematic studies of the multiple post-natal environmental variables, especially the caregiving relationship, are needed to better understand the needs of this group of children (Black, Schuler & Nair, 1993; Chasnoff, 1993; Hawley & Disney, 1992; Zuckerman & Bresnahan, 1991).

The quality of the caregiving environment is an important factor in determining developmental outcome (Sameroff & Chandler, 1975; Sameroff & Freise, 1990). More specifically, parent-child interaction has been related to cognitive functioning and social-emotional adjustment and functioning (Ainsworth & Bell, 1974; Arend, Gove & Sroufe, 1979; Bee et al., 1982; Cicchetti & Serafica, 1981; Main, 1983; Matas, Arend, & Sroufe, 1978). For example, Blasco, Hrncir, and Blasco (1990) found that maternal involvement (as assessed by the Parent/Caregiver Involvement Scale) during free play was a predictor of developmental competence (as assessed by the Bayley Scales of Infant Development and the Hrncir Spontaneous Mastery Measure) in 18-month-old toddlers. Farran et al. (1987) found that quality of interaction between caregiver and child predicted IQ at age 5. A recent review of four early intervention outcome studies found that developmental outcome of the child was most enhanced when mothers increased their responsivity in parent-child interactions (Mahoney, Boyce, Fewell, Spiker & Wheeden, 1998). Given that assessment of parent-child interaction provides insight as to the nature and quality of the current relationship and that this construct is associated with later developmental outcome, it is an important variable when considering the outcome of children at risk, including those who were prenatally exposed to cocaine.

Several studies have examined broad aspects of the caregiving environments of children exposed to cocaine or other drugs in utero. For example, Leventhal et al. (1997) found that cocaine exposed children, by age 2, were more likely to experience maltreatment, especially neglect, and out-of-home placements than a comparison group of children matched for socioeconomic status. Hawley, Halle, Drasin, and Thomas (1995) used maternal interviews to compare the caregiving environments of cocaine-exposed and nonexposed preschool children. They found the exposed group had increased rates of emotional neglect, physical neglect, changes in residence, and foster care placements. Another study found that drug-using pregnant women scored statistically significantly higher on a measure identifying the potential for child abuse, compared to pregnant women who were not using cocaine (Williams-Petersen et al., 1994).

Relatively few empirical studies have examined differences in interactions between mothers and their infants, as a function of maternal drug abuse. Fewer still, are studies with preschool children. Gottwald and Thurman (1994) investigated the interactions of prenatally cocaine-using and cocaine-nonusing mothers and their newborn (12 to 48 hours) infants, and found the mothers who used cocaine were more passive while interacting with their neonates. They also noted that exposed infants slept more than nonexposed infants, and this appeared to influence the moth-

ers' perceptions of the quality of their relationship with their infants. A study by Mayes et al. (1997) examined mother-infant interactions between three groups of mothers: (a) those who used drugs including cocaine during pregnancy, (b) those who used drugs other than cocaine during pregnancy, and (c) those who did not use drugs during pregnancy. Three minutes of mother-child interactions were observed when infants were 3-months-old and again when they were 6-months-old. Interestingly, at both the 3- and 6-month observations, cocaine-using mothers were less attentive and engaged in fewer interactions than mothers who used drugs other than cocaine, or mothers who were drug free. In addition, at the 6-month observation, cocaine using mothers were less attentive and more frequently interrupted interactions than at the 3-month observation, although the two other groups showed no change over time.

Burns, Chethik, Burns, and Clark (1991) investigated parent-child interactions between cocaine-using mothers and their 8- to 11-month-old infants. Results showed that mothers were lacking in emotional involvement and responsivity, and tended to overcontrol their infants. Only five pairs of mothers and infants were included in this study, however, and no control group was utilized.

Hofkosh et al. (1995) investigated within group differences with drug using mothers who were participating in a clinical intervention program and their 1-year-old infants. Infants were found to be functioning at developmentally appropriate levels yet the caregiving environment (as assessed by the Nursing Child Assessment Satellite Training Feeding Scale and the Home Observation for the Measurement of the Environment) was still related to child outcome measures. Black et al. (1993) also found that quality of the caregiving environment was positively related to infant developmental outcome measures. In a study of the interactions between prenatally drug-exposed preschool children and their mothers, Heller, Sobel and Tanaka-Matsumi (1996) observed negative interaction patterns and concluded that parent-training programs are needed for this population. Their sample, however, consisted of only five mother-child pairs.

In sum, limited conclusions and generalizations can be made regarding the relationship between maternal cocaine use, parent-child interaction, and child outcome. Given that prenatally cocaine-exposed children face biological risk, it is clearly important to explore whether they experience environmental risk, particularly as it relates to negative caregiving interactions. Such data could provide direction for intervention programs with this population. The current study examined the quality of caregiving environments of preschool aged children who had been prenatally exposed to cocaine and preschool aged children who had not been prenatally exposed but were of similar low socioeconomic status. The following two research questions were explored: Are there differences in caregiver-child interaction between prenatally cocaine-exposed and non-exposed preschoolers? And, are there differences in interaction between the biological mothers and foster caregivers of prenatally cocaine-exposed preschool children?

METHODS AND PROCEDURES

Participants

Eighty (80) preschool children and their primary caregivers participated in this study. Forty-one children were prenatally exposed to cocaine and 39 were not. Of the 41 exposed children, 23 were approximately 3.5 years of age (M = 42.6 months) and 18 were approximately 4.5 years of age (M = 55.0 months). Of the nonexposed children, 21 were approximately 3.5 years of age (M = 42.6 months) while 18 were approximately 4.5 years of age (M = 54.9 months). Overall, there were 24 (58%) females in the study and 17 (41%) males. No statistically significantly differences for gender were found for the exposed and nonexposed groups.

Participants in this study were part of a larger, ongoing longitudinal study (see Hurt, Brodsky, Betancourt, et al., 1995), and children had been followed developmentally since birth. Mothers who agreed to participate in the study were interviewed shortly after birth.

Drug use histories were obtained using a modified version of the Addiction Severity Index (ASI; McClellan et al., 1980). In addition, maternal and infant urine tests for cocaine metabolites and other controlled substances were performed at the time of a child's birth. Mothers who gave histories negative for cocaine use and who, along with their infants, tested negative for cocaine metabolites were control, or nonexposed, participants. Mothers with newborns whose gestational age was less than 34 weeks and whose Apgar scores were less than five at 5 minutes were excluded from the study in order to control for the effects of prematurity and birth asphyxia. Children who exhibited signs of any other condition or syndrome associated with developmental delay, such as Fetal Alcohol Syndrome, also were excluded. Likewise, mothers who used substances other than cigarettes, alcohol or marijuana, who did not speak English, who had a major psychiatric illness, or who used cocaine during only one trimester (in the cocaine group) were excluded. All caregivers and their children in this study were of low socioeconomic status and dependent on medical assistance. Of the 41 children prenatally cocaine exposed, 12 were in the full time care of relatives, and 7 were in foster care placements. Only two children in the nonexposed group were in foster care.

Child Characteristics. At the time of the study, no statistically significant differences existed between the groups in developmental progress, $t = -1.59$, $p = .12$, as measured by the Battelle Developmental Inventory (Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984) or in cognitive ability, $t = 0.24$, $p = .81$, as measured by the Wechsler Preschool and Primary Scale of Intelligence-Revised (Wechsler, 1989).

Maternal Characteristics. At the time of birth, mothers of cocaine-exposed children and nonexposed children differed in a number of ways. As shown in Table 1, cocaine-using mothers were older, had more children, had had more pregnancies, and were more likely to smoke cigarettes, drink alcohol and use marijuana than nonusing mothers. Likewise, education level of biological mothers of exposed children was lower at both the time of birth and time of preschool visit. An inherent difficulty in conducting this type of research is ensuring correct placement into the drug and drug free groups; these differences between the samples lend a degree of convergent validity to the study beyond the drug use histories and urine screens described earlier. No descriptive data could be obtained on foster caregivers of exposed children at the preschool follow-up visit. This data was omitted in part in order to optimize subject retention by the principal investigators of the larger, longitudinal study of child developmental outcome.

Measures

Parent-Child Interaction was evaluated using the Parent/Caregiver Involvement Scale (PCIS; Farran, Kasari, Comfort & Jay, 1986; see also Comfort, 1988). The PCIS is a behaviorally anchored rating scale designed to assess the quality and appropriateness of parent-child interaction behavior during play. It is designed for use with caregiver-child dyads and for children under 5 years of age. The scale was developed to measure aspects of an interaction between habitual caregiver and child that foster optimal development. Jay and Farran (1981) found relationships between the PCIS and later scores on standardized intelligence and achievement tests, although Farran et al. (1986) hypothesize that caregiver-child interactions may have a stronger relationship to social development.

The PCIS measures the adult's behavior while interacting with the child. Although the authors recognize that the child's contributions to the interaction are important, the focus of the scale is on (a) the caregiver's actions that are appropriate to the child's emotional needs and developmental level and (b) caregiver actions that promote developmental competence. Twenty-minute observations are conducted during free play between caregiver and child. Observations are scored live or from videotape by trained observers. Eleven maternal behaviors are assessed: physical involvement, verbal involvement, responsiveness of caregiver, playful interaction, teaching

Table 1.
Maternal Characteristics at Childbirth and Preschool Visit

	Cocaine-Using		Cocaine-Nonusing		
At childbirth[a]	*M*	*SD*	*M*	*SD*	*t*
Age	28.0	4.0	22.3	4.5	5.94*
Pregnancies	5.2	2.3	2.3	1.5	6.57*
Other children	2.6	1.5	0.9	1.1	5.74*
Education (in yrs.)	11.3	1.21	12.1	1.6	−2.58*
	Percent[b]		Percent[b]		x^2
Prenatal care					36.71*
<5 visits	90.2		20.5		
>5 visits	9.8		79.5		
Cigarette use					49.80*
No	2.4		79.5		
Yes	90.2		20.5		
Alcohol use					29.87*
No	36.6		94.9		
Yes	61.0		5.1		
Marijuana use					25.37*
No	51.2		100		
Yes	46.3		0		
At Preschool Visit[c]	*M*	*SD*	*M*	*SD*	*t*
Education (in yrs.)	11.6	0.9	12.5	1.3	−2.79*
Dependent children	3.4	2.0	2.3	1.2	2.59*

[a]n = 41 (cocaine-using group); n = 39 (cocaine-nonusing group).
[b]Percents may not add to 100% due to missing data.
[c]n = 20 (cocaine-using group); n = 34 (cocaine-nonusing group).
*$p < .05$.

behavior, control over child's activities, directives, relationship among activities, positive statements, negative statements or discipline, and goal setting. Each behavior is measured on amount, quality, and developmental appropriateness using a behaviorally anchored, five-point rating scale. To increase reliability, ratings 1, 3, and 5 are anchored with specific behavioral descriptors. Rating of 2 or 4 indicate a caregiver exhibited all of the behavior specified for the lower anchor and some of the behavior specified for the upper anchor. *Amount* provides a rating of how often the caregiver engages in each of the eleven behaviors. *Quality* describes the degree of emotional warmth, acceptance, sensitivity, and flexibility displayed during each of the eleven behaviors. *Appropriateness* describes the degree to which the caregiver's behavior is matched to the child's developmental level. As such, amount, quality and appropriateness are three separate and distinct aspects of the interaction behaviors. Higher scores represent more amount, quality, or appropriateness of a behavior. Because each behavior is given three scores, a total of 33 scores are obtained for this section of the PCIS.

In addition to the amount, quality and appropriateness ratings, the PCIS utilizes overall observer impression scores for the following five areas: availability, acceptance, atmosphere, enjoyment, and learning environment. Each of these areas is rated on a 5-point scale, with five representing the most optimal behavior.

Averaging the Quality, Appropriateness,

and Impression subscales derived three summary scores used in our data analyses. As in previous studies using the PCIS (Blasco et al., 1990; Comfort, 1995; Farran et al., 1987; Sparling, Seeds & Farran, 1988), we did not use the Amount summary score because our focus was the qualitative aspects of caregiver's interaction behavior. For this study, Chronbach's alpha was computed on the PCIS ratings as a measure of the scale's internal consistency; alpha equaled .98.

According to the PCIS authors, percent-agreement reliability of the scale ranges from .77 to .87 when interactions are coded live, in the home, and reliability coefficients range from .54 to .93 when interaction are coded from videotaped play situations. A PCIS author (MC) trained the senior author (RBK); 92% agreement was obtained at training. Agreement, is defined by authors of the PCIS as ratings within one point of each other on the Likert scale. Interrater reliability checks were conducted on 10% of the sample (with the study and control groups equally represented) by an off site coder. When rating interactions, both coders were blind to cocaine group status. Percent-agreement ranged from 79% to 100% with a mean agreement of 92%.

Regarding validity, moderate to high correlations have been obtained between the PCIS and behavioral counts of adult behaviors (Jay & Farran, 1981). Further, there is evidence to suggest that the PCIS is related to later performance on intelligence and achievement tests (Jay & Farran; Ramey, Farran, & Campbell, 1979) and social development (Farran et al., 1986).

Procedures

Children 3 1/2 and 4 1/2 years of age came to the laboratory for their semi-annual study visit. During this visit, a 20-minute videotape of free play between the primary caregiver and the child was obtained as required by the PCIS manual. Standard instructions to the adult for free play situation are, ''We'd like you to spend about 20 minutes playing with your child just as you normally do.'' A small laboratory room (3.3m $\times$ 3.3m) contained a range of toys that were developmentally appropriate for children at various developmental levels. There were infant toys (a toy key ring, stacking cups) and early school age toys (a board game, small Legos). The majority, though not all, of the toys were appropriate for children in the 3 to 5 year range. In this way, there was the opportunity for the caregiver to choose a developmentally inappropriate (appropriate for a younger or older child) toy for the child. For example, there were stacking cups that are commonly used by 18 to 24 month old children in sensorimotor play. However, these cups could be adapted to the developmental needs of a 3 1/2 or 4 1/2 year old child by focusing on color labeling, size concepts, or pretend play (drinking, for example). One way to assess the developmental appropriateness of the caregiver's behavior is to observe whether the child can successfully accomplish a particular task or if the caregiver's teaching results in successful accomplishment.

Data Analysis

Data were computerized using dBASE III Plus and analyzed using SPSS PC+. Multivariate analyses of variance (MANOVA) were used to examine differences in caregiver-child interaction according to cocaine group status and caregiver status.

RESULTS

The summary scores for the Quality, Appropriateness, and Impression subscales were used as dependent variables in the analyses. As noted before, the summary scores were averages of the 11 quality ratings, the 11 appropriateness ratings, and the 5 impression ratings. A MANOVA was performed using cocaine-exposed or nonexposed status as the independent variable and the quality, appropriateness, and impression summary scores as the three dependent variables. Child age did not affect scores ($p <$ .59) and was excluded in the analysis. Results of this analysis showed a statistically significant effect for cocaine status (Wilks Lambda $=$ .787, $p <$ .001).

Although data were not collected on foster caregivers' characteristics, some data such as

Table 2.
Differences[a] in Summary Scores for Quality, Appropriateness, and Impression Subscales by Caregiver (CG) Status

	Quality *M* ± *SD*	Appropriateness *M* ± *SD*	Impression *M* ± *SD*
Cocaine-Using			
Biological CG (n = 22)	2.9 ± 0.9*	2.9 ± 1.1*	3.1 ± 1.2*
Foster CG (n = 19)	3.2 ± 0.7*	3.0 ± 0.8*	3.5 ± 0.8
Cocaine-Nonusing			
Biological CG (n = 37)	3.8 ± 0.8	3.8 ± 0.9	3.9 ± 1.0

[a]Difference = mean ± standard deviation.
*$p < .05$ compared with nonexposed (Scheffe)

maternal education were available for the biological mothers of exposed and nonexposed children. To explore the effects of maternal education status on interaction, a multiple analysis of covariance (MANCOVA) was performed using the same independent variable described above (cocaine status) and the same three PCIS summary scores as dependent variables with maternal education as the covariate. The results of this analysis did not reach statistical significance. Within the cocaine group, current educational level data were available for only twenty biological mothers and none of the 19 relative caregivers or foster caregivers.

To further analyze the effects of maternal education on interaction, we grouped the cocaine-using and cocaine-nonusing mothers into those who had completed high school and those who had not. Seventy-five percent of the nonusing mothers had completed high school compared to only 46% of cocaine-using mothers ($p = .02$). This dichotomous education variable was then used in a 2 (cocaine group status) × 2 (completed high school) MANOVA using the quality, appropriateness, and impression PCIS scores as dependent variables. These data were available for 36 cocaine-nonusing participants and 22 cocaine-using participants. Results supported statistically significant effects for both cocaine group status ($p = .05$) and completion of high school ($p = .01$), with no interaction effects.

Differences in interaction between the exposed and nonexposed children according to the status of the caregiver (biological mother, relative or foster caregiver) were examined as well. A MANOVA was used in order to compare the three caregiver groups (cocaine-exposed children with their biological mother, cocaine-exposed children with their foster caregiver, and nonexposed children with their biological mother), using the three summary scores from the PCIS (quality, appropriateness and impression) as dependent variables. The two nonexposed children were in foster care and thus not included in this analysis. Results showed a significant effect for caregiver group (Wilks Lambda = .735, $p = .001$). The mean score for each caregiver group, with the results of the one-way ANOVAs and Scheffe tests, are presented in Table 2. The summary scores on the Quality and Appropriateness subscales showed biological mothers of the nonexposed children had statistically significantly higher mean scores than both the biological mothers of exposed children and the foster caregivers of the exposed children. The mean summary Impression subscale score was statistically significantly higher for the drug-free mothers than for the cocaine-using mothers. Thus, biological mothers of nonexposed children did not differ statistically significantly from the foster caregivers of the exposed children on the summary impression score, a more global and general measure of the overall quality of interaction. The same pattern of means occurred with biological caregivers of nonexposed children receiving the highest mean ratings, biological caregivers of exposed

children receiving the lowest mean ratings, and the mean ratings of foster caregivers of exposed children falling in between.

DISCUSSION

The results of this study provide preliminary evidence suggesting that preschool children who were prenatally exposed to cocaine experience less optimal interactions with their caregivers. Specifically, we found that caregivers of children prenatally exposed to cocaine were less sensitive and flexible as well as less developmentally appropriate in play interactions. No statistically significant differences in emotional quality or developmental appropriateness of play interaction were found when foster caregivers of prenatally cocaine-exposed children were compared with biological mothers of exposed children.

In this study, emotional quality and developmental appropriateness were negatively compromised in interactions between children prenatally exposed to cocaine and their caregivers. Cocaine-nonusing caregivers were consistently more sensitive in their verbal and physical involvement, playfulness, teaching, structuring and redirecting than were study caregivers. In addition, cocaine-nonusing caregivers better matched their behavior to the child's developmental needs, interests, and capabilities. Cocaine-nonusing caregivers received higher scores on both specific interaction items (e.g., verbal quality; ''adult almost always assures child's comprehension of talk directed to child, repeats for clarity'') and on more global measures of the affective climate (e.g., availability; ''adult appears intensely involved, continually responsive, time seems to revolve around child and his/her activity'').

Cocaine caregivers, as reflected in their low developmental appropriateness scores, had unrealistically high expectations of their preschoolers. Oftentimes, these caregivers placed high demands for independence and performance on their children. For example, when looking at a book or playing a board game, cocaine caregivers often inappropriately expected their preschoolers to know the letters of the alphabet or count with one-to-one correspondence. Further, when the children became frustrated, these caregivers gave little assistance aimed at helping the child learn a particular task, which often resulted in increased frustration for the child. If teaching strategies were used, they were not a good match to the child's developmental level. Cocaine caregivers also appeared to become frustrated when their child could not perform to their expectations.

Foster caregivers of prenatally cocaine-exposed children did not differ from biological mothers of exposed children in the quality and developmental appropriateness of their interaction. It is important to note that of the 19 foster caregivers, 12 were relatives. This finding is open to several interpretations. In a study of 105 women, Boyd (1993) found a statistically significant correlation between family drug use and age of first illicit drug use among African American, cocaine-addicted women. This study supported a belief that family drug use has a number of direct and indirect effects on the development of drug addiction in women. For example, drug use may be modeled by female family members and also negatively affect the caregiving environment in which a woman is raised. Boyd also cited the increased incidence of physical and sexual abuse in families of women addicted to drugs. Thus, one explanation of the current study's finding may be that relatives of cocaine addicted women did not create positive or developmentally appropriate interaction experiences for the exposed children as a result of their own experiences with, or contributions to, the same addicted, negative family environment as the cocaine addicted mother. Further, Hawley and Disney (1992) cite high rates of child abuse in foster families as one a reason against placing prenatally cocaine-exposed children in foster care.

Interestingly, the mean scores of the three caregiver groups in this study, biological caregivers of cocaine-exposed children, foster caregivers of cocaine-exposed children, and biological caregivers of nonexposed children, presented a rather consistent pattern. The mean ratings of the foster caregivers of cocaine-exposed children were higher than those

of the biological mothers of cocaine-exposed children, but lower than the biological mothers of nonexposed children. This may suggest a continuum of parenting competence among the three groups and represents an avenue for future research.

It is important to note that the PCIS is entirely focused on the adult's behavior during play interaction, so differences in interaction scores do not necessarily reflect child differences. This reduces the likelihood that the lack of difference between foster caregivers and biological mothers of prenatally exposed children is due to qualities within the child, especially given that the PCIS focuses on the warmth and match of the adult's social initiations and responses to the child's developmental level. Blasco et al. (1990) did not find any differences on the PCIS when comparing caregivers of children diagnosed with cerebral palsy and normally developing children, although maternal interaction did relate to developmental level for both groups. In a study of children with disabilities receiving early intervention services, up to 15% of the caregiver's interaction behavior (as assessed by the PCIS) was accounted for by child temperament and social behavior, with social behavior being influenced by the severity of the disability (Huntington, Simeonsson, Bailey & Comfort, 1986). The authors noted, however, that a range of caregiver and environmental characteristics, as well as their interactive effects, can contribute to interaction as much as, or more than, child behavior.

A primary limitation of the current study is lack of data regarding caregiver characteristics, which might influence caregiver-child interaction. Although it is clear from the results that prenatally cocaine-exposed preschoolers experienced less positive interactions with their caregivers than nonexposed children, the reasons for this finding are unknown and warrant further investigation. Exploration of maternal and environmental characteristics considered pertinent to child outcome in this population of at-risk children is needed. In this study, cocaine caregivers were more experienced mothers who were older and had more children, yet the quality of their interaction was poor. One possible explanation may be that these factors contributed to increased stress, which in turn led to compromised quality of interaction (Hetherington, 1984). In addition, this study provides preliminary support for further investigation into the contribution of maternal education to this population of at-risk children. Maternal education may be an important, and perhaps protective, factor related to positive outcome. Comprehensive measures of the parenting and family environment, such as perceived stress, parenting knowledge and expectations, maternal depression, and locus of control, will shed more light on the degree of environmental risk experienced by this population of children, as well as the potential for resilience.

Finally, the results of this study suggest there may be a critical need for services with families of prenatally drug-exposed children. While other studies have demonstrated that maternal-infant interactions are compromised when the mother is cocaine involved, the current study suggests that such interaction difficulties continue into the preschool years. Repeated empirical support for family-centered early intervention that emphasizes both the enhancement of parenting knowledge and skills, and the identification of family strengths, needs, stressors and supports can be found for a wide range of children at risk (Thurman & Widerstrom, 1990). Families of children prenatally exposed to cocaine appear to especially need such interventions.

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