

# Social & Cultural Disparities of Concussion: Considerations for Future Implications

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## BACKGROUND

Clinical guidelines for concussion care are guided by several national and international groups, most notably, the International Concussion in Sport Group (CISG). Established in 2002,<sup>1</sup> the CISG is comprised of concussion experts who collectively review contemporary scientific evidence that inform consensus-based clinical recommendations. These guidelines are broadly adopted by physicians, athletic trainers, and clinical specialists who provide concussion care. Despite the breadth of adoption, they often lack specific guidance for those working with under-represented patient-populations.<sup>2</sup>

Indeed, scientific and lay interest in concussions has grown exponentially over the previous two decades, giving rise to prospective and longitudinal databases that allow researchers to study the natural history of concussion, the influence of repetitive head impacts, and/or the long-term consequences.<sup>3,4</sup> Despite this progress, there is a dearth of research describing concussion risk factors, injury disclosure, and recovery trajectories among those who identify as female, low socioeconomic status (SES), parasport athletes, and/or veterans.

To address the lack of guidance around female, low SES, parasport, and veteran tactical athletes, the University of Michigan (U-M) Concussion Center invited an expert panel for a roundtable discussion in October 2021 on the [Social and Cultural Disparities of Concussion](#). Panelists included: **Dr. Tracey Covassin**, professor in the Department

of Kinesiology and director of the Athletic Training Education Program and Sport Concussion Research Laboratory at Michigan State University; **Dr. Michael Uihlein**, assistant professor in the Department of Emergency Medicine at the Medical College of Wisconsin, team physician of the United States National Sled Hockey Team, and a medical team member of the National Veterans Wheelchair Games and the National Disabled Veterans Winter Sports Clinic; and **James Alexander**, executive director of athletics of the Detroit Public Schools Community District (DPSCD) and one of the center's Concussion Champions.

“Concussion is a treatable injury, and we need to start looking at these clinical profiles to see if there are differences that we could [utilize] within [our] treatment plan.”  
-**Dr. T. Covassin**

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## SEX-RELATED DIFFERENCES IN CONCUSSION RISK, SYMPTOMOLGY, & RECOVERY

Concussion reporting has increased over the past several years,<sup>5</sup> which has been attributed (in part) to increased educational efforts. Despite these improvements, there is a continued misconception that only student-athletes participating in contact/collision sports (e.g., football, lacrosse) are at risk for concussion. Dr. Covassin highlighted a memorable experience during a pre-participation meeting. “I was talking to volleyball athletes at a high school, and a father came up to me afterward and said, ‘Do you not realize you’re talking to my daughter? She plays volleyball... My son plays football, and they’re the only ones that get concussions.’”

The data tells a different story. A 2015 study co-authored by Dr. Covassin described the epidemiology of sport-related concussion (SRC) across the National Collegiate Athletic Association (NCAA).<sup>6</sup> Although men’s football reported the highest total number of concussions, women’s soccer and women’s basketball were the second and third highest, respectively. Dr. Covassin further noted that across sex-comparable sports, the SRC rate in women’s soccer was 1.8 times higher than the SRC rate in men’s soccer, and similar trends were noted across men’s and women’s basketball. The reason(s) for the higher SRC rates among female athletes has not been resolved in the medical literature, but some speculate that women’s neck strength is lower than men’s relative to head mass,<sup>7</sup> menstrual cycles may play a role,<sup>8</sup> and women tend to be more honest in medical reporting.<sup>9</sup>

Beyond concussion risk, sex-related differences in the post-concussion clinical presentation remain unclear. Dr. Covassin highlighted this point by discussing previous clinical observations for heart attacks. “Twenty-to-thirty years ago, it was [thought that] only males had heart attacks and not females. We [later] found out there are different symptoms presentations for heart attacks in

females [than in] males.” Indeed, recent concussion research has sought to investigate sex-related differences across high school and collegiate populations. She highlights that “females tend to report a higher number of concussion symptoms and greater symptom severity, including cognitive, migraine, and fatigue symptom clusters, compared to males. Despite higher symptom reports, others have reported no notable male/female differences in the time to return to sport in sex-comparable sports (i.e., soccer, basketball, ice hockey, etc.).<sup>10</sup>

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## THE INFLUENCE OF SOCIOECONOMIC STATUS ON CONCUSSION MANAGEMENT

Like many injuries, clinicians tend to focus on the biological injury incurred. Concussion, described as a biopsychosocial injury, has characteristics that cross injury pathology, patient psychology, and the social structures around the athlete. Within this framework, clinicians must consider the athlete’s SES and the potential economic burden concussion care can cause. Alexander highlighted this by stating, “Parents [and guardians] don’t have the knowledge they need to make [these medical decisions]” and may lack the resources for medical consultation to make informed decisions about their child’s healthcare.

Additionally, Dr. Uihlein discussed clinicians’ need for further education on concussion assessment and management. He believes “this is an area that needs constant revision in education for [healthcare] providers,” in particular, when working with patients who do not present with a “typical” SRC. He reiterated, “If the emergency department or primary care physician is not educated [on concussion], these injuries can be completely overlooked” and therefore “cause difficulty getting back to daily life and [sport-related] activities.” Misdiagnoses and/or poor clinical care following concussion can result in prolonged recovery, disproportionately affecting patients from a low SES background due to limited funds that allow for time off of work, local support systems, and/or additional healthcare.

Indeed, healthcare costs are a considerable barrier to many families who identify as low SES. Alexander discussed how many of his students opt to “go to urgent care because most do not have primary care physicians and/or insurance.” Despite efforts by some sporting organizations (e.g., [Michigan High School Athletes and Officials Medical & Concussion Insurance](#)), parents/guardians may not know how the insurance may be utilized. Alexander highlighted that a reimbursement model may not be feasible for many families when working with an insurance company. Specifically, “families can’t wait

“ ...in our district, the need for concussion resources and awareness is a huge issue for our student-athletes, [in particular,] follow-up care. ”  
-J. Alexander

for funds to be reimbursed,” as these funds may be needed for other basic family needs, including groceries and rent/mortgage payments. To address these concerns, the U-M Concussion Center partnered with DPSCD to build the “Concussion Toolkit” to promote awareness of the MHSAA concussion insurance and provide step-by-step directions on how to utilize it, as well as a list of clinics throughout the Detroit-metropolitan area that will accept this insurance.

Alexander discussed additional considerations for community members in the Detroit metropolitan area. “If you look at the makeup of our area, [concussed patients may have to consider whether they] go to work or try to go back [to the hospital or other healthcare entities] to get care.” Among adults paid hourly, those who sustain concussions may miss a paycheck and/or potentially get fired for missing work, undoubtedly affecting their finances. Therefore, clinicians working with low SES populations should consider the finances and accessibility of their patient population and ways to work around those challenges. For example: connect patients to free or low-cost clinics within their communities and/or telemedicine. Moreover, student-athletes within low SES communities may not have the same access to coaching and/or sports medicine resources as those within high SES neighborhoods. To mitigate these disparities, Alexander discussed that some of these deficits can be addressed by building rapport and community with administrators, coaches, parents/guardians, and school staff. He further reiterated that relationship building builds trust that can foster change, even with a lack of resources.

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## **CONSIDERATIONS FOR THE ADAPTIVE SPORT ATHLETE AND/OR VETERAN**

Until recently,<sup>11</sup> clinical SRC consensus documents have not addressed unique patient populations, including adaptive sport athletes and veterans. Dr. Uihlein highlighted the struggles of using guidelines for able-bodied athletes with para-athletes throughout his presentation. In 2012, he was invited to serve as the team physician for the U.S. National Sled Hockey Team. During the pre-season, he recalled one of his first patients, a veteran who used a wheelchair, was unable to complete the balance portion of the baseline assessment. The “huge gaps in evaluation for concussion” among adaptive sport athletes was a pivotal moment in deciding to leave his role as an emergency medicine physician and immerse himself in a sports medicine fellowship with an emphasis on adaptive sports.

“ I want people to keep asking these questions, keep looking for answers, and look for gaps in [concussion] research, education, and assessment to advance concussion care for athletes participating in adaptive sports.”  
-Dr. M. Uihlein

Dr. Uihlein discussed the limited data regarding concussion epidemiology in paralympic athletes. “The first paralympic injury surveillance [initiative] was in 2012,” but “it wasn’t until [the 2016] Rio [Paralympic Games] that concussion was [considered] a subset of the head, neck, and facial injury [category].” Using that data, Dr. Uihlein highlighted work addressing injury disclosure and a need for additional concussion education among wheelchair basketball athletes.<sup>12</sup> Approximately 6% of wheelchair athletes will sustain a concussion each season, but nearly half do not report their injury. The majority (67%) of concussed athletes indicated they did not want to be removed from activity,<sup>12</sup> others did not think the concussion was serious (50%), did not know it was a concussion (50%), or thought sustaining a concussion was just a part of the game (42%).<sup>12</sup> Collectively, these findings give foundation to address concussion education among wheelchair basketball athletes and other adaptive sport groups.

Lastly, Dr. Uihlein discussed the importance of clinicians considering how cognitive and physical disabilities influence baseline and post-concussion assessment scores. He stated, “If you don’t have a baseline for adaptive athletes, and you don’t know them [personally], you may not know if their symptom score is because of their disability [rather than the injury].” Specifically, he mentioned that “the SCAT-5 (Sport Concussion Assessment Tool – 5th edition) is not a ‘one size fits all model’ for [adaptive] athletes. [These assessments] can be really affected by someone’s underlying disability.” For example, many veterans participate in adaptive sports, but a traumatic brain injury history “may affect their cognitive ability [during] a delayed recall neurologic screen.” Overall, clinicians should strive to conduct baseline assessments among all adaptive sport and/or veteran athletes to ensure they can compare their post-concussion scores to their individualized normative ranges.

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## CONCLUSION

### *Summary*

Concussion assessment and management have made significant strides over the past several years, with a notable improvement in sport safety across multiple populations. However, a more inclusive approach to educational and clinical tools is necessary to improve concussion awareness, reporting, and management. Furthermore, the majority of research used to inform clinical consensus statements is comprised of studies primarily (80/20% male/female athletes) or exclusively (40% of all studies) of male cohorts.<sup>13</sup> The absence of research addressing the needs of 50% of student-athletes is of immense concern and warrants targeted research proposals and national funding to support these endeavors.

### *Future Directions*

This roundtable discussion emphasized several areas of future research and educational actions essential to improve concussion standards of care. To accomplish this, we recommend the following:

- Develop educational tools to promote concussion awareness and pathways to care.
- Support research proposals seeking to investigate the natural history of concussion and/or repetitive head impacts among historically under-represented populations.
- Provide continuing education opportunities for clinicians to address gaps in training regarding patient education and advocacy among low SES patient populations, veterans, adaptive sport athletes, and women.

### **University of Michigan Concussion Center**

The University of Michigan Concussion Center maximizes societal and individual health through the relentless pursuit of concussion knowledge. The Concussion Center amplifies its impact by facilitating the development and sharing of groundbreaking ideas that translate laboratory, clinic, and community observations into interventions that reduce concussion risk and improve outcomes in those affected by the injury. Learn more about the Concussion Center at: [concussion.umich.edu](https://concussion.umich.edu).

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