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**ABSTRACT**

Children exposed to cocaine prenatally (n=183) were followed at 12 years of age and compared to non-exposed children (n=181) on measures of language and phonological processing skills. Results showed that cocaine exposure had a negative effect on the phonological awareness skills of sound blending and elision, as well as sentence combining, a measure of syntax skills. The phonological processing skills were significantly related to reading outcomes of letter-word identification, reading fluency, and passage comprehension. These findings suggest that prenatal cocaine exposure has lasting effects on language skills that are related to literacy skills.

**INTRODUCTION**

Children exposed to cocaine in utero are at risk for delayed language development due to both biologic risk and postnatal environmental influences. Biologic risk includes a disruption in auditory and attention that may result in failure to attend to the auditory and visual cues necessary to acquire speech sounds, vocabulary, and grammar. The environmental risks include inadequate early stimulation for language provided by a drug using mother, effects of poverty, or exposure to toxins such as lead. Prior studies by our group and others have found specific language deficits in children exposed to cocaine at preschool and early school-age. Few studies have followed children to 12 years of age and controlled for multiple medical, environmental, and demographic variables.

**PURPOSE**

The present study reports the 12 years outcome of a large cohort of children exposed to cocaine in utero and followed prospectively from birth. Children exposed to cocaine are compared to a sample of children also enrolled prospectively at birth and followed to 12 years. The purpose of this study was to investigate the effects of prenatal cocaine-exposure on language skills including phonological processing in 12-year-old children while controlling for multiple drug exposures, maternal characteristics, and environmental factors.

**METHODS**

**Measures**

- **Language and Reading**
  - Comprehensive Test of Phonological Processing (CTOPP)
  - Test of Language and Development Intermediate (TOLD-I3)
  - Woodcock Johnson Letter-Word Identification and Reading Fluency subtests

**Child Characteristics and Caregivers (Covariates)**

- Quality of home environment (HOME)
- Child IQ (Wechsler Intelligence Scale for Children-V)
- Child placement status
- Child lead level

**RESULTS**

- **T-tests and chi-square analyses for the evaluation of demographic and drug use variables.**
  - Positively skewed data were normalized by log (x+1) transformations.
  - Multiple linear and logistic regression analyses were used to determine the significant predictors of CTOPP and TOLD-I scores controlling for the following covariates that were correlated with language measures and differed by cocaine status (p<0.10).

**Adjusted Means of Language Outcomes by Cocaine Group**

**Significant Covariates at the p<.05 level**

**CONCLUSIONS**

- The effects of prenatal cocaine exposure in utero on language skills persisted through elementary school at 12 years of age. Specific language domains such as phonological awareness and syntax may be more affected by cocaine exposure in utero than other skills. Phonological awareness and syntactic abilities are related to literacy.
- Prenatal exposure to other drugs such as alcohol and tobacco also contributed to poorer outcomes of children exposed to cocaine than outcomes of non-exposed children.
- The biological mother’s IQ and vocabulary were related to the child’s vocabulary.
- The language learning environment even at 12 years of age may be influenced by the caregiver’s education and IQ and the home environment.
- An unexpected finding was the children exposed to cocaine did better than children not exposed on Rapid Letter Naming, possibly due to differences in impulsivity.
- Earlier studies of language skills in this cohort revealed auditory processing difficulties and attentional deficits that may relate to poor phonological awareness skills in later childhood.