

# Inconsistent performance speed among children with ADHD may underlie how well they use memory

March 24 2009

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(SACRAMENTO, Calif.) — Children with attention-deficit hyperactivity disorder (ADHD) show more variable or inconsistent responses during on 'working' or short-term, memory tasks when compared with typically developing peers, a study by UC Davis M.I.N.D. Institute Julie Schweitzer has found.

"We think poor [working memory](#) is a characteristic present in many [children](#) and adults with ADHD," said Schweitzer, an associate professor in the Department of Psychiatry and Behavioral Sciences.

"Our study helps explain why working memory may be fine at one moment and poor at another, just as one day a child with ADHD seems to be able to learn and focus in class and on another day seems distracted and not paying attention," Schweitzer said.

According to the national Centers for Disease Control and Prevention (CDC), an estimated 4.4 million youth, ages 4 to 17, have been diagnosed with ADHD by a healthcare professional. In 2003 nearly 8 percent of school-aged children were reported to have an ADHD diagnosis by their parent. The current study, published online in February in the journal *Child Neuropsychology*, supports the idea that what underlies impaired working memory is a problem in how consistently a child with ADHD can respond during a working [memory task](#).

"We have known for some time that children with ADHD vary in how fast they are able to complete working memory tasks when compared to normally developing control subjects," Schweitzer explained .

Previous studies have suggested that children with ADHD might be slower at responding to tasks. The current study took a closer look at their performance using a relatively newer statistical analytical approach, to determine whether the children with ADHD were indeed faster, slower, or if perhaps another, more complicated process was occurring. The hypothesis was that children with ADHD were actually mostly responding at the same rate as healthy children, but with more frequent very [slow responses](#) than the control subjects.

To test this hypothesis, the study authors presented 25 children with ADHD and 24 typically developing peers with the Visual Serial Addition Task, a computerized program that presents children with a number on one screen and then asks them to mentally add it to another number shown on a second screen. The children are then asked to decide whether or not a given sum is correct. From session to session, the task is presented at different speeds and at different levels of difficulty.

"We found that the children with ADHD were much less consistent in their response times," said Wendy Buzy, study lead author and a graduate student when the experiments were conducted.

Schweitzer and Buzy were both at the University of Maryland at the time. Buzy said that the children with ADHD had more frequent longer response times when compared with their typically developing peers, but the responses they did give were just as accurate.

"Once we controlled for omission errors, the accuracy of the two groups was the same," she said.

Buzy and Schweitzer pointed out that one of the unique things about their study was the way in which their data were analyzed. Previous studies compared only the range of reaction times and average reaction times for children with ADHD and controls. The method used in the current study allowed researchers to compare variation in response times within and between individuals, as well as within and between the two groups. The researchers also showed that working memory variability correlated with ADHD symptoms as scored by parent surveys (using the Conners' ADHD rating scale) prior to testing.

"We found that higher levels of hyperactivity and restlessness or impulsivity correlated with slower reaction times," Schweitzer said.

The current results led another Schweitzer laboratory member, postdoctoral fellow Catherine Fassbender, to design a study looking at variability in [response time](#) during a working memory task in the brains of children with ADHD using functional magnetic resonance imaging (fMRI).

"This study increases our understanding of what might be happening at a physiological level that underlies the inconsistency in responding in ADHD," she said.

Schweitzer also hopes to look at whether behavioral interventions and/or medications can help reduce the kind of variability observed in the current study. Variability in working memory, she said, means children cannot generalize what they learn in one situation to another.

"Improving consistency in how children with ADHD respond to the environment should help them generalize what they learn in clinical interventions improving their skills across situations."

Source: University of California - Davis

Citation: Inconsistent performance speed among children with ADHD may underlie how well they use memory (2009, March 24) retrieved 19 April 2024 from <https://medicalxpress.com/news/2009-03-inconsistent-children-adhd-underlie-memory.html>

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