

Study finds no sex difference in concussion recovery among college athletes

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A new large, national study of collegiate student-athletes in the United States dispels a long-held belief about concussions, finding that women and men recover from sport-related head injuries within the same time frame.

Women and men's recovery patterns were similar on tests of cognitive function, symptoms and [mental health](#), and in balance and reaction time. Though [women](#) as a group entered the return-to-play protocol later than men, there was no significant difference in the time it took for men and women to return to unrestricted participation in their respective sports.

The findings are based on an analysis of medical data from 906 [student-athletes](#) competing in sports at National Collegiate Athletic Association (NCAA) institutions.

"I think a lot of people will be surprised in such a large sample that women and men recover along the same trajectory," said senior study author Jaclyn Caccese, assistant professor in The Ohio State University School of Health and Rehabilitation Sciences. "For many years we've thought women took longer to recover, but evidence suggests that if women get the same access to care, they do recover similarly."

The research was published in the journal [Sports Medicine](#).

Data came from the [Concussion Assessment, Research and Education \(CARE\) Consortium](#), an initiative established by the NCAA and U.S. Department of Defense to fill gaps in knowledge about concussion effects and recovery among student-athletes at colleges, universities and military service academies.

The study sample was 61% female and included student-athletes in 15 sex-comparable sports ranging from basketball and diving to ice hockey, soccer and volleyball. Members of all-male football and wrestling teams and all-female field hockey squads were excluded.

"Much of the concussion research came out of football, a predominantly male sport. This study is important because it's the largest study of concussion recovery in women to date," said Caccese, citing a 2022

[review](#) showing that 40% of 171 studies on which athlete concussion recovery consensus papers were based had no [female participants](#) and relied on samples that were overall 80% male.

"We've been making [clinical decisions](#) based on studies that included only a very small percentage of females," she said. "But if student-athletes' cognitive function, symptoms and mental health are recovering along the same trajectories, we probably don't need to hold women back longer."

Participants in the CARE initiative completed pre-season baseline assessments that enabled, for this study, comparisons to their health status after a sport-related concussion. Post-concussion evaluations were taken within six hours of the injury, 24–48 hours later, the day they entered return-to-play protocol, the day they were cleared for unrestricted play and six months post-injury.

The tests over that time period included assessments of cognition and memory, balance, reaction time, and overall symptoms and how distressing they were, as well as surveys on health, anxiety and depression, and satisfaction with life.

Statistical analysis showed that recovery trajectories did not differ by sex, with the exception of women reporting more problems with eye and inner ear function than men within 48 hours of injury. As a group, women waited a day longer than men to start return-to-play workouts, but there was no statistical difference in student-athletes' return to unrestricted competition—on average, about two weeks post-concussion.

Women did report higher symptoms than men at baseline (headache, pressure in the head, fatigue, for example) and during recovery, though the study cannot explain why. The researchers posed the question in their paper: Could it be biological differences affecting symptom experience,

or sociocultural differences in reporting behavior?

Caccese said this finding suggests that individual baseline data or established data on sex-specific norms is needed to properly evaluate athletes' overall condition after a sport-related head injury.

"Otherwise, clinical providers might think women are not recovered who actually are," she said.

She also noted that high schools have tended to focus athletic trainer resources over past years on sports with the highest injury risk—namely, football—meaning there's a good chance female athletes at the high school level haven't received the same level of medical attention.

"Student-athletes at the institutions in this study receive immediate access to the best sports medicine evaluation and treatment. I think that could be one of the driving factors in why we didn't see much of a sex difference," Caccese said.

"Historically, some women's sports didn't have the same on-site access to health care, and what that does is result in delayed evaluation, delayed initiation of treatment and prolonged recovery. I think having someone on the field watching and taking care of athletes and knowing them and knowing how to provide concussion management is key."

Co-authors of the study were investigators from multiple CARE Consortium member institutions, including its principal investigators.

More information: Jaclyn B. Caccese et al, Sex Differences in Recovery Trajectories of Assessments for Sport-Related Concussion Among NCAA Athletes: A CARE Consortium Study, *Sports Medicine* (2023). [DOI: 10.1007/s40279-023-01982-2](https://doi.org/10.1007/s40279-023-01982-2)

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