

Comparing profiles of learning and memory impairments in two groups of children

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While children with fetal alcohol spectrum disorders (FASD) are known to have deficits in verbal learning and recall, the specifics of these deficits remain unclear. This study compared the verbal learning and memory performance of children with heavy prenatal alcohol exposure (PAE) with that of children with attention-deficit/ hyperactivity disorder (ADHD), finding that both groups of children have difficulty with learning and memory but in different ways.

Results will be published in the June 2011 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"Children with FASD and ADHD can appear very similar," explained Sarah N. Mattson, a professor in the department of psychology at San Diego State University and corresponding author for the study. "Both alcohol-exposed children and those with ADHD demonstrate behavioral difficulties such as [hyperactivity](#) and impulsivity, and children with FASD often meet diagnostic criteria for ADHD. Studies that compare these groups can aid in accurate identification and appropriate diagnoses, which are important as they have implications for the kinds of interventions and resources provided to these children and their families."

"The broad range of neurodevelopmental, cognitive, and behavioral abnormalities that occur in FASD most likely result from a combination of prenatal alcohol exposure and other factors such as other drug exposures, disrupted home environment, abuse, and co-morbid

conditions," added Jeffrey R. Wozniak, assistant professor of psychiatry at the University of Minnesota. "This heterogeneity or wide range of potential problems among this population remains a significant challenge to researchers attempting to identify a 'profile' of abnormalities that are associated with PAE."

Mattson and her colleagues used the California Verbal [Learning](#) Test - Children's Version (CVLT-C) to examine three groups (n=22/group) of children, ages seven to 14: those with heavy PAE and ADHD (10 boys, 12 girls); those not exposed to alcohol and with ADHD (14 boys, 8 girls); and those not exposed to alcohol and without ADHD (12 boys, 10 girls). The groups were matched on age, sex, race, ethnicity, right or left-handedness, and socioeconomic status. The test required the children to learn and remember a list of words.

"The children with alcohol exposure had problems with learning information initially, but they were able to remember what they did learn later on," said Mattson. "The children with ADHD, however, were better at recalling information immediately after it had been presented but had difficulty retaining this information over time."

"This pattern of results suggests that FASD may be associated with a specific deficit in the initial encoding of verbal information while, in contrast, ADHD may be associated with a deficit in retrieval," said Wozniak. "The authors speculate that the encoding problems seen in FASD may be related to underlying difficulties in executive functioning – those processes by which a child organizes and directs his/her own learning."

Mattson explained that "inefficient encoding of verbal material" means that when children are presented with verbal information, they have difficulty learning that information. "If children have encoding deficits, it may be experienced as a memory problem as they will recall less than

their peers," she said. "They may also find it difficult to remember and follow instructions given to them by teachers or parents and have difficulty learning material presented in the classroom."

A "deficit in retrieval of learned material," on the other hand, is related to memory but is different from "forgetting," said Mattson.

"If a child has a difficulty retrieving learned material, the problem is related to accessing material that is stored in the brain," Mattson explained. "These children won't be able to independently generate the material, but if you presented them with some choices they could recognize the correct answer. 'Forgetting' refers to learned information that is no longer available for recall."

"Children with FASD might need additional repetition of the information as well as guidance about how to organize the information as they are learning it," added Wozniak. "In contrast, children with [ADHD](#) might benefit most from assistance in developing strategies for retrieving information from memory, such as self-cueing."

"This research has important implications for clinicians and educators," noted Mattson. "Understanding the profiles of learning and memory impairments in these populations of children can allow for appropriate intervention and remediation strategies to be implemented."

Wozniak agreed. "Both educators and clinicians will benefit from knowing that children with FASD are, in fact, struggling at the level of encoding information but that their retrieval mechanisms are less affected. Individuals with FASD might benefit most from additional efforts to improve their initial encoding, such as developing strategies for active learning and techniques for 'deepening' their initial processing in order to improve encoding of the information into [memory](#)."

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