Complex Developmental Issues of Prenatal Drug Exposure

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Abstract

The polydrug pattern of drug use by pregnant women, combined with the varying purity, dosage, and timing during pregnancy when drugs are taken, makes it very difficult to determine the developmental impact of any specific drug. Nevertheless, studies of drug-exposed newborns suggest an array of behavioral characteristics that make their care challenging, and a few studies indicate that some prenatally substance-exposed infants display developmental problems as toddlers and preschoolers in areas as diverse as language, attachment to primary caregivers, ability to organize behavior, and mental and motor development. Researchers agree, however, that prenatal exposure to drugs is only one, and probably not the most important, of many factors than can influence a child’s development. Postnatal environment is probably more important than prenatal drug exposure in determining outcomes in child development. Intensive intervention efforts are therefore needed now. Early childhood intervention strategies already developed for other vulnerable children can offer guidelines for working with drug-exposed children and their families. Specialized treatment programs, coupled with broad-based family support and parent education services, can ameliorate the negative effects of prenatal drug exposure.

The youngest casualties of the current drug epidemic in the United States are the thousands of infants born each year exposed prenatally to illegal drugs and alcohol. Although media attention has primarily focused on crack cocaine use by pregnant women, that examination ignores the thousands of pregnant women who use and abuse one or more other legal and illegal drugs. Unfortunately, the polydrug nature of most substance use makes it exceptionally difficult to determine the effects of any one drug on subsequent child development. Furthermore, the complexity of the situations in which many drug-using mothers live makes it hard to attribute their children’s developmental lags, when they are observed, to drugs, as opposed to other environmental conditions. In many ways, prenatally drug-exposed children look much like other children who live in similarly chaotic homes or neighborhoods.
Nevertheless, based on what we know about child development in general, the deficits that some drug-exposed infants and toddlers exhibit may predict subsequent developmental problems. Other findings from developmental literature indicate that even children who are impaired by their exposure to drugs \textit{in utero} can and should be helped by concerted early intervention programs.

This paper begins with a description of some of the basic premises and findings of child development research, with special attention on how these general tenets apply to substance-exposed infants. The difficulties of conducting research in this area are then discussed briefly. Then, the literature on the effects of cocaine, marijuana, opiates, alcohol, and tobacco on child development is reviewed. Finally, ideal early intervention programs are described, based on what we know about programs that have served other vulnerable children. The review considers many aspects of child development, including emotional, social, cognitive, motor, and behavioral development.

### How Children Develop

Most child development researchers and clinicians subscribe to some basic tenets. The following are some of the principles that are most helpful in understanding the extent to which the damage exerted by fetal substance exposure is inevitable and/or irreversible.

1. Development is influenced by constitutional and genetic predispositions as well as by environmental conditions.

   Children vary in their inborn physical, biological, and temperamental makeup. These constitutional and genetic factors interplay with each individual’s environment throughout life. Human development is the product of the complex cumulative interaction of constitutional, genetic, biological, familial, social, and environmental factors. For example, while still \textit{in utero}, some harder fetuses may be better able to withstand higher levels of cocaine than others (see also the article by Zuckerman in this issue).

   After birth, children’s inborn capacities continue to help determine their responses to caregivers, families, and surroundings. For example, children are born with varying sensitivities to touch, noise, and bright lights, and with different temperaments. A child who is temperamentally difficult from birth will react differently to cocaine exposure than a child born with a more relaxed temperament. The differing responses of the child will, in turn, influence a mother’s subsequent response to that child. If an infant cries and draws away from a mother’s advances, it is very likely that the mother will attempt fewer advances in the future. As a result, the relationship, and the child, will suffer.

2. Individual children vary in their responses to any one environmental insult, but multiple insults on any one child are quite predictive of poor outcomes.

   Children’s inborn constitutional and genetic factors make them more or less able to withstand the environmental challenges, or “environmental risks,” they face.

   As negative environmental conditions accumulate, children become less resilient and more vulnerable to problems. For example, drugs in the infant’s system at birth, coupled with poor nutrition, inadequate prenatal care, and neglect or abuse during the early years may interact to create a vulnerability that might not have existed if only one or two of the risk factors had been present. Explanations and interpretations about development based on a single cause
3. Experiences and events that influence development can be enduring or temporary, obvious or subtle.

Just because something has an effect on a child’s development does not mean that the impact will be long-lasting. Conversely, because something does not immediately appear to influence development does not mean that it may not exert a profound influence at some later date. For example, prenatal exposure to drugs may contribute to a pattern of disturbing behaviors in the newborn, but no residual problems may be detected later; or, drugs in the newborn’s system may show no behavioral traces at birth but may contribute to serious learning problems that are not identified until elementary school. The challenge is to develop ways to determine the extent of any one specific factor’s influence on a child.

4. There is enormous plasticity in development.

Even when environmental conditions or innate capacities place children at a disadvantage, children have a tremendous ability for regeneration, recuperation, and accommodation. The negative impact of any one risk factor can be mitigated by other more supportive environmental influences. Prenatal exposure to drugs may influence a child’s development for the worse, but that influence can be minimized by environmental supports, such as a strong and loving family, enough resources to meet basic needs, and good housing, schools, and health care.

5. During infancy, one of the most significant developmental “tasks” is the establishment of bonding and attachment between child and caregiver.

Bonding is the process by which an infant develops a sense of trust and connection with a primary and consistent caregiver. Attachment is the affectionate link between the infant and caregiver. Secure attachment enables infants to explore the world with confidence and is related to later self-esteem, empathy, persistence on tasks, and problem-solving abilities. If substance-exposed infants are not able to bond with their parents (or with any one consistent caregiver), either because of damage done to them directly by the drugs or because drug-addicted parents or caregivers are unable to respond appropriately to them, then the children are at increased risk for behavioral difficulties later in life.

Why Research Is So Difficult

As previously noted, research on a drug’s subsequent effects on children is challenging because chemically-dependent, pregnant women rarely use just one drug. (See also the article by Gomby and Shiono in this issue.) Illegal drugs, such as cocaine, methamphetamines, PCP, and marijuana, are very commonly combined with alcohol and cigarettes. This pattern of polydrug use, coupled with the fact that the illegal substances ingested are seldom pure, makes it hard to determine which drugs a pregnant woman has used or when during pregnancy and how much she has taken.

In addition, drug-dependent, pregnant women often have poor nutrition, increased infections, other medical complications, and no prenatal care. All of these factors can cause problems for infants, making it difficult to parcel out the effects of drugs from the effects of a generally unhealthy prenatal environment or maternal lifestyle.

As a further complication, our present knowledge of prenatal drug exposure is based mainly on information gathered from indigent, non-White women and their children. Although substance abuse during pregnancy cuts across all socioeconomic classes and ethnic groups, it is usually the poor and women of color who are identified as substance abusers and therefore come to the attention of service providers and researchers. We do not know if the effects attributed to drug use would be observed among more well-to-do families who, with additional resources, might be able to cushion the effects of drug exposure on their children.

Finally, the tools we have to assess child development are problematical. On the one hand, standardized developmental as-
essment tests may not be sensitive enough to pick up subtle variations in drug-exposed children's learning and behavior. The tests may not be able to capture the elusive indicators that can predict later learning problems for substance-exposed children. On the other hand, even if differences are observed, we do not always know the functional significance of the differences. That is, for many tests, the extent to which the test results are useful predictors for subsequent performance in the real world (e.g., in school, in jobs) is unknown.

Because of these difficulties, we should almost expect to see differing results from studies purporting to address the same question. Reconciling results requires that we can identify who was studied, the methods that the researchers used to ascertain what drugs were taken (see Gomby and Shiono's article in this issue for a discussion of the offsetting problems involved in using parental self-report versus toxicological screenings), and the tests used to find the reported developmental problems in the children. Variation in any one of these factors could well lead to differing results. When differences are found, we should consider their magnitude and their functional meaning in determining their importance.

**Effects of Prenatal Drug Exposure on Child Development**

Given all these cautions, the following summarizes what we know about the developmental effects of cocaine, marijuana, opiates, tobacco, and alcohol on child development. Most of the research reviewed considers children's development through age 4 years, with a few studies looking at children through age 7.

**Cocaine and Polydrug Exposure**

Two primary groups of researchers have been studying the long-term effects of cocaine upon children: Judy Howard and her colleagues at UCLA, and Ira Chasnoff and his associates at the Center for Perinatal Addiction at Chicago's Northwestern Hospital. In both cases, the exposed babies are not really "crack" or "cocaine" babies but rather "polydrug" babies. The UCLA group, for example, has studied 18 toddlers who were most often exposed to PCP, along with cocaine and heroin, marijuana, and/or alcohol. Infants in the Chicago study were born exposed to cocaine as well as to marijuana and/or alcohol. It is impossible to say which of the effects described below (and often misattributed to cocaine alone in the popular press) are due to the cocaine, which to the other substances used, and which to the combination.

**Infants (Birth to 1 Year)**

Although the medical difficulties of drug-exposed infants are described in detail elsewhere in this journal (see the article by Zuckerman), some are also mentioned here because of their particular implications for child development. Low birth weight, growth retardation in utero, and small-sized heads at birth are all potential consequences of cocaine use during pregnancy (see the article by Zuckerman in this issue). These conditions may contribute to the risk for developmental problems, such as cerebral palsy, seizure disorder, and mental retardation. Not all infants with these conditions go on to develop the more serious problems; the risk for developing these is strongly influenced by the child's caregiving environment.

Some researchers have postulated central nervous system damage as the underlying cause of later developmental problems of polydrug-exposed children. The irritability, tremulousness, and irregular sleep patterns of some newborn cocaine-exposed infants are taken as markers of such damage. The only study to document specific central nervous system damage indicated that over one third of a sample of 28 cocaine-exposed infants had bleeding in the cerebral area of the brain, a finding relatively common in very low birth weight or preterm infants born to mothers who have not taken such drugs during pregnancy. The dosage levels or timing of cocaine ingestion which cause such problems and the reasons why some, but not all, exposed infants appear to suffer them is not known. Nor is it known if such damage has functional significance.
for later developmental problems, or if the impairments can be ameliorated through intervention programs such as those used for other vulnerable infants.

With respect to behavior, cocaine-exposed newborns are not a homogeneous group, but the following paragraphs describe a cluster of characteristics that has been noted in many newborn infants identified as cocaine-exposed. Again, we do not know why some, but not all, infants display these characteristics, or why some infants show the symptoms with greater intensity and persistence than do others.

Immediate after birth, some cocaine-exposed infants are often in great distress. Jittery and suffering tremors, the infants are irritable and sensitive to the mildest environmental stimulation. Their muscles are unusually stiff, and they may show a prolonged persistence of early reflexes. Often, they cry a great deal. They do not fall asleep readily, but once asleep are easily awakened. The distress of these newborns is obvious, but they are unable to calm themselves. Sometimes cocaine-exposed infants display the opposite characteristics: they sleep much of the time and appear to shut down as if to avoid environmental stimulation.

Although the problems associated with motor development, such as increased muscle tone and persistence of reflexes, usually diminish during the first year, irritability, sleep and feeding problems, and difficulty with calming may continue into the second year for some infants.

Most newborns cycle through periods of sleeping, wakefulness, and crying. As they develop, infants spend more time in quiet alert states and less time sleeping or crying. In the quiet and alert state, infants make contact with their caregivers. They are increasingly attracted and responsive to the face, touch, and voice of their mothers. In contrast, many cocaine-exposed infants are initially not capable of achieving the calm state necessary to participate in this mutual interaction with their mothers or primary caregivers. They may withdraw from the caregiver’s face and touch.

**Toddlers (Age 12-30 months)**

Researchers at UCLA’s Department of Pediatrics and the Center for Perinatal Addiction at Northwestern Hospital in Chicago have each been monitoring the development of a group of drug-exposed children since birth. As described above, Judy Howard and her colleagues at UCLA have followed a sample of 18 full-term and preterm infants born to highly impoverished women who used cocaine and other drugs during pregnancy. The babies were compared with non-drug-exposed, preterm infants from similar environments. Both groups of families received intervention services, including pediatric care, case management, parent education, and home visits.

Comparisons between the two groups indicate that developmental scores for the drug-exposed group in a structured setting were lower than for the non-drug-exposed comparison group. Scores for both groups were within the low-average range. In an unstructured, free play setting, drug-exposed toddlers’ play was less age-appropriate and more constricted and impulsive than that of non-drug-exposed toddlers. This play pattern, consisting of throwing and batting objects, is comparable to that observed in children with neurological impairments. In addition, drug-exposed toddlers appear to be less securely attached to their caregivers than were the comparison group. Although the sample of drug-exposed toddlers included those living with biological mothers, extended family members, and in foster care homes, it is noteworthy that of the eight residing with their biological mother, seven were insecurely attached.

Researchers at Chicago's Center for Perinatal Addiction have been following a group of over 200 infants who were born prenatally exposed to cocaine as well as to marijuana and/or alcohol. Like those of the UCLA researchers, their results indicated that drug-exposed toddlers were within the normal range in structured developmental assessments of cognitive and motor abilities. However, about 30% to 40% had language or behavioral problems of varying severity. These included delayed language development, lack of tolerance for frustration, distractibility, and difficulty organizing their behavior.
At the Center for Perinatal Addiction, preliminary results regarding outcomes for children at age 3 are just being analyzed. A sample of about 20 of these 3-year-olds continued to test within the normal range on structured developmental tests. In fact, at least 60% of the drug-exposed 3-year-olds were found to be normal with respect to language and behavioral organization. It is estimated that 30% to 40% of the drug-exposed 3-year-olds had specific problems of widely varying severity that included difficulties with expressive language articulation, focusing attention, and organizing their own behavior.

As described above, pregnant women in the Chicago program receive prenatal care and nutrition services as well as drug treatment and social services referral. Because the researchers have been unable to find a suitable non–drug-exposed control group, these results do not tell us what developmental problems the substance-exposed youngsters would have shown if their families had not received any intervention. Would their performance have been better, worse, or the same? We cannot tell. Nor can we tell if the children’s developmental delays are the result of in utero substance exposure or are due to their living situations.

No other research results are available regarding the development of preschool and older children whose primary prenatal drug exposure includes cocaine. However, some of these preliminary findings are confirmed by the clinical impressions of professionals in special education who treat children presumed to have been prenatally exposed.

For example, staff in a special Los Angeles Unified School District program for 3- and 4-year-old children prenatally exposed to drugs report the children show high sensitivity to their environments, irritability, agitation, hyperactivity, speech and language delays, poor task organization and processing, emotional problems related to difficulty with attachment and separation, passivity, apathy, aggression, and poor social skills.

Teachers in the Los Angeles program view these behaviors as the consequences of multiple risk factors, including the prenatal exposure, early difficulties with attachment and children’s subsequent lack of trust, and children’s unstable home and community environments. The program staff caution that there is no typical profile of a drug-exposed child, and that children show a continuum of impairment ranging from mild symptomatology in one area to severe problems in all areas of development.

Lack of a non–drug-exposed comparison group and the presence of chaotic home environments make it very difficult to attribute these characteristics solely to the prenatal drug exposure. Furthermore, some of the characteristics listed clearly indicate the difficulty in defining a profile for these children. For example, “apathy” and “agitation” are unlikely to be present in the same child at the same time, nor are both likely to be the primary characteristics of any one child.

**Opiates**

Heroin and methadone are opiates. Methadone, given to heroin-addicted, pregnant women in registered treatment programs, contributes to better pregnancy outcomes, perhaps due to the medical management and lifestyle changes made by the pregnant woman in treatment as compared to the pregnant heroin addict on the street.

More research has been conducted concerning the developmental outcomes of children exposed in utero to heroin and methadone than for most other drugs. Much of that research was initiated or conducted in the 1970s, when heroin was seen as the most serious drug threat then facing the nation. In some cases, children have been followed through school age.

Newborn infants of opiate-using mothers may go through withdrawal, called “neonatal abstinence syndrome,” which consists of central nervous system and digestive system symptoms that may include irritability, poor feeding, poor weight gain, ineffective sucking, yawning, sneezing and tremulousness, and sometimes seizures. They are often of low birth weight and have small head circumference, conditions associated with increased risk for later developmental problems. Most withdrawal symptoms disappear by age 2 months, but the irritability may persist during the first year or longer, contributing to caretaking difficulties similar to those encountered by parents of cocaine-affected infants. (For further description of early neonatal symptoms, see the article by Zuckerman in this issue.)
As mentioned above, researchers have followed opiate-exposed children through infancy, into the preschool years, and beyond. The extensive literature has been reviewed by several authors. In general, findings, but not their interpretations, are fairly consistent.

**Methadone-Exposed Children**

If we consider overall scores on standard developmental tests (such as the Bayley Scales of Infant Development), most studies find small or no differences in the development of children who were exposed to methadone prenatally when compared with national norms or with groups of similar, but non-drug-exposed children. In most cases, methadone-exposed children through 2 years of age score within normal ranges. However, some studies do find differences between these and other children when subscales of the developmental tests rather than overall scores are considered, or when other non-standard tests are used. Some studies, for example, find that methadone infants do not perform as well as comparison group infants on the mental or motor development subscales of the Bayley. These differences are not consistently found either across studies or at different points in time within the same study. In one study, for example, methadone-exposed children who were tested every 2-3 months, from birth to age 18 months, performed more poorly than non-exposed children only on a motor development subscale at 12 and 18 months.

Most of these studies involve children from low socioeconomic backgrounds and have found that the developmental scores of all of the children (substance-exposed and non-exposed) sink below national norms as the children grow older. This general decline appears to begin by about 18 months to 2 years of age and is similar to a decline in scores observed in other studies involving children from low socioeconomic backgrounds.

Studies that follow children through age 5 find similar results: either no differences between methadone-exposed and other children or no differences on general scores but deficits on subscales or on non-standardized tests.

**Heroin-Exposed Children**

Geraldine Wilson and her colleagues at Baylor College of Medicine have studied the development of heroin-exposed children. Their results have not always been consistent. In a study of 1-year-olds, for example, methadone-exposed children were worse off than either heroin-exposed or non-drug-exposed children, but all groups were within normal ranges on a standard developmental test. In a study of 3- to 6-year-olds, heroin-exposed children displayed physical, intellectual, perceptual, and behavioral problems when compared with similar non-drug-exposed children. A third study found no differences between groups of heroin-exposed, methadone-exposed, and non-exposed children at ages 3-5 years. Follow-ups with a subgroup of the heroin-exposed children at school age indicated that 65% of the children had repeated one or more grades or needed special educational services.

Perhaps even more striking were differences among the three groups in parenting and home environments. By their first birthday, 48% of infants of untreated heroin users were living with their biological parents, as compared with 80% of the methadone-maintenance children, and 100% of the comparison group. By the time the children reached preschool ages, only 9% of children of untreated heroin users were still cared for by their biologic mother, but almost 50% of the methadone-maintained mothers still retained custody. Given this fact, it is impossible to determine the extent to which placement in one or more foster or relatives’ homes accounts for some or all of the differences in development that these children displayed.

Most researchers agree that a poor environment will magnify any weaknesses caused by the opiate exposure. Where researchers disagree is in whether or not the drug exposure so damages children that a ceiling to their development is created—a ceiling that children cannot clear, no matter how enriched their subsequent environment. At this time, most researchers appear to agree that postnatal experiences are probably more important...
than prenatal. For example, one group states, "From the present data, it appears that the infants' environment and subsequent lack of stimulation had a more direct influence on 2-year development than maternal drug use during pregnancy."41

**Marijuana**

Although some studies of marijuana use during pregnancy report lower birth weight in newborns, these findings are not consistent.42 Most of what we know about the longer-term effects of marijuana exposure on child development derives from the work of Peter Fried and his colleagues at Carleton University in Ontario, Canada.43-47 Their Ottawa Prenatal Prospective Study has followed substance-exposed (marijuana, alcohol, and/or cigarettes) and non–substance-exposed children through the first 4 years of their lives.

Approximately 700 women enrolled in the study between 1979 and 1985. They were interviewed about drug use prior to and during each trimester of pregnancy. Children of a subgroup of the women, including those who used marijuana or smoked during pregnancy or who drank alcohol more than the average for the group were compared with children of a group who did not smoke tobacco or use marijuana and who abstained or drank little alcohol. Tests at 12, 24, and 36 months of age indicated no negative effect of marijuana exposure on mental, motor, or language development.47,48 Indeed, at 36 months of age, children of moderate marijuana users inexplicably displayed superior motor performance.47 At 48 months, however, heavy maternal marijuana use during pregnancy was associated with poor performance on memory and verbal tests.47 Because findings similar to those at 36 and 48 months were not observed at any other ages, these results can only be regarded as tentative. The children are due to be tested again at 60 and 72 months of age.

**Alcohol**

Frequent or heavy use of alcohol during pregnancy can result in a constellation of characteristics known as fetal alcohol syndrome (FAS). Children with FAS have growth deficiencies, specific facial malformations, and mental retardation.49 Some children who are alcohol-exposed may not have full FAS but only one or two signs that may then be called "fetal alcohol effects" (FAE).50 However, we do not know how much alcohol leads to problems, when during pregnancy alcohol intake is riskiest, or why some exposed children develop FAS, while others do not.

Researchers have investigated the development of FAS or FAE children separately from that of children whose mothers may have had less frequent or less heavy alcohol use during pregnancy. Studies that have followed FAS and FAE children into adolescence and adulthood find that FAS adults have lower IQ scores than FAE adults.51 The range of scores in both groups is quite broad, however, with some adults scoring above average. Therefore, it is probably neither possible nor wise to predict any one individual child’s development solely on the basis of an initial diagnosis of FAS or FAE.51

Studies that have considered more moderate maternal use of alcohol are subject to varying interpretations. In a series of papers based on the Seattle Longitudinal Study on Alcohol and Pregnancy, a study which has followed a group of about 500 children over 7 years, Ann Streissguth and her colleagues at the University of Washington have traced several developmental problems to prenatal exposure to alcohol. Studies of 8-month-olds, for example, indicated that infants of mothers who drank more heavily (although the whole sample was primarily composed of social drinkers rather than alcoholics) had lower mental and motor development scores than infants of less heavy drinkers. Nevertheless, the differences were slight, and overall scores of the sample were above average.52,53

At age 4, children of heavier drinkers displayed poorer performance on some measures of motor development54 and lower scores on a test to assess their ability to maintain attention to a task.55 Other studies link prenatal alcohol exposure to lower IQ scores at age 4.56

The researchers have followed the children through age 7½ years. They conclude that binge drinking during pregnancy, and especially during the first trimester, is associated with deficits in memory, in arithmetic problem solving, and in attention.57-59 The best predictor of children’s performance on tests of IQ, achievement, and classroom behavior was the father’s educational level, but prenatal alcohol exposure was still a significant determinant of children’s development.57 The authors believe that the negative effects of prenatal alcohol exposure are
heightened in families with poorly educated parents or with larger numbers of older children.57

Interpreting these findings is difficult. Not all researchers have found similar decrements in performance in alcohol-exposed children, or at least not on all tests.47 Streissguth and her colleagues conclude that no level of alcohol exposure during pregnancy is safe,54 although in other papers they trace more serious decrements to binge drinking early in the first trimester.58 Even when differences are found, they are usually small, with most of the children scoring within normal ranges on standardized tests.54 It is not clear what functional significance these subtle differences may have.

Tobacco

Cigarette smoking during pregnancy has consistently been associated with lower birth weight in newborns; the greater the number of cigarettes smoked, the lower the birth weight. In addition, many studies have documented the relationship between smoking during pregnancy and decreased length and head circumference in newborns.42 As described above with respect to the effects of cocaine and polydrug exposure, these conditions may be associated with increased risk for later learning and developmental problems.

Quite a few studies have been conducted to trace the effects of maternal smoking during pregnancy on subsequent child development. Some have examined children as old as 16 years of age. In their 1989 review of over 30 papers on the subject, Rush and Callahan conclude that there is a "regular and consistent pattern of lower IQ and ability, and less advanced verbal, reading, and mathematical skills associated with maternal smoking during pregnancy."60 In addition, smoking appears related to behavioral and temperamental difficulties in the children, with children of smokers appearing to have more behavioral problems, hyperactivity and inattention, and poorer social adjustment.

Although the patterns of association are strong, Rush and Callahan emphasize that smokers may differ from nonsmokers in terms of behavior, personality, and social status. The observed differences in child development may therefore be due to those parental or environmental differences rather than to the cigarettes. However, they cite a few studies in which some of these environmental differences were taken into account, with the finding that the decrements in children's performance are still observed, indicating that cigarettes may indeed have a persistent effect.

Summary of Drug Effects on Child Development

In sum, there is little evidence that prenatal substance exposure, whether to cocaine, marijuana, opiates, tobacco, or alcohol, is linked with large deficits on standardized developmental tests. Indeed, much of the recent concern regarding cocaine- and polydrug-exposed children has been related to their performance on non-standardized tests.5 If we rely on findings from the effects of other drugs on child development as a guide to what we can expect from cocaine- and polydrug-exposed children, then we should expect small differences between exposed and similar non-exposed children, with both groups probably scoring within low-normal ranges. However, to the extent that the cocaine-exposed children are from low socioeconomic backgrounds, then we should also expect to see the performance of substance-exposed children decline in comparison with national norms as they grow older, because that is what we would expect to see from other children from similarly disadvantaged backgrounds. The importance of postnatal environments for these children cannot be emphasized enough. The following sections describe some of the ways in which parents and structured, early intervention programs can help or hinder the development of substance-exposed children.

Parents Can Compound the Problem

The young child's caregivers are critical influences on later development. Based on studies of those mothers identified as substance-abusing (which, as noted above, may not fairly represent all substance-abusing mothers), many are from families with an intergenerational legacy of chemical dependence and physical, sexual, and/or emotional abuse. Their histories of chaotic family life interact with stressful living situations and difficult behavioral characteristics of drug-exposed newborns to create scenarios in which inadequate parenting or child neglect and abuse are likely.61

Much of the research on the effects of substance abuse on parenting is from stud-
ies of mothers in methadone treatment. In her 1986 review of the literature, Deren describes substance-abusing mothers as more likely than their substance-free counterparts to feel inadequate in their parenting roles and to have greater concern about their children becoming addicts, dropping out of school, or going to jail. In addition, they may have greater difficulty meeting their children’s basic needs. They often become overinvolved with their children and try to control them excessively by trying to exclude outside influences. They may also reinforce disruptive methods of attention-getting.62

These vulnerable mothers want to be good parents but are unable to provide their children with what they themselves have not experienced. They may have powerful needs for affection and idealized expectations about their relationships with their newborns. If their attempts to engage and stimulate their sensitive children fail, the mothers may leave their infants alone rather than continue to confront what they perceive as rejection by their own children. The guilt and shame they already feel about their drug abuse is intensified.63

The prenatal drug exposure, parental and family factors, infant behaviors, and other environmental problems may all impede the development of secure attachment and a solid mother-child bond. Indeed, the most serious problem for drug-exposed children may well be their difficulty in establishing this essential trusting attachment bond to a single caregiver in the early months.

Of course, not all substance-exposed infants return home with their mothers. Many enter the child welfare system and may move from a county shelter to an emergency foster home to one or more subsequent foster homes within the span of a few years (see McCullough’s article in this issue). In terms of establishing a firm attachment to one caregiver, these children may have as difficult a time as those returned home to their biological parent.

Implications for Intervention

General Considerations

Although more research needs to be done on the impact of prenatal drug exposure on children, action on behalf of drug-exposed children need not await the results of such research. Based on principles that we know are effective with other vulnerable children, we can create services now to ameliorate the negative influence of prenatal exposure to drugs. Early childhood intervention research teaches us that such interventions should include the following characteristics:64

1. Since some families are so disordered, basic survival goals must be set before other goals, such as those related to parenting, can be pursued.

2. Training in parenting skills, based on didactic and cognitive methods, must be coupled with other intervention strategies to create enduring changes in parenting behaviors.

3. Service providers must be competent and have basic knowledge and practical skills that match the needs of the child and family. The providers should be warm, sensitive, and should foster mutual respect.

4. Service utilization and client satisfaction are enhanced by continuity of providers.

5. The best results occur when service providers create working partnerships with parents or caregivers on behalf of the child.

6. A young child must bond with and develop an attachment to at least one person in his or her life. The person need not be a parent.

7. Referrals to other agencies for more intensive services should be provided when necessary.

8. Intervention efforts must be linked and integrated with existing community services to maintain immediate short-term benefits.

Specific Strategies with Drug-Exposed Children

While drug-exposed newborns are still in the hospital, interventions designed to help them organize and regulate their responses should begin. Caregivers should help infants to relax by avoiding excessive handling and by protecting them from bright lights and noise; use special positioning techniques to improve posture and movement; use specific containment measures such as swaddling and holding infants firmly against caregiver’s skin; employ slow, vertical rocking and frequent warm bathing; avoid abruptness and emphasize gentle care and handling; and use gentle but firm tactile stimulation around the face to decrease sensitivity and increase appropriate sucking.65
In addition, parent education should begin as soon as possible after birth to facilitate appropriate and effective caregiving and to avoid compounding the problems of the already at-risk infant. Involving parents or caregivers in developmental assessments may be a helpful first step. Caregivers who participate in assessments see their infants’ strengths instead of just focusing on their weaknesses. They also begin to understand their infants’ cues and learn to respond appropriately.

Information regarding intervention with 3- and 4-year-old, drug-exposed children comes from the special program at the Los Angeles County School District described previously. The core of this program is the establishment of a strong relationship between program staff and each child and family. The staff provides a regular classroom program with a low adult-child ratio to promote children’s attachment and learning. The establishment of a strong partnership with each child’s primary caregiver (parent or foster parent) is emphasized, in which nurturing interactions and respect for the child’s feelings are modeled. Because drug-exposed young children may often have difficulty organizing their own behavior effectively, the transition between activities is seen as an important activity in and of itself, which requires the preparation and support of the teaching staff.

It is noteworthy that specialists at this program report that the children they see are similar to other vulnerable preschoolers who require sensitive and nurturant teaching environments. Indeed, labeling children as “drug-exposed” is not advisable, in part because information may be unreliable. Even if a particular child were prenatally exposed to drugs, that exposure may not be the only cause of current behavioral, educational, or emotional problems. Rather than facilitating appropriate interventions, such labeling may encourage teachers and other school personnel to give up on a child.

Conclusions

Substance-exposed children are a diverse group who are at increased vulnerability to later difficulties in learning and behavior. This heightened vulnerability is the combined result of the prenatal exposure blended with other inborn and environmental variables. Indeed, any child, prenatally exposed or not, who grows up in a substance-abusing home is at increased risk for problems later in life.

Unfortunately, current research does not shed much light on the subject of which particular substances contribute to which later disability. Polydrug exposure, impoverished home life, and chaotic communities make it impossible to attribute developmental effects to one particular drug. The research has not controlled for other important variables, such as the role of the father, the mother’s personality, her health, and her access to social supports.

In addition, some of these studies can be criticized for their small sample size and/or their lack of a suitable, non–substance-exposed comparison group. We soon can look toward future research in which development is examined in larger groups of substance-exposed children, in a variety of environments, including stable, nurturant home conditions. This will enable us to begin to disentangle the complicated influences of various contributing factors. We are not yet at that level of understanding.

What we do know is that many substance-exposed children have few environmental supports and resources that could help them offset the negative impact of their prenatal exposure. We also know that there are successful early intervention strategies for vulnerable children and their families. We may never precisely and completely identify the specific developmental impact of prenatal exposure to any particular legal or illegal drug, but we already know enough to take action.


41. See 33., p. 361.


56. See 52., p. 150.


66. See 13., Griffith, D.R. Neurobehavioral effects etc.