

# Creating a preliminary neurobehavioral profile of fetal alcohol spectrum disorders

**A continuum of physical, mental, and behavioral damage is caused by prenatal alcohol exposure (PAE) and is referred to by the non-diagnostic term, fetal alcohol spectrum disorders (FASD). While the identification of children along the continuum of FASD is complicated, it is also necessary in order to assist more precise diagnoses and/or better treatment options. A new study has constructed a preliminary neurobehavioral profile of FASD using neuropsychological data from a multisite study, finding that executive functioning and spatial processing are especially sensitive to alcohol exposure.**

Results will be published in the September 2010 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"In some cases, children with heavy PAE meet criteria for fetal alcohol syndrome (FAS), which can be identified by trained professionals," explained Sarah N. Mattson, a professor of psychology at San Diego State University and corresponding author for the study. "However, the majority of children with heavy PAE do not meet these criteria and cannot be identified by physical features alone. The goal of this study was to determine a neurobehavioral profile that could be used to help identify these children, even when the physical features of alcohol exposure are absent."

"Having a good sense of which behavioral manifestations of PAE are most consistent will be of tremendous advantage in the diagnosis of FASD," added John H. Hannigan, deputy director of the Merrill Palmer Skillman Institute for Child and Family Development at Wayne State University in Detroit. "It is difficult to diagnose children who do not show the facial features characteristic of FAS, in part because neurobehavioral outcomes can be so variable, sometimes requiring large numbers of tests to be done. The current study is important because it boiled down 500+ measures to about 20 that converged mostly on two kinds of outcomes."

Researchers analyzed data taken from two sites of the Collaborative Initiative on Fetal Alcohol Spectrum Disorders, an interdisciplinary study of FASD. Study participants were between the ages of seven and 21 years of age at the time of their neuropsychological assessments, and were divided into two groups: children with heavy PAE (n=79) and unexposed children (n=60). The alcohol-exposed group included children with (n=41) and without (n=38) FAS, which falls at the severe end of the FASD spectrum. Out of 547 neuropsychological variables, 22 were selected for analysis based on their ability to distinguish children with heavy prenatal alcohol exposure from unexposed controls.

"Our results told us that we could use some of our neuropsychological tests to distinguish alcohol-exposed subjects from controls with a high degree of accuracy," said Mattson. "When children with FAS and controls were examined, 92 percent of the subjects were correctly classified. When we included alcohol-exposed children without FAS and controls, 85 percent of the subjects were classified. The measures that were most useful in this classification were measures of executive function and spatial processing ... which tells us that although deficits are reported in a variety of neuropsychological domains, it may be that some are more valuable than others in distinguishing alcohol-exposed children from controls."

"'Executive function' refers to abilities which allow a person to self-monitor or self-direct what they should focus on, call to memory, and think about," explained Hannigan. "Poor executive function can impair the ability to plan ahead, inhibit responding, or correct one's behavior in response to feedback. Poor spatial processing means not only that FASD children may lose their way, but these abilities may also be related through underlying brain processes to problems with math, verbal abilities, and abstraction."

Both Mattson and Hannigan noted the generalizing strength of these results - having found similar outcomes in children across diverse populations from San Diego, California and Helsinki, Finland - as well as the greater power of these results versus IQ in distinguishing among the groups.

"Identification of an FASD 'behavioral phenotype' or profile has been a prime goal of research since FAS was first described in 1973," said Hannigan. "This profile is important because having specific neurobehavioral outcomes that are most reliably related to PAE not only aids diagnosis, but also can allow researchers to better focus their time and resources on devising interventions."

Hannigan added that the range and magnitude of neurobehavioral problems examined by this study is a reminder that even modest prenatal alcohol consumption can have life-long negative consequences on brain function and behavior in children, even without leading to full FAS. "Thus, primary care providers have an obligation to ask about their patients' drinking, to advise them to avoid drinking during pregnancy, and to refer for appropriate intervention all women who drink at risk levels and have difficulty stopping or limiting their drinking," he said.

"While this study is one important step in improving diagnosis of FASD, future steps are also important," said Hannigan. "For example, testing of the generated profile in diverse populations in order to compare how well it can uniquely identify children with PAE compared to children with other developmental disorders."

Provided by Alcoholism: Clinical & Experimental Research

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