

Cumulative sub-concussive impacts in a single season of youth football

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In an investigation of head impact burden and change in neurocognitive function during a season of youth football, researchers find that sub-concussive impacts are not correlated with worsening performance in neurocognitive function.

Each year, more than 3 million children in primary and high school play tackle football in the United States. Growing concern about the possible negative effects of repetitive sub-concussive head impacts led to an increased number of physicians and parents who counsel against youth participation in full-contact sports.

A research team, led by Sean Rose, MD, pediatric sports neurologist and co-director of the Complex Concussion Clinic at Nationwide Children's Hospital, followed 112 [youth football](#) players age 9-18 during the 2016 season in a prospective study.

"When trying to determine the chronic effects of repetitive sub-concussive head impacts, prospective outcomes studies are an important complement to the existing retrospective studies," says Dr. Rose. "In this study of primary school and high school football players, a battery of neurocognitive outcomes tests did not detect any worsening of performance associated with cumulative head impacts."

The pre- and post-season assessments used to measure outcomes included:

- Neuropsychological testing
- Symptoms assessment
- Vestibular and ocular-motor screening
- Balance testing
- Parent-reported ADHD symptoms
- Self-reported behavioral adjustment

Sensors placed in the helmets recorded sub-concussive head impacts during practices and games. Researchers added the impact g-forces to yield a cumulative impact measure. According to the study, cumulative [impact](#) did not predict changes (from pre-season to post-season) in any of the outcome measures. Additionally, Dr. Rose notes, having sustained one or more concussions prior to entering the study was not associated with worse pre-season testing.

In their secondary analysis, they found that younger age and reported history of attention deficit hyperactivity disorder (ADHD) predicted score changes on several cognitive testing measures and parent-reported ADHD symptoms. Additionally, a reported history of anxiety or depression predicted changes in scores of symptom reporting.

"We expected repetitive impacts to correlate with worsening [neurocognitive function](#), but we found that sub-concussive [head](#) impacts sustained over the course of a single season were not associated with neurocognitive functional outcomes. And also surprising, sustaining isolated high g-force impacts was also not associated with worse outcome," says Dr. Rose. "The lack of a significant association may reflect the need for longer follow up—so we are continuing to follow kids across multiple seasons."

This publication is the first analysis in a four-year prospective cohort study. Dr. Rose will be presenting data from the second year of the study at the upcoming Child Neurology Society meeting in mid-October. The

team is currently collecting data for a third year.

More information: Rose SC, Yeates KO, Fuerst DR, Ercole PM, Nguyen JT, Pizzimenti NM. Head impact burden and change in neurocognitive function during a season of youth football. *The Journal of Head Trauma Rehabilitation*. [Epub ahead of print.]

Provided by Nationwide Children's Hospital

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