

Childhood concussions impair brain function

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University of Illinois kinesiology and community health professor Charles Hillman and his team investigate the link between childhood concussions and brain function. Credit: L. Brian Stauffer

A new study finds that pre-adolescent children who have sustained sports-related concussions have impaired brain function two years following injury.

The results are published in the *International Journal of Psychophysiology*.

Over a million brain injuries are treated annually in the U.S. While organized sports at all levels have implemented safety protocols for preventing and treating [head injuries](#), most pediatric concussions still result from athletic activities.

What we know about long-term effects of childhood concussions is limited. Several researchers claim that only a small portion of children have developmental deficits following a [concussion](#). However, other reports indicate much more dire consequences of head injury, including long-term cognitive deficits.

"Our data indicate that children who sustain a concussion demonstrate deficits in brain function and cognitive performance approximately two years after injury, relative to others their age who do not have a history of mild [traumatic brain injury](#)," said Charles Hillman, University of Illinois kinesiology and community health professor. Hillman, who also is affiliated with the Beckman Institute for Advanced Science and Technology, led the research with R. Davis Moore, a recent Illinois graduate and a postdoctoral fellow at the University of Montreal.

The study included 30 8-to 10-year-old children who are active in athletic activities. Fifteen of the children were recruited two years following a sports-related concussion and the remaining children had no history of concussion.

The researchers assessed the children's ability to update and maintain memory, as well as pay attention and inhibit responses when instructed to do so. The team also analyzed electrical signals in the brain while the children performed some of these cognitive tests. With the brain signals, they were able to measure how each child's brain performed the tests.

Relative to children in the control group, those with a history of concussion performed worse on tests of working memory, attention and impulse control. This impaired performance was also reflected in differences in the electric signals in the injured children's brains. Also, among the [children](#) with a history of concussion, those who were injured earlier in life had the largest deficits, Moore said.

The researchers emphasize the potential for lifelong academic and vocational consequences for kids who sustain concussions early in life, Moore said.

"These data are an important first step toward understanding sustained changes in [brain function](#) and cognition that occur following childhood concussion," Hillman said. "Our study suggests the need to find ways to improve cognitive and brain health following a head injury, in an effort to improve lifelong [brain](#) health and effective functioning."

More information: The persistent influence of concussion on attention, executive control and neuroelectric function in preadolescent children, [DOI: 10.1016/j.ijpsycho.2015.11.010](https://doi.org/10.1016/j.ijpsycho.2015.11.010)

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