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Eye Tracking Shows Promise as Screening Tool for Children With FASD

What is this research about?

Prenatal alcohol exposure (PAE) affects the developing brain. Children with fetal alcohol spectrum disorder (FASD) experience a variety of issues resulting from fetal exposure to alcohol. These issues may be cognitive or behavioural. Learning, memory, attention, and movement can also be affected. Eye movement and psychometric tests assess working memory and visuospatial processing. Visuospatial skills allow objects to be seen and relationships between these objects to be assessed. Working memory is the ability to temporarily store and change information. Eye movement tests involve a series of saccades, which are rapid eye movements that bring new visual targets onto the fovea of the retina.

This study looked to examine the relationship between measures of working memory and visuospatial skills in children with FASD, PAE, and typically developing children. The children with PAE had alcohol exposure but were believed to not be affected enough to have a diagnosis at that time. This was done through the use of eye movement tasks and standardized psychometric tests.

What did the researchers do?

Children and adolescents aged 5 to 17 years diagnosed with FASD (71), PAE (20), and typically developing children (111) were studied. Participants were asked not to take their medication on test day to stop any conflicting results. They were seated in a dark, quiet room in a stable chair. Participants

What you need to know:

The developing brain is affected by prenatal alcohol exposure (PAE). Working memory and visuospatial deficit are major problems for those with fetal alcohol spectrum disorder (FASD). Psychometric tests and eye movement control tasks assess cognitive function. These tests show overlapping brain regions that are damaged by PAE.

completed a psychometric test battery and a series of saccadic eye movement tasks.

Participants completed 3 eye movement tasks. In the prosaccade and antisaccade task, trials started with the illumination of a central fixation point (FP). The FP disappeared after a delay and a target appeared to the left or right of the central FP. Participants had to look left or right to the correct location. They were told to look towards the target (prosaccade) or away from the target (antisaccade). In the memory-guided saccade task, participants looked steadily at the central FP while 2 targets appeared one after the other. After the FP disappeared, they had to make saccades to the remembered locations in the order they appeared.

Psychometric tests assess multiple areas of functioning. One subtest measured the ability to judge line orientation (visuospatial ability). Another measured the child's ability to sort cards into categories. The working memory test battery (WMTB) assesses working memory with subtests measuring visual and verbal working memory.

What did the researchers find?

The researchers found that:

- The FASD group had lower test scores than typically developing children on all psychometric tests.
- The FASD group performed worse on eye movement measures of working memory and visuospatial skills.
- Eye movement control tasks were directly related to measures of psychometric tests for both working memory and visuospatial processing.
- The PAE group did not show a large decrease in working memory or visuospatial ability compared to controls.
- Poor visuospatial processing shows that children with FASD may view things in a disorganized and disconnected way. This decreases their ability to look at things in a meaningful way.

How can you use this research?

There is potential for practitioners to use eye movement control tasks as a first screening step for FASD diagnosis. Eye movement tasks can be used to better understand results of psychometric tests. Further research is needed to see if some patterns of brain damage are more vulnerable to prenatal alcohol exposure than others.

The process to receive a diagnosis of FASD is long and stressful on the child and their family. It requires specialized training, a high expense and may not be accessible by all populations. Eye movement can help with early identification of those in need of follow-up assessment or those in need of an intervention while waiting for a diagnosis. This would lead to potentially less negative outcomes for those prenatally exposed to alcohol and their families.

About the Researchers

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Fetal alcohol spectrum disorder, Prenatal alcohol exposure, Visuospatial skills, Visual-spatial skills, Working memory, Eye movements

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