The most recognized sport-related neurological injury is a brain concussion. Previous studies have demonstrated a delayed resolution of sport-related post-concussive symptoms and a greater number of neurological and behavioral symptoms in women compared to men. In this study, the authors from the United States investigated the outcomes of sport-related brain concussions in college athletes of both sexes.

A sport-related concussion is a biomechanical injury that results in altered brain function. There is a lack of consensus in the use of this term, with an overlap in the use of concussion and mild traumatic brain injury. The American Academy of Neurology guidelines for sport-related brain injuries do not separate concussion from mild traumatic brain injury. In contrast, the Zurich Consensus Statement on Concussion in Sport from 2012 proposed that concussion and mild traumatic brain injury should be viewed as separate entities.

Sport-related concussion may lead to somatic, cognitive, and emotional disorders. Signs and symptoms typically last between 7 and 10 days, with a favorable prognosis for complete recovery. A small percentage of individuals experience a longer recovery time, and in some cases, signs and symptoms remain symptomatic for months or even years after an injury. The factors such as female sex, more severe initial injuries, pre-existing psychological issues, older age, and previous head injuries increase the likelihood of persistent symptoms.

A minority of athletes with concussions may develop chronic brain disorders, such as chronic traumatic encephalopathy (CTE). CTE is a histopathological diagnosis that can only be diagnosed *postmortem.* The suspected CTE is described by a clinical syndrome known as traumatic encephalopathy syndrome (TES), based on cognitive, behavioral, and other features. According to the results of the recent study, CTE was found in 41% of brain samples from young athletes who played contact sports and died before 30 years of age. https://discovermednews.com/chronic-traumatic-encephalopathy-deceased-young-athletes/

Recent developments in modern neuroimaging techniques, such as diffusion tensor imaging (DTI) and functional magnetic resonance imaging (fMRI), provided some new insights into the pathophysiology of brain concussion. DTI data demonstrated that acute brain injuries are associated with altered brain microstructure and a higher mean diffusivity of white

matter. The fMRI studies showed that increased global functional connectivity (integration) was the most significant change in brain function in concussed athletes. Global functional connectivity was found in the bilateral inferior parietal lobes, the bilateral middle temporal gyri, the right angular gyrus, and the left inferior frontal lobe. It is considered a protective mechanism in response to injury. Increased global functional connectivity in dorsal brain regions was detected in athletes who took longer to reach a safe return-to-play.

Clinical data have shown that women experience less favorable outcomes and have higher mortality rates than men after moderate to severe traumatic brain injury. Additionally, women have a delayed resolution of sport-related post-concussive symptoms compared to men and a greater number of neurological and behavioral symptoms, such as increased reaction times and more difficulties with visual memory tasks. The underlying mechanisms of sex-related differences in outcomes after a sport-related brain injury remain unclear and unexplored.

About the Study and Results

This prospective study included 1,751 college athletes of both sexes with a sport-related brain concussion. Slow recovery was defined as recovery exceeding 14 and 24 days.

80% of participants reached the return-to-play time points at 14 and 24 days, whereas 399 college athletes took more than 24 days to return to play. Within 60 days of injury, 78% of participants were able to return to play, and 84% were able to return to play within 88 days of injury.

11% of the participants did not return to play by the end of the 6-month follow-up. Participants who experienced a longer recovery were more likely to be women and have more symptoms immediately after injury.

Conclusion

The authors concluded that these results showing that 78% of participants were able to return to play within 60 days of injury and that 84% of participants were able to return to play within 88 days of injury are encouraging.

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Journal Reference

Walker McAllister T, Broglio SP, Katz BP, *et al*. Characteristics and Outcomes of Athletes With Slow Recovery From Sport-Related Concussion: A CARE Consortium Study. Neurology, January 18, 2023. (Open Access)
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