

Researchers call for more study into impact of repetitive heading in soccer

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Soccer is the most-popular and fastest-growing sport in the world and, like many contact sports, players are at risk of suffering concussions from collisions on the field.

But researchers warned in a paper published today that not enough attention has been given to the unique aspect of [soccer](#) – the purposeful use of the head to control the ball – and the long-term consequences of repetitive heading.

The literature review by Dr. Tom Schweizer, director of the Neuroscience Research Program of St. Michael's Hospital, was published in the journal *Brain Injury*.

More than 265 million people play soccer worldwide, including 27 million in North America. Due to the nature of the sport, [players](#) are particularly vulnerable to head and neck injuries. Most are caused by unintentional or unexpected contact, such as when a player collides with teammates, opponents or the playing surface.

There is significant concern in the sporting and medical worlds about the potential long-term cognitive and behavioural consequences for athletes who suffer acute or repeat concussions or multiple "sub-concussive" head impacts—blows to the head not causing symptoms of concussions.

"The practice of heading, which might occur thousands of times over a player's career, carries unknown risks, but may uniquely contribute to

cognitive decline or impairment in the short- or long-term," said Dr. Schweizer, a neuroscientist. "Thus, [soccer players](#) present a unique opportunity to study whether cumulative sub-concussive impacts affect cognitive functioning, similar to that of concussions."

Examining [research papers](#) that studied the incidence of [concussion](#) in soccer, he found that concussions accounted for 5.8 per cent to 8.6 per cent of total injuries sustained during games. One study found that 62.7 per cent of varsity soccer players had suffered symptoms of a concussion during their playing careers, yet only 19.2 per cent realized it. Another found that 81.8 per cent of athletes who had suffered a concussion had experienced two or more and that players with a history of concussion had a 3.15 times greater odds of sustaining another one than those who had never had a concussion. One study found concussions sustained during soccer accounted for 15 per cent of the total number of concussions in all sports. In particular, girls' soccer accounted for 8.2 per cent of sports-related concussions, the second highest sport after football.

Research papers that looked at the mechanism of injury found 41.1 per cent of concussions resulted from contact by an elbow, arm or hand to the head. One found that 58.3 per cent of concussions occurred during a heading duel. More females suffered concussions from player-to-surface and player-to-ball contact than males who had more player-to-player contact than females.

Defensemen and goalkeepers are at greatest risk of suffering a concussion, the study found. Dr. Schweizer said that for goalkeepers, the risk decreases as they get older and become more aware of where they are at any given time in relation to the goal posts. He said padding goal posts might be one way to reduce concussions in younger players who don't have such a developed sense of spatial relations.

Studies on the long-term effects of heading found greater memory, planning and perceptual deficits in forwards and defenders, players who execute more headers. One study found professional players reporting the highest prevalence of heading during their careers did poorest in tests of verbal and visual memory as well as attention. Another found older or retired soccer players were significantly impaired in conceptual thinking, reaction time and concentration. The few studies that used advanced imaging techniques found physical changes to the brains in players who had concussions.

Monica Maher, a co-author and University of Toronto master's degree student in neuroscience, said the researchers wanted to emphasize possible injury prevention methods.

"Use of protective headgear, limiting heading exposure or stressing proper heading technique in younger children and increasing concussion education are all suggestions to perhaps decrease the incidence of head injury and their subsequent effects in the long run," she said.

Provided by St. Michael's Hospital

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