

# Para athlete concussion care following the Amsterdam 2022 International Consensus Statement on Concussion in Sport: an urgent need for inclusivity within concussion research

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## INTRODUCTION

The Amsterdam 2022 International Consensus Statement on Concussion in Sport (6th International Conference on Concussion in Sport) was the first Concussion in Sport Group (CISG) consensus to consider the para athlete.<sup>1</sup> To date, a lack of research in para sport on most aspects of concussion has prevented the development of evidence-informed consensus on any aspects of concussion care for para athletes, resulting in a reliance on expert opinion.<sup>2,3</sup> Prior to 2023, all CISG guidelines used the default that athletes all have 'normal' cognitive and neuromuscular (central and peripheral) functions. This default is not representative of the global population, and discounts para athletes who have impairments with wide heterogeneity, which may be visible or invisible.

In 2021 the Concussion in Para Sport (CIPS) group, an international, voluntary, multidisciplinary group of para concussion-focused clinicians, researchers and athletes published the first position statement on concussion in para sport, which built on the 2017 CISG Consensus Statement.<sup>4</sup> The prospective International Paralympic Committee injury and illness surveillance studies started in 2012, and while concussions were reported at the Pyeong Chang 2018 Paralympic Winter Games (n=4),<sup>5</sup> the first detailed concussion information was reported

for the Tokyo 2020 (n=9) and Beijing 2022 (n=4) Paralympic Games.<sup>6,7</sup>

Following publication of the Amsterdam 2022 Consensus on Concussion in Sport, the CIPS group present this editorial to (1) highlight that the guidance outlined in the first CIPS Position Statement can be adapted and applied to this most recent Amsterdam 2022 Consensus Statement<sup>4</sup> and (2) advance the global concussion research agenda to benefit all athletes. This can be achieved by encouraging the concussion research community to include study participants that better reflect diversity across society, including sport. The lack of representation of female athletes has been highlighted,<sup>8</sup> and equally it is vital that para athletes (including female para athletes and paediatric para athletes) are included in concussion research studies.

## Considerations for para concussion research

Our understanding of concussion symptoms and management have evolved over 50+ years, but still largely reflects a general assumption that all athletes will respond in the same way to assessment tools and recovery strategies.<sup>1,9,10</sup> An overview of the potential challenges to the use of the currently available assessment tools in para athletes is presented elsewhere.<sup>4,11</sup> Acknowledging the heterogeneity of the para athlete population, research initiatives will therefore (1) need to be tailored by impairment, (including considerations for age of impairment onset); (2) require

the inclusion of para athlete experts in the research team; and (3) include para athletes to understand their experiences of and responses to injury. A para athlete who had an impairment from birth, for example, will develop different adaptive behaviours to an athlete who developed an impairment at a later age. Thus, the effects of concussion on their daily activities cannot be assumed to be the same. In addition, accessibility, cultural context and linguistic diversity must be considered and the appropriate adaptations incorporated in the cognitive sections of assessments. This necessarily adds complexity, but helps ensure a representative sample in further research.

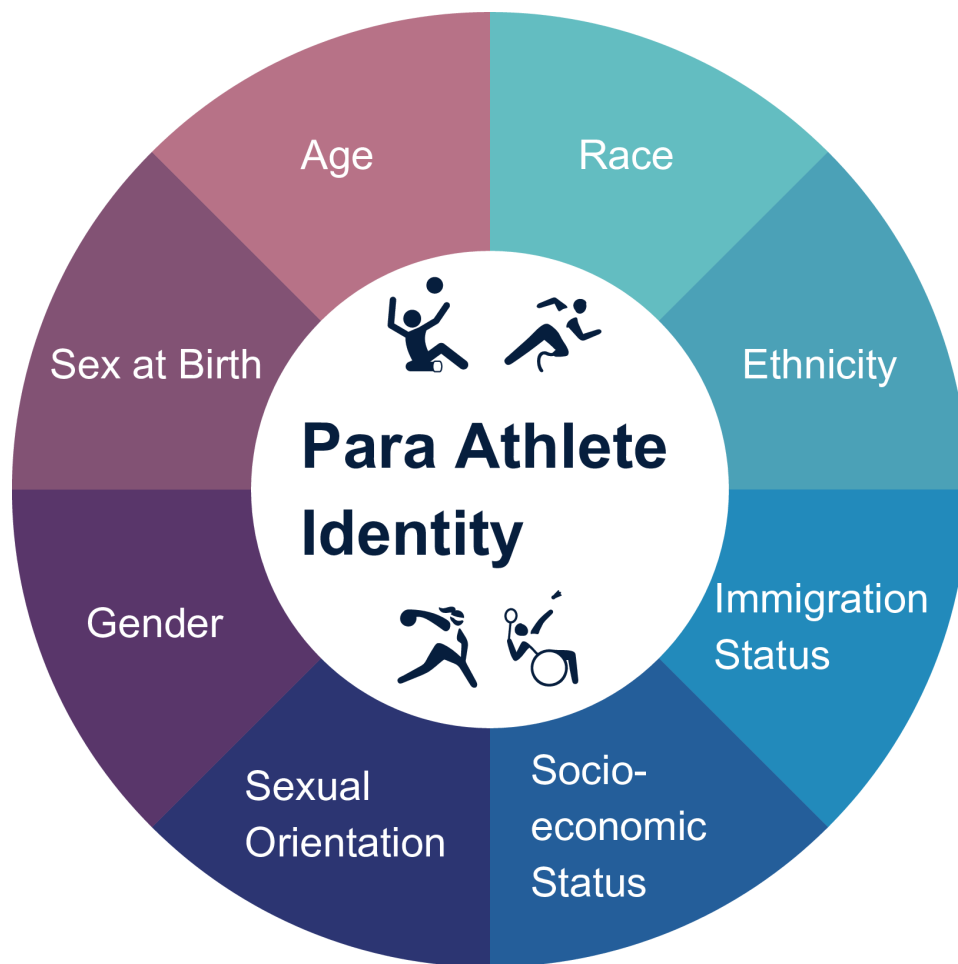
Understanding the impact of concussion across the diversity of the para athlete population, including athletes with physical, visual, auditory and cognitive impairments, will require a combination of complementary study designs. These might include retrospective and prospective observational and interventional studies, qualitative study approaches and single-case experimental design studies focusing on in-depth investigations of individual cases.

## Call for concussion research inclusivity

The intentional inclusion of para sport athletes in mainstream concussion research studies should acknowledge the intersectionality of disability with additional individual characteristics such as age, sex, gender, race and ethnicity, to ensure research is appropriately designed to maximise the quality and impact of its outcomes. Addressing intersectionality is vital given that a prior study showed female para athletes had a significantly higher incidence rate of concussion over a 52-week period.<sup>12</sup> Thus, including female para athletes in research exploring sex and gender differences is imperative. In addition, there is also currently a dearth of research examining how disability-related factors may impact concussion and long-term brain health outcomes. We summarise the importance of inclusion and individual intersectionality in para athlete concussion research within [figure 1](#).

Further research considerations must acknowledge inequities for para athletes who may lack resources and access to medical care in low- and middle-income countries, and within historically marginalised groups. Although injury surveillance has improved the reporting of concussion and sports injury at the Paralympic Games,<sup>5,6</sup> most para athletes competing at

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**Figure 1** A para athlete’s identity is formed through the intersectionality of many factors beyond their impairment type, which is inherent to the para athlete’s identity, that contribute to their experiences with concussion and sport.

this level are adult males.<sup>7</sup> Further research should attempt to explore injury rates longitudinally across training and competition events more broadly, at all levels of competition and within diverse groups (especially paediatric para athletes).

To appropriately support para sport concussion researchers, there is an obvious need for increased funding. Equally, the field offers greater opportunities for collaboration with concussion researchers worldwide. Alongside existing links to the CISG, the CIPS group aims to establish and strengthen transdisciplinary networks and to broaden representation in concussion research initiatives, with the goal of achieving truly equitable concussion management guidelines for all athletes, regardless of impairment. We hope that the global concussion research community hears our call and joins us in this journey to achieve greater para athlete inclusivity in concussion research.

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