

# Researchers comprehensively assess the safety of heading the ball in youth soccer

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Repeatedly heading a soccer ball has been previously associated with negative long-term brain health for professional players. However, in a new study from researchers at the Minds Matter Concussion Program at

Children's Hospital of Philadelphia (CHOP), a small number of repeated soccer headers equivalent to a throw-in did not cause immediate neurophysiological deficits for teens, suggesting that limited soccer heading exposure in youth sports may not result in irreversible harm if players are properly trained.

The findings, which represent the most comprehensive real-time study of soccer headers in adolescent athletes, were published in the *Journal of Biomechanical Engineering*.

For some professional athletes, repeated head loading in sports—using your head as part of the game—is associated with negative long-term brain health even when there are no initial clinical symptoms. Despite the awareness of long-term consequences, short-term neurophysiological issues after repeated head impacts like soccer heading are poorly understood in youth athletes. Some studies have identified potential issues across an entire sports season. This study examined the consequences of repeated head impacts shortly after the heading exposure with a battery of six different tests to examine a wider variety of potential clinical implications.

In 2015, the U.S. Soccer Federation implemented limits on soccer headers for teens during practice—no more than 30 minutes of header practice time and no more than 15 to 20 headers per week. The English Premier League also passed guidelines restricting the number of high-force headers to 10 in a single practice per week. This lab-based study simulated these limits conducting 10 repeated soccer headers within a single session with experienced teenage players.

Based on their findings, researchers determined that this practice did not result in acute neurophysiological issues, as assessed by a comprehensive exam. The study did not assess the safety of regular soccer headers over the course of a season or scholastic career.

"Soccer is a sport where intentionally using your head to hit the ball is an integral part of the game, and concern over its [long-term effects](#) has parents, caregivers and coaches understandably concerned," said first study author Colin Huber, Ph.D., a postdoctoral research fellow at Emory University who conducted this research while with the Center for Injury Research and Prevention (CIRP) at CHOP. "We wanted to simulate these effects in a controlled laboratory setting and build upon the work of prior studies to quantitatively assess the neurophysiological effects of repeated soccer heading."

In this study, 19 participants (17 male, two female) between 13 and 18 years old were assigned to either a frontal heading group (directing the ball back to where it came from), an oblique heading group (directing the ball to the right) or a kicking control group. These participants completed neurophysiological assessments immediately prior to, immediately after and approximately 24 hours after completing 10 headers or kicks. These assessments included multiple eye movement tracking, pupil response and balance tests.

The study ultimately found no neurophysiological issues in either group when compared with the kicking control group, even when taking the six different assessments into account. However, oblique headers resulted in higher levels of angular head motion. Angular motion is associated with concussions and other brain injuries, suggesting that players should be properly trained to head the ball in a frontal fashion to reduce the risk of injury.

"This study represents the most comprehensive examination of the acute neurophysiological effects of soccer headers on youth to date, providing us with meaningful information regarding the safety of headers on the field," said senior study author Kristy Arbogast, Ph.D., Co-Scientific Director at CIRP and research director of the Minds Matter Concussion Program at CHOP.

"We need to be clear that there still may be long-term consequences for repeated [soccer](#) headers over the course of an athletic career, but it appears that a small number of headers in a given session does not pose an immediate risk to properly trained youth athletes."

**More information:** Colin M. Huber et al, Neurophysiological Effects of Repeated Soccer Heading in Youth, *Journal of Biomechanical Engineering* (2023). [DOI: 10.1115/1.4062423](https://doi.org/10.1115/1.4062423)

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