

USE OF THE DIAGNOSTIC CLASSIFICATION OF MENTAL HEALTH AND DEVELOPMENTAL DISORDERS OF INFANCY AND EARLY CHILDHOOD: REVISED EDITION (DC:0–3R) WITH CANADIAN INFANTS AND YOUNG CHILDREN PRENATALLY EXPOSED TO SUBSTANCES

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ABSTRACT: The current study examined the mental health diagnostic profiles of infants and young children prenatally exposed to substances using the Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood, Revised (DC:0–3R) diagnostic system. Participants were 46 biological mother–infant dyads who were engaged in a clinical program for mothers with substance-use problems and their young children (aged 10–41 months). Diagnostic information was reported for each of the five axes listed in the DC:0–3R diagnostic system based on file reviews. In addition, the children's socioemotional and adaptive behaviors were assessed using the Child Behavior Checklist, Infant–Toddler Social Emotional Assessment, the Social-Emotional Scale, and the Adaptive Behavior Assessment System (2nd ed.). In this sample of young children with prenatal substance exposure, a broad range of socioemotional symptoms were evident, with almost one third of the children meeting criteria for at least one Axis I mental health diagnosis. In addition, the majority of dyads demonstrated features of a disordered relationship. Children in more problematic relationships demonstrated higher levels of socioemotional and adaptive functioning difficulties and were more likely to have an Axis I diagnosis than were children in adapted relationships. The importance of early intervention efforts aimed at infants with prenatal substance exposure and their biological mothers is highlighted, with a particular focus on enhancing the quality of the mother–child relationship.

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Children prenatally exposed to alcohol and other substances are at an increased risk for impaired development and later psychopathology (Bandstra, Morrow, Mansoor, & Accornero, 2010; Frank, Augustyn, Knight, Pell, & Zuckerman, 2001; Huizink & Mulder, 2006). Alcohol, for instance, is a well-known teratogen that causes damage to the brain and central nervous system of the developing fetus. Given the limited repair capacity of the nervous system, the damage caused by fetal alcohol exposure can have lifelong implications (Olson, O'Connor, & Fitzgerald, 2001). In fact, the Public Health Agency of Canada (2005) reported that alcohol

exposure during pregnancy and its resulting spectrum of disorders, fetal alcohol spectrum disorder (FASD), is the leading cause of developmental disability among Canadian children. Depending on the timing, amount, and frequency of exposure, children who are prenatally exposed to substances present with a vast range of cognitive, behavioral, regulatory, and relational difficulties associated with their organic brain insults (Chudley et al., 2005; National Institute on Alcohol Abuse and Alcoholism, 2000; Shankaran et al., 2007).

PRENATAL SUBSTANCE EXPOSURE AND NEUROBEHAVIORAL FUNCTIONING

Research on the developmental outcomes of infants prenatally exposed to alcohol has focused primarily on cognitive and neurobehavioral outcomes. Several studies have documented that prenatal alcohol exposure predicts less optimal motor and mental

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development scores on the Bayley Scales of Infant Development (Fried & Watkinson, 1988; J. L. Jacobson et al., 1993; Kaplan-Estrin, Jacobson, & Jacobson, 1999; O'Connor, Sigman, & Kasari, 1993; Streissguth, Barr, Martin, & Herman, 1980; Testa, Quigley, & Eiden, 2003). Neurobehavioral assessments of infants with alcohol exposure reveal problems with habituation to redundant stimuli (Streissguth, Barr, & Martin, 1983), abnormal reflexes (Coles, Smith, Lancaster, & Falek, 1987), motor immaturity (Coles et al., 1987), inefficient information-processing abilities (J.L. Jacobson, Jacobson, & Sokol, 1994; S.W. Jacobson, Jacobson, Sokol, Martier, & Ager, 1993; Kable & Coles, 2004), and disruptions in the regulation of sleep–wake states (Rosett et al., 1979; Scher, Richardson, Coble, Day, & Stoffer, 1988; Stoffer, Scher, Richardson, Day, & Coble, 1988). Unlike research on alcohol, studies examining the effects on developmental outcomes of prenatal exposure to substances such as cocaine, cannabis, opioids, and nicotine have produced inconclusive results. Nonetheless, these studies generally have indicated a wide range of impairment in auditory and visual attention (Cornelius & Day, 2009; Frank et al., 2001; Fried & Smith, 2001; Fried, Watkinson, & Gray, 2003; Huizink & Mulder, 2006; Hunt, Tzioumi, Collins, & Jeffery, 2008; Pauly & Slotkin, 2008), language development (Dixon, Thal, Potrykus, Dickson, & Jacoby, 1997; Fried, O'Connell, & Watkinson, 1992; Malakoff, Mayes, Schottenfeld, & Howell, 1999; Singer et al., 2001), and executive function (Fried & Smith, 2001; Noland, Singer, Mehta, & Super, 2003; Noland, Singer, Arendt et al., 2003). Taken together, the aforementioned findings have indicated that the effects of prenatal substance exposure are likely present in early infancy, suggesting that these children begin life with significant developmental disadvantages.

SOCIOEMOTIONAL FUNCTIONING IN INFANTS AND YOUNG CHILDREN WITH SUBSTANCE EXPOSURE

Although there is a vast literature on the neurological and developmental problems in children with substance exposure, there is comparatively little research on socioemotional functioning. Affect regulation is a critical component of socioemotional development in infancy and early childhood. The affect and behavior regulation capacities of infants develop in the context of their relationships with primary caregivers, a process that Tronick (1989) described as “mutual regulation” (pp. 115). The primary caregiver and infant act as interactive partners, with the infant relying on the emotional signals and behaviors of the caregiver to learn to express and regulate emotions, and the caregiver showing sensitivity and responsiveness to the infant's emotional cues (Crockenberg & Leerkes, 2000). For the substance-exposed dyad, factors associated with both the mother (e.g., recovery from substance use, low socioeconomic status, co-occurring mental health problems, compromised caregiving environment in general) and the infant (e.g., compromised development, neurobehavioral deficits) may challenge the capacity to effectively regulate emotions (Beeghly &

Tronick, 1994). Neurophysiological research has begun to identify the neural circuitry involved in children's affect regulation abilities (e.g., Lewis, Lamm, Segalowitz, Stieben, & Zelazo, 2006; Lewis & Stieben, 2004). Given that prenatal substance exposure may impair early brain development, infants with exposure may be at greater risk for emotion regulation difficulties.

Although limited, the research on the socioemotional functioning of infants prenatally exposed to substances is consistent with this perspective. For example, O'Connor et al. (1993) used path analyses and found that greater alcohol use during pregnancy was a predictor of more negative affect in infants at 12 months during mother–infant interactions. A follow-up study of these children at 6 years of age revealed that negative affect in infancy and higher levels of prenatal alcohol exposure were predictors of early childhood depressive symptoms, suggesting continuity in emotional difficulties associated with alcohol exposure (O'Connor, 2001). Lowe, Handmaker, and Aragón (2006) also examined the impact of maternal alcohol use during pregnancy on infant negative affect. They found that infants (specifically female infants) of mothers who reported higher levels of alcohol use during pregnancy exhibited greater difficulties regulating negative affect in response to a stress episode (i.e., mother's still face) than did infants with lower levels of prenatal alcohol exposure. Other research on the effects of substance use more generally also has shown an association between prenatal substance exposure and dysregulation of negative and positive affect during infancy (Lester et al., 2009; Schuetze, Eiden, & Coles, 2007) as well as high rates of disorganized attachment behaviors (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010; Espinosa, Beckwith, Howard, Tyler, & Swanson, 2001; O'Connor, Sigman, & Kasari, 1992).

Research on the socioemotional functioning of older children with prenatal substance exposure has consistently identified a range of socioemotional difficulties, including depressive and internalizing symptoms (Mattson & Riley, 2000; O'Connor, 2001; O'Connor & Kasari, 2000; O'Connor & Paley, 2006; Roebuck, Mattson, & Riley, 1999), social skills problems (Mattson & Riley, 2000; S.E. Thomas, Kelly, Mattson, & Riley, 1998; Whaley, O'Connor, & Gunderson, 2001), insecure attachment relationships (O'Connor, Kogan, & Findlay, 2002b), aggressive behavior problems (Griffith, Azuma, & Chasnoff, 1994; Mattson & Riley, 2000), attention problems (Mattson & Riley, 2000), learning problems (Roebuck et al., 1999), and adaptive functioning impairments (Whaley et al., 2001). Given that adaptive socioemotional development relies on early regulatory capacities and healthy attachment relationships (Landy, 2002), it is important to build on the limited research with infants prenatally exposed to substances to better understand these early precursors to the broad range of later socioemotional problems. One goal of the current study is to explore the socioemotional functioning of infants with prenatal substance exposure who are living with their biological mothers.

PRENATAL SUBSTANCE EXPOSURE AND THE NEED FOR COMPREHENSIVE DIAGNOSTIC ASSESSMENT

In light of the range of difficulties that children with prenatal substance exposure may experience, there is a critical need for comprehensive, developmentally sensitive, diagnostic assessment to develop as thorough an understanding as possible of their behaviors, capacities, and abilities as a basis for appropriate and supportive interventions. Although diagnosis does not prevent primary disabilities (i.e., neurological damage) caused by exposure to alcohol and other substances, a better understanding of a child's individual profile can help ameliorate secondary disabilities (e.g., disrupted life experience, development of mental health problems; Streissguth, Barr, Kogan, & Bookstein, 1996; Streissguth et al., 2004). Unfortunately, little research has explored the diagnostic profiles of children with prenatal substance exposure. One set of researchers examined the diagnostic profiles of children with prenatal alcohol exposure (ages 5–13 years) using the *Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV)*; American Psychiatric Association, 1994). This research revealed high rates of socioemotional problems, with mood disorders diagnosed most frequently among these children (O'Connor et al., 2002b). However, no studies to date have examined the comprehensive diagnostic profiles of infants and very young children with prenatal substance exposure, which is the overall goal of the current investigation.

DIAGNOSTIC CLASSIFICATION OF MENTAL HEALTH AND DEVELOPMENTAL DISORDERS OF INFANCY AND EARLY CHILDHOOD—REVISED

The ZERO TO THREE Task Force developed the Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (DC:0-3) and its revised version (DC:0-3R; ZERO TO THREE, 1994) to complement and extend existing mental health classification systems by identifying mental health disorders among infants and toddlers using a developmental framework (ZERO TO THREE, 2005). The DC:0-3R is a multiaxial diagnostic system intended to capture the diagnostic complexity of infants by emphasizing not only the infant's mental health diagnostic status but also the parent-child relationship and the broader social context. Axis I reflects the clinical mental health diagnoses listed in the DC:0-3R as well as any mental health diagnoses classified with other diagnostic systems (e.g., *DSM-IV*). Axis II, which is based on clinical observations of parent-child interactions, identifies significant disturbances and disorders in the parent-child relationship. Axis III lists any medical conditions (i.e., physical or neurological) and/or developmental disorders. Any socioemotional stressors in the infant's environment are considered under Axis IV. Finally, Axis V provides ratings of the infant's socioemotional development, including the ability to express and regulate affect, and the capacity to engage in relationships (ZERO TO THREE, 2005). Although the DC:0-3R diagnostic system has been used in various clinical settings (see A. Guédeney & Maestros, 2003), the clinical

utility of this diagnostic system for infants with prenatal substance exposure has not yet been described.

WHY USE THE DC:0-3R FOR INFANTS WITH SUBSTANCE EXPOSURE?

The contextual approach of the DC:0-3R system is particularly relevant for infants with substance exposure and their families. Such infants often present with a range of difficulties that make them more challenging to care for (discussed earlier), and mothers with substance-use problems often face a variety of stressors (e.g., poverty, unstable housing, abusive relationships, involvement in drug-dealing activities) that may impair their ability to parent effectively (Freier, 1994; Mayes & Truman, 2002). The literature has suggested that substance-exposed dyads are at risk for problematic interactions (Blackwell, Kirkhart, Schmitt, & Kaiser, 1998; Burns, Chethik, Burns, & Clark, 1997; Hans, Bernstein, & Henson, 1999; Johnson et al., 2002; Mayes et al., 1997; Minnes, Singer, Arendt, & Satayathum, 2005; Pajulo et al., 2001; Schuler, Nair, & Black, 2002) and at greater risk than are nonexposed dyads for insecure and disorganized attachment patterns (Swanson, Beckwith, & Howard, 2000). There are also high rates of documented neglect (Chaffin, Kelleher, & Hollenberg, 1996; Kelley, 1998; Magura & Laudet, 1996) and child maltreatment (Chaffin et al., 1996; Kelley, 1992, 1998; Locke & Newcomb, 2003; Magura & Laudet, 1996; Walsh, MacMillan, & Jamieson, 2003) among substance-involved families. These findings may be linked to the often-limited regulatory capacities of the substance-exposed dyad, where the mother has difficulty responding to the infant's emotional behaviors and where the infant seems emotionally unengaged and demonstrates a difficult-to-handle temperament (Pajulo, Suchman, Kalland, & Mayes, 2006; Suchman, Pajulo, DeCoste, & Mayes, 2006). Therefore, these dyads are at risk for developing maladaptive relationships, which in turn may lead to later socioemotional difficulties in these infants (O'Connor, Kogan, & Findlay, 2002b). The framework of the DC:0-3R system takes this critical relationship context into account in considering the diagnostic profiles of infants with substance exposure.

The current study builds on the limited literature that has examined the impact of prenatal substance exposure on infant mental health. This research is critical to informing early intervention efforts with these vulnerable infants and their families. To our knowledge, this study is the first to describe the mental health diagnostic profiles of infants and very young children (aged 0–3 years) with substance exposure. It also is the first to describe the use of the DC:0-3R diagnostic system with a substance-exposed sample. Finally, given the importance of the early attachment relationship for infants and the high potential for this relationship to be compromised in a substance-exposed sample, we explored the impact of the mother-child relationship on the diagnostic profiles of these infants. The main hypothesis was that infants with substance exposure would present with significant mental health difficulties on each of the DC:0-3R axes, and that these difficulties would be related to problems in the mother-child relationship.

METHOD

Participants

Participants were drawn from Breaking the Cycle (BTC), a Toronto-based children's mental health program for infants and young children (0–6 years) whose mothers have histories of substance-use problems. The BTC program is designed to reduce the risk of mothers' substance use on child development by addressing addiction and trauma-related issues and by supporting the mother–child relationship through various parenting programs that involve both mother and child. BTC delivers intensive and comprehensive long-term interventions via a “single-access” model in which clients access a variety of programs from different partner agencies at one community-based location, with street-outreach and home-visitation components. Mothers are either referred by community agencies or are self-referred; they must be pregnant or parenting a child under the age of 7 years and willing to participate in both parenting and addiction services. More detailed information on the larger sample of women and children at BTC and the programs and services offered is described elsewhere (see Motz, Leslie, Pepler, Moore, & Freeman, 2006).

As part of a longitudinal treatment evaluation project funded through the Canadian Institute of Health Research at BTC, 100 women and their children were asked to participate in research, and written consent was obtained from 96% of these women. Of the original sample, mother–child dyads were selected for the current study if they met the following criteria: (a) The mother, a BTC client, had consented to participating in research, (b) the child was between 0 and 3 years of age at the time of engagement with the BTC program, (c) the child had undergone a developmental assessment between September 2005 and July 2010 inclusive, and (d) the child was living with his or her biological mother at the time of the developmental assessment. Based on these criteria, data were available for 46 mother–child dyads. Demographic information was obtained from clinical files (see Tables 1 and 2). Although all of the children were living with their biological mothers at the time of assessment, child welfare services were involved with all of the dyads, and over half of the dyads (55.8%) had experienced at least one separation. Ethical approval for this particular study of 46 dyads was approved by the Human Participant Review Committee at the Office of Research Ethics at York University.

Procedure and Measures: Infant Mental Health Diagnostic Profile

Developmental assessments are conducted routinely as part of clinical service at BTC. These assessments always include one standardized measure of infant/child neurobehavioral development (e.g., Battelle Development Inventory, Bayley Scales of Infant Development) based on clinical observations, and various standardized measures of socioemotional functioning, depending on the child's age and clinical relevance, which are based on maternal report (discussed later). Information from these standardized developmental-assessment measures and from the last five clinical case notes written prior to the developmental assessment was

TABLE 1. *Maternal Characteristics*

Mothers With Substance-Use Problems	
Age, in years	
<i>M</i> (<i>SD</i>)	31.20 (6.30)
<i>Mdn</i> (range)	30.00 (20–50)
Ethnic background, %	
North American	54.3
European	19.6
African	10.9
Aboriginal	6.5
Caribbean	4.3
South American	4.3
Education, %	
Did not complete high school	45.6
Employment	
Currently unemployed, %	92.9
Monthly income	
<i>M</i> (<i>SD</i>)	\$1,229.64 (898.04)
<i>Mdn</i> (range)	\$1,075
Parity	(\$45–\$4,167)
<i>M</i> (<i>SD</i>)	
<i>Mdn</i> (Range)	2.20 (1.41)
First-time mothers, %	2.00 (1–5)
Psychiatric Symptoms, %	43.48
CES-D ^a score	
<i>M</i> (<i>SD</i>)	
<i>Mdn</i> (range)	16.79 (12.40)
In Clinical Range (score >16), %	11.00 (1–47)
BAI ^b score	39.0
<i>M</i> (<i>SD</i>)	
<i>Mdn</i> (range)	11.00 (9.50)
In Severe Range (score >26), %	8.00 (0–38)
DSM-IV diagnosis, % of sample	26.0
diagnosed	
Substance-use disorders (SUD)	100.00
Posttraumatic stress disorder	15.22
Anxiety disorder	10.87
Borderline personality disorder	8.70
Bipolar disorder	6.52
Depression	6.52
More than one diagnosis other than SUD	10.87
Primary Substance Addiction, %	
Crack/cocaine	43.5
Alcohol	17.4
Heroin	15.2
Relationship Status, %	
Single or divorced	69.4
Abuse History, %	
Emotional abuse	90.5
Physical abuse	88.1
Sexual abuse	69.0

^aCentre for Epidemiologic Studies Depression Scale (CES-D; Weissman, Sholomkas, Pottenger, Prusoff, & Locke, 1977).

^bBeck Anxiety Inventory (BAI; Beck & Steer, 1993).

used for DC:0–3R axis ratings in this study (for details on the use of all measures in this study, see Table 3). Clinical case notes

TABLE 2. *Child Characteristics*

Infants and Young Children With Substance Exposure	
Age, in months	
<i>M</i> (<i>SD</i>)	19.87 (9.09)
<i>Mdn</i> (range)	15.00 (10–41)
Gender, %	
Male	47.83
Gestational age, in weeks	
<i>M</i> (<i>SD</i>)	38.99 (1.96)
<i>Mdn</i> (range)	39.00 (34–42)
Prematurity (<37 weeks), %	7.32
Birth weight, g	
<i>M</i> (<i>SD</i>)	3,086.55 (661.35)
<i>Mdn</i> (range)	3,050 (1,474–4,309)
Low birth weight (<2,500g), %	15.91
Amount of prenatal substance exposure	
Crack/cocaine, g/use	
<i>M</i> (<i>SD</i>)	2.71 (5.13)
<i>Mdn</i> (range)	1.00 (0.4–25)
No. of children exposed, %	60.87
Alcohol, drinks/use	
<i>M</i> (<i>SD</i>)	4.83 (4.98)
<i>Mdn</i> (Range)	3.50 (0.5–18)
No. of children exposed, %	54.35
Methadone, mg/day	
<i>M</i> (<i>SD</i>)	61.20 (34.94)
<i>Mdn</i> (range)	65.00 (12–110)
No. of children exposed, %	21.74
Marijuana, cigarettes/day	
<i>M</i> (<i>SD</i>)	3.00 (2.47)
<i>Mdn</i> (range)	2.00 (1–9)
No. of children exposed, %	41.30
Nicotine, cigarettes/day	
<i>M</i> (<i>SD</i>)	14.08 (7.04)
<i>Mdn</i> (Range)	15.00 (2–40)
No. of children exposed, %	86.67
Multiple-substance exposure, %	89.13

were written by parent–infant therapists following home visits and group interventions. These notes are structured to the extent that they first provide a description of the child’s development and behavior, followed by a description of the mother–child interactions, and conclude with suggestions for future intervention. In keeping with DC:0–3R guidelines, these clinical notes provide valuable information regarding a child’s functioning at different times and in different contexts.

Axis I. Clinical mental health diagnoses were assigned based on the criteria listed in the DC:0–3R. A clinical psychologist provided Axis I ratings for all children, and a psychological associate who was not clinically involved with the dyads provided blind, independent ratings for 25% of the cases. Ratings were based on information from the clinical files and developmental assessments. Both raters have extensive clinical experience with children prena-

tally exposed to substances and the DC:0–3R system. A high level of interrater reliability was achieved, $K = .85$, $p < .01$.

Axis II. The Parent–Infant Relationship Global Assessment Scale (PIR-GAS) from the DC:0–3R was used to provide categorical ratings of mother–child relationship quality. Scores on this measure ranged from 0 (*documented maltreatment*) to 100 (*well-adapted*). Ratings were based on comparisons made between the relationship quality of each dyad, as described in the last five clinical case notes written prior to each infant’s developmental assessment, and categorical descriptions of relationship quality on the PIR-GAS (see Table 4). Consistent with DC:0–3R guidelines, ratings of relationship quality took intensity, frequency, and duration of relationship difficulties into account, along with the overall functional level of the dyad, as indicated by the level of dyadic distress, conflict, and flexibility, and the effect of these on the infant’s development. Also in keeping with the guidelines, relationships scoring below 41 were classified as “disordered.” To ensure that rater bias was not a problem, different raters were used for Axes I and II. A psychology graduate student with clinical training, but not clinically involved with the families, provided blind, diagnostic ratings for Axis II, and the clinical psychologist who rated Axis I provided independent ratings for 37% of the sample. A moderate-to-high level of interrater reliability was achieved, $K = .70$, $p < .001$. The same graduate student who rated the Axis II PIR-GAS used the Relationship Problem Checklist (RPCL) from the DC:0–3R to rate the dyads in terms of whether they showed the following problematic relationship features: overinvolved, underinvolved, anxious/tense, angry/hostile, physically abusive, verbally abusive, and sexually abusive. In accordance with DC:0–3R guidelines, relationships were rated as showing no evidence of the particular feature, some evidence, or substantial evidence while taking behavioral quality of the interaction, affective tone, and psychological involvement into account.

Axes III and IV. Reviews of clinical files up to the time of the developmental assessment were carried out by the clinical psychologist who provided ratings for Axis I. Information regarding any medical conditions (i.e., physical or neurological problems) and/or developmental disorders found in these reviews was recorded on Axis III. Socioemotional and environmental stressors that could impact emotional functioning were recorded on Axis IV using the Psychosocial and Environmental Stressor Checklist (PSCL) from the DC:0–3R. Each stressor was rated as “present” for a child if it appeared in the file review; otherwise, it was recorded as “absent.” Scores on the PSCL ranged from 0 to 68.

Axis V. A second psychology graduate student not involved in rating any other axes and not clinically involved with the dyads provided blind ratings for Axis V using the Capacities for Emotional and Social Functioning Rating Scale (CESFRS) from the DC:0–3R. Ratings were based on clinical file reviews up to the time of the developmental assessment and based on information from the assessment itself. The CESFRS guides clinicians in assessing

TABLE 3. *Summary of Measures Used, Raters, and Basis of Ratings*

Measures	Rater(s)	Basis of Rating
DC:0–3R		
Axis I	1. Clinical Psychologist 2. Psychological Associate (provided ratings for 25% of cases)	1. The last 5 clinical notes before the developmental assessment, which provide information regarding dyadic interactions between mother and infant 2. The developmental assessment, which provides standardized assessments of an infant's neurobehavioral and socioemotional development based on clinical observation and maternal report
Axis II	1. Psychology Graduate Student 2. Clinical Psychologist (provided ratings for 37% of cases)	1. The last 5 clinical notes before the developmental assessment, which provide information regarding dyadic interactions between mother and infant
Axis III	1. Clinical Psychologist	1. File reviews up to time of developmental assessment
Axis IV	1. Clinical Psychologist	1. File reviews up to time of developmental assessment
Axis V	1. Research Assistant (entering psychology graduate program)	1. File reviews up to time of developmental assessment 2. The developmental assessment, which provides standardized assessments of an infant's neurobehavioral and socioemotional development based on clinical observation and maternal report
Standardized Measures		
ITSEA (Carter & Briggs-Gowan, 2006)	1. Mother	
CBCL/1½–5 (Achenbach & Rescorla, 2000)	1. Mother	
ABAS (Harrison & Oakland, 2003)	1. Mother	
SES (Greenspan, 2004)	1. Mother	
EAS (Biringen, 2008)	1. Researcher trained in scoring the EAS 2. Researcher trained in scoring the EAS (uninvolved in scoring DC:0–3R axes)	

DC:0–3R = Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood, Revised; ITSEA = Infant–Toddler Social and Emotional Assessment; CBCL/1½–5 = Child Behavior Checklist for Ages 1½–5; ABAS = Adaptive Behavior Assessment System; SES = Greenspan Social-Emotional Scale; EAS = Emotional Availability Scale.

a child's social and emotional functioning in comparison to normative development in the following six socioemotional domains, listed from least to most complex: (a) attention and regulation, (b) forming relationships/mutual engagement, (c) intentional two-way communication, (d) complex gestures and problem solving, (f) use of symbols to express thoughts/feelings, and (g) connecting symbols logically/abstract thinking. As outlined in the DC:0–3R, capacity level in each of these domains was rated as 1 (*age appropriate*), 2 (*immature*), or 3 (*not evident*) (see Table 5).

Measures of Socioemotional and Relationship Functioning

The following standardized and widely used measures of infant socioemotional functioning and mother–child relationship functioning were collected at or around the time of each child's developmental assessment and used in conjunction with the DC:0–3R to better understand the diagnostic profiles of infants and young children with substance exposure.

The Infant–Toddler Social and Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006) and the Child Behavior Check-

list for Ages 1½–5 (CBCL/1½–5; Achenbach & Rescorla, 2000). The ITSEA and the CBCL/1½–5 are commonly used measures of socioemotional problem behaviors and competencies in children. In this study, the ITSEA was used with children 12 to 17 months of age ($n = 9$) and the CBCL/1½–5 was used with children 18 months to 3 years of age ($n = 15$). Scores from both indices were combined to obtain a measure of internalizing and externalizing behaviors across a larger portion of the sample. *T* scores (i.e., scores corrected to a mean of 50 and an *SD* of 10 based on a normative sample) were obtained for a total of 24 children for whom data were available. Higher scores on this measure are indicative of more problematic behaviors, and in accordance with the CBCL manual, scores above 63 are considered in the clinical range. Scores on both measures were based on maternal report.

Adaptive Behavior Assessment System (ABAS; Harrison & Oakland, 2003). Adaptive skills are those necessary for daily living, including taking care of oneself and relating to others. The ABAS provides ratings in three domains of adaptive functioning based on performance in the following skill areas: (a) conceptual domain: communication, self-direction, and functional

TABLE 4. *Child Mental Health Diagnoses and Relationship Distributions*

DC:0-3R	<i>n</i>
Axis I: Primary Diagnosis	
No diagnosis	31
Multisystem Developmental Disorder	4
Regulation Disorders of Sensory Processing	
Hypersensitive-Type A: Fearful/Cautious	2
Hyposensitive/Underresponsive	1
Sensory Stimulation-Seeking/Impulsive	1
Adjustment Disorder	3
Mixed Disorder of Emotional Expressiveness	2
Posttraumatic Stress Disorder	1
Deprivation/Maltreatment Disorder	1
Axis II: Global Assessment of Relationship Disturbances	
PIR-GAS 91-100 Well-Adapted	0
(Relationship mutually enjoyable/conflict-free)	
PIR-GAS 81-90 Adapted	11
(Relationships synchronous and reasonably adapted)	
PIR-GAS 71-80 Perturbed	4
(Overall relationship functioning less than optimal)	
PIR-GAS 61-70 Significantly Perturbed	9
(Relationship strained, but conflict-limited)	
PIR-GAS 51-60 Distressed	12
(Relationship affected across multiple domains)	
PIR-GAS 41-50 Disturbed	6
(Relationship problematic; development can be temporarily disrupted)	
PIR-GAS 31-40 Disordered	1
(Rigidly maladaptive interactions; development likely affected)	
PIR-GAS 21-30 Severely Disordered	2
(Relationship functioning severely compromised; development affected)	
PIR-GAS 11-20 Grossly Impaired	1
(Relationship dangerously disorganized; infant in imminent danger)	
PIR-GAS 0-10 Documented Maltreatment	0
RPCL	
None	10
Underinvolved	13
Overinvolved	7
Angry/Hostile Anxious	3
Mixed	2
Underinvolved & Angry/Hostile	4
Underinvolved & Anxious	1
Overinvolved & Angry/Hostile	2
Overinvolved & Underinvolved	2
Verbally Abusive & Angry/Hostile	1
Physically Abusive & Angry/Hostile	1

DC:0-3R = Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood, Revised; PIR-GAS = Parent-Infant Relationship Global Assessment Scale; RPCL = Relationship Problems Checklist.

pre-academics; (b) social domain: leisure and social; and (c) practical domain: community use, home living, health and safety, and self-care. The ABAS also provides a general adaptive composite (GAC) score, which is a measure of overall functioning across these nine skill areas and a motor skill area. *T* scores (i.e., scores with a *M* = 100 and an *SD* = 15) were obtained for each of the adaptive

domains as well as for the GAC. Data from 38 children were available for the GAC and social domains, and data from 37 children were available for the conceptual and practical domains. Higher scores on these measures indicate better functioning. In accordance with the manual, scores above the 74th percentile were classified as “above average,” scores between 25 and 74 were classified as “average,” and scores below 25 were classified as “below average.” Scores on this measure were based on maternal report.

Greenspan Social-Emotional Scale (SES; Greenspan, 2004). The SES is a standardized measure of children’s mastery of early socioemotional milestones. Items on this scale are associated with particular developmental milestones and are listed developmentally according to the order in which these milestones typically occur: (a) self-regulation and interest in the world, (b) the ability to engage in relationships, (c) using emotions in a purposeful manner, (d) using emotions and gestures to communicate, (e) using emotions and gestures to solve problems, (f) using symbols/ideas to convey feelings, (g) using symbols/ideas to express needs, and (h) making logical bridges between emotions and ideas. Scaled scores (i.e., scores with a *M* = 10 and an *SD* = 3) were obtained for 36 infants for whom data were available. Higher scores on the SES indicate higher socioemotional mastery. Scores on this measure were based on maternal report.

Emotional Availability Scale (EAS; Biringen, 2008). The EAS is a widely used, standardized measure of the emotional quality of caregiver-child interactions that requires extensive training. Unlike the PIR-GAS from the DC:0-3R, which provides a global measure of the mother-child relationship, the EAS measures specific aspects of the mother-child relationship by independently assessing both mother and child contributions to the interaction. In this study, the EAS was rated based on an observational assessment of the mother-child relationship, which was conducted with a subset of the sample who had consented to videotaping (*n* = 30). Mother-child play interactions were videotaped close to the time of each child’s developmental assessment. These observations were standardized to the extent that mothers were provided with a developmentally appropriate set of toys and asked to play with their child as they would at home for a period of 15 min. The videotaped interactions were coded independently using the EAS by two trained researchers, one of whom was not involved in any DC:0-3R axis ratings. Maternal contribution scores ranged from 7 to 29 in the following domains: sensitivity, structuring, nonintrusiveness, and nonhostility. Child contributions were similarly scored in the following domains: responsiveness to the parent and involvement of the parent in interaction. Like the PIR-GAS, the screener portion of the EAS provides a global assessment of the emotional quality of the mother-child relationship. Scores on this measure were included to compare with global ratings from the PIR-GAS. Screener scores ranged from 0 to 100. Higher scores on all EAS measures are indicative of better mother-child functioning. The EAS requires a high level of interrater reliability (Bornstein et al., 2010). In this study, intraclass correlation

TABLE 5. Summary of the Children's Socioemotional Functioning Capacities Using the CESFRS, Axis V of the DC:0–3R

Functioning Capacity	<i>n</i> ^a	Rating		
		Age Appropriate (%)	Immature (%)	Not Evident (%)
Attention and regulation	46	20 (43.5)	26 (56.5)	–
Forming relationships/mutual engagement	45	24 (53.3)	21 (46.7)	–
Intentional two-way communication	45	30 (66.7)	14 (31.1)	1 (2.2)
Complex gestures and problem-solving	44	8 (18.2)	28 (63.6)	8 (18.2)
Use of symbols to express thoughts/feelings	17	4 (23.5)	7 (41.2)	6 (35.3)
Connecting symbols logically/abstract thinking	5	–	1 (20.0)	4 (80.0)

CESFRS = Capacities for Emotional and Social Functioning Rating Scale; DC:0–3R = Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood, Revised.

^aThe sample size for each functioning capacity domain varied depending on whether the child was below the expected age for the functioning capacity in question.

coefficients for interrater reliability were calculated for each of the mother and child dimensions using recommended parameters (McGraw & Wong, 1996: two-way random, absolute agreement, average of coders) and ranged from .82 to .93 (i.e., high reliability).

RESULTS

DC:0–3R Mental Health Diagnostic Profiles as Rated by Clinicians/Researchers

Axis I and II. A total of eight different Axis I mental health diagnoses were assigned to almost one third (32.6%) of the children in this study, and 2 children met criteria for multiple Axis I diagnoses. Moreover, the mother–child dyads in this sample demonstrated varying degrees of problematic relationships, based on Axis II PIR-GAS ratings. Ratings ranged from “Adapted” (i.e., exceptionally well-functioning) to “Grossly Impaired” (i.e., indicating severe problems in the relationship). However, the majority of the dyads (76.1%) were classified as exhibiting features of a disordered relationship, and four dyads met criteria for an Axis II relationship disorder. The distribution of Axis I mental health diagnoses and Axis II relationship ratings and features are summarized in Table 4.

Axis III. Five children had medical problems listed under Axis III. Of these, 2 children had a diagnosis of mild mental retardation, 1 child had congenital malformations of the pulmonary and tricuspid valves, 1 child had hypospadias, and 1 child had talipes equinovarus.

Axis IV. The Psychosocial Stressor Checklist from Axis IV revealed high rates and a wide range of stressors in the broader social context of the children in this sample. The number of stressors present ranged from 5 to 30 ($M = 15.50$, $SD = 4.90$). All mothers had experienced substance-use problems, and almost all (84.8%) had experienced mental health difficulties. In addition, most mothers (69.4%) were parenting on their own and did not feel supported by their families (87.0%). Many mothers were unemployed (92.9%), had not completed high school (45.6%), were living in poverty with their children (84.8%), were living in un-

safe neighborhoods (73.9%), were living in unsafe/overcrowded housing (78.3%), and were experiencing food insecurity (73.9%). Child welfare services had been involved with all of the dyads, and almost half of the children (43.5%) had been placed in foster care at some point while a subset of the children (12.3%) had been placed in kinship care. The majority of children (60.9%) had directly witnessed domestic violence. These findings underscore the extremely high-risk nature of the families accessing services at BTC.

Axis V. Ratings in each of the socioemotional functioning domains listed on the Axis V CESFRS are summarized in Table 5. With the exception of intentional two-way communication, nearly half of the children were rated as functioning below age-appropriate level in each socioemotional domain. For instance, 46.7% of the children were perceived as functioning below age-appropriate level (i.e., immature and/or no evidence) in terms of forming relationships and mutual engagement, and all children were below age-appropriate level for connecting symbols logically and abstract thinking.

Infant Sociomotional Profiles Based on Maternal Report

The mean GAC score on the ABAS was 103.8 ($SD = 23.3$), and the mean socioemotional score on the SES was 10.0 ($SD = 3.0$), indicating that the children in this sample were generally exhibiting adaptive and socioemotional skills in the normal range, according to their mothers. On average, children also were functioning in the normal range on the CBCL, with mothers reporting similar mean levels of internalizing ($M = 51.3$, $SD = 10.2$) and externalizing ($M = 51.4$, $SD = 7.1$) behaviors. Despite normative ratings for the majority of children, a subset of children were rated as functioning below average in terms of their socioemotional and adaptive functioning. More specifically, on the ABAS, 14% of children were below average in the socioemotional domain, 27% were below average in the practical domain, and 16% were below average in the general domain of adaptive functioning. Moreover, 29% of the children were rated as below average in multiple domains of adaptive functioning, suggestive of a more global developmental

delay. On the CBCL, mothers also reported clinical levels of internalizing in 20.8% of the infants and clinical levels of externalizing in 12.5% of the infants.

Quality of the Mother–Child Relationship Based on Direct Observation—EAS

Based on the EAS, the means of maternal sensitivity, structuring, nonintrusiveness, and nonhostility scores were 17.93 ($SD = 3.42$), 18.33 ($SD = 2.99$), 16.87 ($SD = 2.96$), and 18.33 ($SD = 3.64$), respectively. The means of child responsiveness and child involvement scores were 16.77 ($SD = 3.33$) and 16.50 ($SD = 3.20$), respectively. Scores on the EAS screener ranged from 15 to 75 ($M = 57.17$, $SD = 15.24$). A Spearman rank-order correlation analysis was conducted to compare Axis II PIR-GAS ratings with EAS ratings and revealed a significant correlation between PIR-GAS ratings and two of the maternal contribution ratings, including adult sensitivity, $rs(30) = .39$, $p < .05$ and adult nonhostility: $rs(30) = .36$, $p < .05$, as well as the EAS screener rating (rating of the overall relationship quality, $rs(30) = .37$, $p < .05$). However, child contribution ratings on the EAS were not significantly correlated with global relationship ratings on the PIR-GAS, $ps > .05$.

Relations between Mother–Child Relationship Quality and Mental Health Diagnostic Profiles

Although DC:0-3R guidelines suggest that maternal ability to ameliorate child symptoms should be considered in making an Axis I diagnosis, it is not required. Moreover, the guidelines suggest that when severe difficulties in the mother–child relationship cause symptoms in the child, these symptoms should be accounted for under Axis II relationship classification rather than under Axis I (ZERO TO THREE, 2005, p. 29). This means that diagnoses on Axis I and II are made independent of each other and that either can occur in the absence of the other. We felt that it was important to look at whether mother–child relationship quality matters in terms of having a diagnosis in our sample of high-risk infants and young children with substance exposure, given the prevalence of relationship difficulties in such high-risk populations.

With the exception of only 3 children, all children given an Axis I diagnosis were experiencing mother–child relationships characterized anywhere from “significantly perturbed” to “grossly impaired” on Axis II of the PIR-GAS. To explore the association between Axis II relationship ratings and the presence or absence of an Axis I mental health diagnosis, the sample was divided into two groups based on PIR-GAS scores: (a) disturbed/disordered (scores of < 80) and (b) adapted (scores > 80), in keeping with DC:0-3R cutoffs. Note that in this sample, more children with an Axis I diagnosis had disturbed/disordered relationships with their mothers (37.1%) than adapted relationships (18.2%) and that more children without an Axis I diagnosis had adapted relationships with their mothers (81.8%) than disturbed/disordered relationships (62.9%). For children with a disturbed/disordered relationship, the odds for having an Axis I diagnosis were 13 to 2. For children with an

adapted relationship, the odds for having an Axis I diagnosis were 22 to 9. To gain a better understanding of the clinical significance of these ratios, an odds ratio (OR) was calculated. The OR for having an Axis I diagnosis/not having an Axis I Diagnosis for children who had a disturbed/disordered relationship was 2.66 (95%, CI = .50–14.25), indicating that the risk of having a diagnosis was over 2.5 times more likely for children with a disturbed/disordered relationship (see Figure 1).

The relation between clinician ratings of the mother–child relationship (i.e., PIR-GAS ratings) and maternal ratings of children’s socioemotional functioning also was explored. A Spearman rank-order correlation analysis revealed a significant association between PIR-GAS ratings and maternal ratings of most of the adaptive functioning domains, including the conceptual domain, $rs(37) = .35$, $p < .05$, the social domain: $rs(38) = .43$, $p < .01$, and the general domain of adaptive functioning: $rs(37) = .37$, $p < .05$. Only the association between ratings on the PIR-GAS and the practical domain of adaptive functioning was not significant, $rs(37) = .23$, n.s. PIR-GAS ratings also were marginally correlated with maternal ratings of children’s socioemotional capacity on the SES, $rs(36) = .32$, $p = .06$, and maternal ratings of children’s internalizing behaviors on the CBCL: $rs(24) = -.44$, $p < .05$. The relation between PIR-GAS ratings and maternal ratings of children’s externalizing behaviors on the CBCL was not significant, however, $rs(24) = -.25$, n.s. Overall, consistent with expectations, children with more maladaptive mother–child relationships tended to exhibit poorer socioemotional and adaptive behaviors, as reported by mothers.

Mother–Child Separation as a Contributing Factor to Diagnostic Profiles

All mothers in this study reported current and/or past involvement with child welfare services for various reasons, including exposure to maternal substance use (52.5%), exposure to domestic violence (25.0%), and suspected child maltreatment/neglect (5.0%). In 48% of cases, child welfare involvement led to at least one mother–child separation; however, in all of these cases, mothers had regular contact with their children during the separation period, and all dyads were eventually reunited. The length of mother–child separation ranged from 4 days to 18 months ($M = 3.85$, $SD = 4.34$). Although age at separation ranged from birth to 36 months, nearly half of the dyads (45.8%) were separated at birth. The length of time between mother–child reunification and the developmental assessment ranged from 2 to 32 months ($M = 10.58$, $SD = 5.56$).

A Spearman rank-order correlation analysis was carried out to examine the relation between the length of separation and mother–child relationship quality ratings (i.e., PIR-GAS ratings on Axis II) and revealed that the two were not correlated, $rs(45) = -.11$, n.s. In addition, the association between whether there was a separation and the presence or absence of an Axis I diagnosis was examined using a chi-square analysis. Children who had experienced a separation from their mothers were not more likely to receive an Axis I diagnosis than were children who had not experienced a

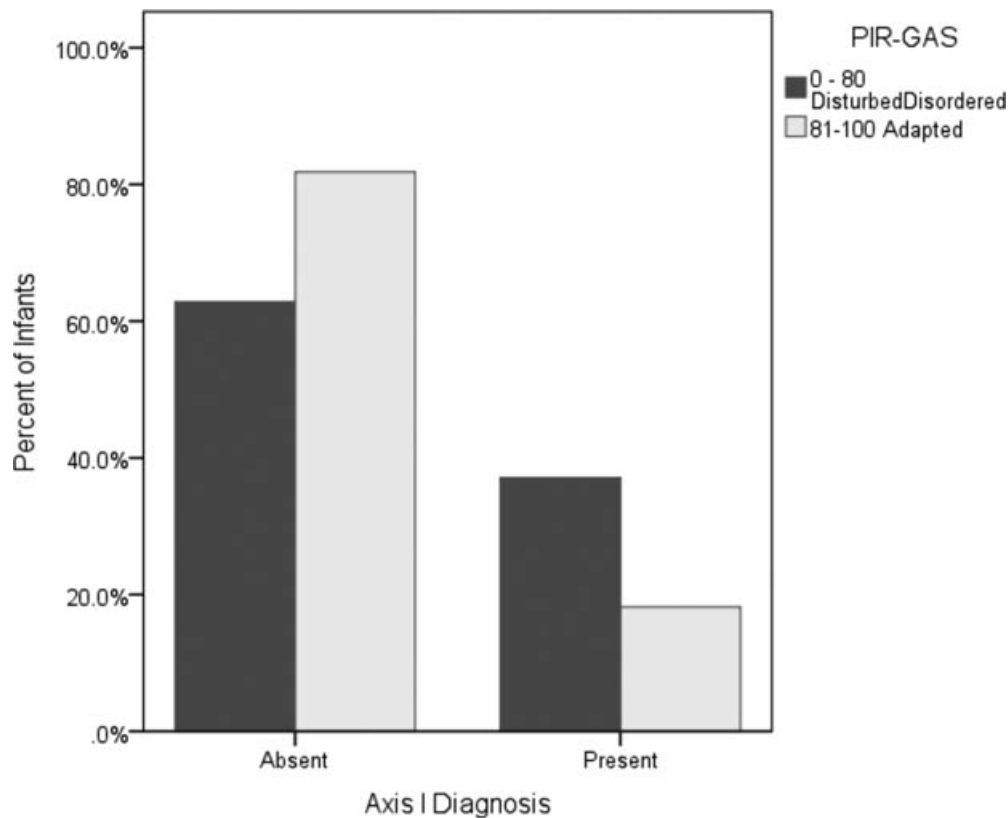


FIGURE 1. Percentage of children within each Parent-Infant Relationship Global Assessment Scale (PIR-GAS) relationship category (Adapted vs. Disturbed/Disordered) based on Axis I diagnostic status (present vs. absent).

separation, $\chi^2(1) = 16$, n.s. Furthermore, the length of separation was not significantly associated with the number of risk factors identified on the Psychosocial Stressor Checklist from Axis IV: $rs(45) = .03$, n.s.

DISCUSSION

The main objective of this investigation was to describe the mental health diagnostic profiles of infants and young children with prenatal substance exposure whose mothers were engaged in early intervention at BTC. We also explored the relation between mother-child relationship quality and child socioemotional difficulties. As predicted, a large subset of these infants and young children with substance exposure experienced socioemotional difficulties. Also consistent with expectations, we found that children who had more problematic relationships with their mothers were more likely to have greater socioemotional problems and also were more likely to have a mental health diagnosis based on DC:0-3R diagnostic criteria.

Infant Mental Health Diagnostic Profiles—DC:0-3R

Axis I—Mental health diagnosis. Close to one third of the children in the present study met criteria for at least one DC:0-3R Axis I mental health diagnosis. The most frequent diagnoses assigned

were multisystem developmental disorder and regulation disorders of sensory processing. Adjustment disorder also was common while just a few children met diagnostic criteria for mixed disorder of emotional expressiveness, posttraumatic stress disorder, and deprivation/maltreatment disorder. The diagnoses of multisystem developmental disorder and regulatory disorders reflect similar underlying developmental concerns regarding an infant's regulatory capacities, including the dysregulation of affect and sensory processing, and impairment in the ability to engage in developmentally appropriate activities. The prominent occurrence of regulatory difficulties in this sample of infants and young children with substance exposure is consistent with previous diagnostic research on children prenatally exposed to substances, highlighting their state-regulation difficulties (Rosett et al., 1979; Scher et al., 1988; Schuetze et al., 2007; Stoffer et al., 1988), particularly in regards to regulating negative affect (Lowe et al., 2006). The distribution of Axis I diagnoses in our study also is consistent with that of Janssens et al. (2009), who found the most frequent Axis I diagnoses to be multisystem developmental disorder and regulatory disorders in their sample of 69 preterm infants (M age = 15 months).

Given that the majority of children in this sample were experiencing varying degrees of socioemotional risks (e.g., maternal substance use, poverty, domestic violence), the number of diagnoses appears low, especially in comparison to other studies with

similar high-risk samples. For instance, the rate of Axis I diagnosis was 76% in a clinical sample of children with high levels of parental psychopathology, home conflict, and negligence (N. Guédeney et al., 2003) and 90% in a sample of similarly high-risk children (Maldonado-Duran et al., 2003). The rate of Axis I diagnosis in the present study (32.6%) also was lower than the 77% rate found using the *DSM-IV* diagnostic system with a sample of older children prenatally exposed to alcohol who were attending an outpatient mental health clinic (O'Connor et al., 2002a). Some important differences between these studies and the present one should be noted that may help explain the discrepant rates of diagnosis. One such difference is that unlike the present study, which used the revised version of the DC:0-3, both N. Guédeney et al. (2003) and Maldonado-Duran et al. (2003) used the original DC:0-3 diagnostic system, which was later revised as a result of concerning risk for false positives due to vague Axis I diagnostic specifications (e.g., Egger & Emde, 2011). Another major difference between these studies is that children in previous samples were specifically referred to clinical services for behavioral problems (N. Guédeney et al., 2003; Maldonado-Duran et al., 2003) whereas children in this study were not. In fact, this is one of the first studies to describe the prevalence rates of particular diagnoses in a sample of high-risk infants and young children with substance exposure who were not specifically referred to clinical services for behavioral issues.

Notwithstanding the low rate of Axis I diagnosis in this study, the children described here exhibited many significant mental health symptoms that were clinically concerning and just subthreshold for any one given Axis I diagnosis based on DC:0-3R diagnostic criteria. That is, the absence of an Axis I diagnosis did not equate with an absence of risk or socioemotional difficulties in our sample. We therefore want to emphasize the importance of ongoing clinical formulation and evaluation, along with early clinical intervention, with children exposed to substances regardless of whether they meet criteria for a particular Axis I diagnosis. The DC:0-3R provides clinicians with not only a diagnosis but also a comprehensive profile of a child, including their mental health and medical status, the quality of their caregiving environment, and their level of socioemotional development. Use of this diagnostic system makes it possible to consider these potential risk and protective factors to fully understand the complex treatment needs of children with substance exposure and provide early clinical intervention even before a diagnosis is made.

Axis II—Relationship classification. Based on PIR-GAS scores, the majority of mother-child dyads in this study had varying degrees of problematic relationships, which is consistent with the high rate of disordered relationships found in other high-risk samples (cf. J.M. Thomas & Guskin, 2001). Just over three fourths of the dyads in this sample exhibited features of a disordered relationship, and four dyads were classified as having a relationship disorder on Axis II. Dyads with a relationship disorder classification also were experiencing a range of problematic relationship features listed on the RPCL (see Table 4). This finding emphasizes

that in a sample of substance-involved families, there are many different difficulties within the mother-child relationship that require clinical attention. It also reflects instability in parenting style within each mother-child dyad in this sample. For example, some children in this sample experienced shifts between overinvolved and underinvolved parenting, and between hostile/angry and anxious parenting. Only 24% of the dyads had PIR-GAS scores in the “adapted” range. This finding is not surprising given the challenges that each member of the substance-exposed dyad presents to the mother-child relationship (Pajulo et al., 2006). A significant portion of children in our sample were exhibiting socioemotional difficulties as perceived by their mothers, likely making them more challenging to care for. In addition, the social-contextual risks often faced by substance-using dyads were likely affecting the mothers’ ability to parent effectively (Freier, 1994; Hans, 2002; Mayes & Truman, 2002).

Overall, we found the PIR-GAS to be a useful clinical tool for evaluating the quality of the mother-child relationship in this high-risk sample of mothers and their young children with substance exposure. Given the high frequency of parent-child relationship problems in high-risk samples, it can be difficult to find a measure that accurately captures subtle variations in the extent to which a relationship may be more adaptive or problematic, as the PIR-GAS seemed to do in this study. We also consider the PIR-GAS clinically useful in providing a means by which clinicians can quickly assess the quality of the mother-child relationship without having to rely on extensive research protocols. Overall ratings of the mother-child relationships in our sample based on brief file reviews (i.e., PIR-GAS ratings) correlated with more objective and specific ratings using the EAS. This suggests that clinicians should be able to accurately judge the overall quality of mother-child dyadic relationships using the PIR-GAS based on their clinical involvement with and observations of the dyad.

We also regard the PIR-GAS as a very promising research tool because we found good variability using this measure with such a high-risk sample, where variability is often limited. However, the research literature contains only preliminary evidence for the validity of the PIR-GAS. Consistent with our findings, lower PIR-GAS scores have been associated with more severe infant regulatory and behavioral problems (von Hofacker & Papousek, 1998), higher child aggression scores (J.M. Thomas & Clark, 1998), more internalizing and externalizing problems (J.M. Thomas & Guskin, 2001), and higher rates of attachment disorders (Boris, Zeanah, Larrieu, Scheeringa, & Heller, 1998). Although these findings are an important starting point, further research is needed to establish the reliability and validity of the PIR-GAS for use as a formal research measure (Emde & Wise, 2003).

Axis II relation with Axis I and mother-child separations. The majority of children given an Axis I diagnosis were experiencing mother-child relationships characterized anywhere from “significantly perturbed” to “grossly impaired” on Axis II of the PIR-GAS. These findings highlight the role of the mother-child relationship in receiving an Axis I diagnosis and the need for early

intervention focused on strengthening this critical relationship (for an example of recent intervention work with a relationship focus, see Pajulo et al., 2006; Suchman et al., 2006). Further, we believe that it is best to start this work during pregnancy when possible. In fact, research based on a subsample of women at BTC has shown better prenatal and postnatal outcomes for mothers who engaged in intervention services at BTC during the first two trimesters of their pregnancies compared to those who engaged during their third trimester. The women who engaged at BTC during the first two trimesters reported fewer prenatal risk factors, reduced prenatal substance exposure, fewer birth complications, higher birth weights, reduced lengths of hospital stay, and fewer infant health concerns (Pepler, Moore, Motz, & Leslie, 2002).

The results of the present study reveal that the presence or duration of a temporary mother–child separation was not significantly related to having an Axis I diagnosis or to ratings of mother–child relationship quality on Axis II. Note that the mothers in this study had regular contact with their children during separations to minimize any negative impact of separations and transitions on the dyads. Mothers also received continuous support from BTC clinicians in managing feelings related to the separation and in preparing for reunification. Research has suggested that this kind of continuity and coordination of care predicts better child developmental outcomes (Stahmer et al., 2009).

Axis III—Medical diagnoses. Only 5 children in our sample had problems listed on Axis III. It was interesting that 3 of these children had distressed mother–child relationships (PIR-GAS rating <60), 1 had an Axis II relationship disorder, and 2 met criteria for an Axis I mental health diagnosis. Therefore, the few children who had problems listed on Axis III experienced problems in multiple domains.

Axis IV—Psychosocial stressors. Many significant stressors were identified in our sample, which is consistent with previous reports on our clinical population (Motz et al., 2006) and with reports of others working with substance-using populations (Freier, 1994; Hans, 2002; Mayes & Truman, 2002). We found the PSCL in the DC:0–3R to be a helpful clinical tool in summarizing sources of stress for BTC families, but there was limited variability on most items using this measure with such a high-risk sample.

Axis V—Social and emotional functioning. Although we found some evidence of delayed socioemotional functioning in this sample of children across the functional capacities typically seen early in infancy, these delays were particularly pronounced across the more complex, functional capacities that typically emerge later in development (for examples of these capacities, see Table 5). Findings from these exploratory analyses are consistent with other studies involving preschool- and school-aged children, which have shown that social and functional deficits among children with alcohol exposure tend to become more pronounced with age (S.E. Thomas et al., 1998; Whaley et al., 2001).

Infant Sociomotional Profiles—Maternal Report Ratings

The infants in our sample experienced socioemotional difficulties in a range of domains, including socioemotional, adaptive, and regulatory domains. Although the number of children old enough to receive scores on the ITSEA and CBCL was small, approximately one fifth (21%) of the children assessed were experiencing internalizing symptoms in the clinical range, and 13% were experiencing clinical levels of externalizing. In addition, a subset of children were categorized as functioning below average in the practical domain of adaptive functioning (27%), and 29% were below average in multiple adaptive functioning domains; in addition, 16% were below average in overall adaptive functioning. Given that most of the dyads in this study had varying degrees of problematic mother–child relationships, it thus is not surprising that a significant subset of the children demonstrated high rates of socioemotional difficulties, as reported by their mothers. Infants and very young children have few mechanisms for coping with intense emotions without the support of their caregivers. Difficulty in managing their emotions is often expressed in externalizing/aggressive behaviors. Research has shown that preschool- and school-aged children with substance exposure often have problems with aggression (Griffith et al., 1994; Mattson & Riley, 2000) and that these problems often persist into adolescence and adulthood in those with FASD, for example (Streissguth et al., 1996). This underscores the importance of early intervention to help caregivers learn how to support their young children in effectively managing their intense emotions to prevent long-term problems.

This study is the first to identify social skills problems very early in the development of infants with prenatal substance exposure. The SES revealed that 14% of the infants were delayed in their mastery of early socioemotional skills, according to maternal report. Depending on age, these skills include the ability to self-regulate, engage in relationships, express affect in an interactive and purposeful way, use emotions and gestures to communicate and to solve problems, and use symbols and ideas to convey feelings, needs, and ideas. A subsample of the infants also showed delays in their social-adaptive functioning on the SES, according to their mothers, which includes the ability to get along with others, use manners, assist others, recognize emotions, play with others, follow rules, and engage in play activities. S.W. Jacobson et al. (1993) assessed the complexity of play in 12-month-old infants who were exposed prenatally to alcohol. They found that alcohol exposure was associated with lower quality play responses when play activities were elicited by the examiner; however, scores on the quality of spontaneous play were comparable to those of a low-risk sample of infants. The literature on school-aged children with alcohol exposure and children with FASD has suggested that these children often have social skills deficits that are independent of IQ (S.E. Thomas et al., 1998) and that these deficits, like problems with aggression, continue to be a concern into adolescence and adulthood (Streissguth et al., 1991; Streissguth et al., 1996). The results of this study indicate that social skills problems among children exposed to alcohol and other substances may be

identified in infancy and early childhood and should be addressed early on to help promote more adaptive social development for these children.

We also found very high rates of trauma among the children in this study. Many were living in a context of domestic violence, neglect, or maltreatment and witnessing maternal substance-use relapses. This is consistent with previous research on substance-involved families, which has suggested high rates of neglect, maltreatment, and exposure to violence in this population (Hans, 2002; Mayes & Truman, 2002). These high rates of trauma underscore the broader context of socioemotional risk for these children and families and highlight the need for clinicians working with children prenatally exposed to substances to have clinical training in the area of early childhood trauma to intervene appropriately.

Mother–Child Relationship Quality and Child Socioemotional Difficulties

The results of this study reveal a significant association between mother–child relationship quality and socioemotional problems. Children with problematic mother–child relationships were more likely to exhibit socioemotional difficulties, including higher rates of internalizing problems and poorer adaptive functioning, as reported by mothers. We also found higher rates of Axis I mental health diagnoses among children with problematic relationships than among children with adapted mother–child relationships. These findings are consistent with other studies using the PIR-GAS with different populations (e.g., Aoki, Zeanah, Heller, & Bakshi, 2002; Boris et al., 1998; J.M. Thomas & Clark, 1998; J.M. Thomas & Guskin, 2001; von Hofacker & Papousek, 1998), demonstrating that disturbances in the quality of the mother–child relationship are associated with a range of socioemotional problems in children. The findings of the present study also are in line with research on infants with substance exposure that has emphasized the importance of high-quality mother–infant interactions (e.g., mother’s supportive presence, more attunement and involvement with the infant) in reducing regulation difficulties and negative affect of young children with prenatal substance exposure (Lowe et al., 2006; O’Connor et al., 2002a), and in improving attachment outcomes for substance-exposed dyads (O’Connor et al., 2002a). Other research has demonstrated that the negative affect and behavior of infants with prenatal substance exposure predicts less maternal elaboration and stimulation during interactions. This highlights the contribution of the child’s negative characteristics to the quality of stimulation received from the mother (O’Connor et al., 1993).

Taken together, these findings stress the importance of conceptualizing the range of difficulties experienced by young children with substance exposure within a relationship framework as well as the importance of focusing intervention efforts on supporting and enhancing the quality of the mother–child relationship. This approach is particularly important when children with substance exposure are living with their biological mothers and experiencing

the associated socioemotional stressors that may further challenge the establishment of a healthy mother–child relationship.

Considerations and Conclusions

This study was based on a small sample of 46 mothers and their children with prenatal substance exposure, making it difficult to control for socioemotional and environmental risk factors (e.g., parent mental illness, poverty, limited social support) that are highly prevalent in substance-involved samples. A comparison with high-risk, non-substance-abusing mothers from the same community would be the ideal design to address whether the findings are due to substance use by mothers or other risk factors. The small sample size also may have limited the ability to accurately represent the prevalence of mental health symptoms and diagnoses in this population. Nonetheless, this sample size exceeded that of previous research exploring the mental health diagnostic profiles of children with prenatal substance exposure (i.e., O’Connor et al., 2002a), which is notable given documented difficulties engaging high-risk populations in research (Katz et al., 2001). And although it was not possible to distinguish between the effects of prenatal alcohol exposure and those of other drugs on postnatal outcomes for infants in this sample, it is a strength of this study that the sample included infants exposed to multiple substances given the prevalence of polysubstance use in the general substance-using population (United Nations, 2004). Another strength of this study is that the ratings for Axes I, II, and V were carried out by independent raters, precluding rater bias. Further, the high degree of correspondence between raters that was achieved for Axes I and II supports the interrater reliability of the DC:0-3R, filling a gap in the extant literature (cf. J.M. Thomas & Guskin, 2001).

FINAL CONCLUSIONS

Our results demonstrate that this sample of infants and young children prenatally exposed to alcohol and other substances experienced a wide range of contextual stressors and socioemotional challenges. Without comprehensive assessments and integrated early intervention programs to address these problems, these kinds of stressors and challenges may become more pervasive and impairing as children age. The DC:0-3R diagnostic system appears to be a useful clinical tool for conceptualizing the difficulties experienced by infants and young children with prenatal substance exposure, and inclusion of relationship classifications (Axis II) seems particularly informative. Given the association between mother–child relationship problems and infant socioemotional problems, it is clear that intervention efforts need to focus on supporting and enhancing the quality of the mother–child relationship in high-risk families.

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