

Editorial

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Colliding Skillfully: Preparing Female Athletes for Collision Events

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EDITORIAL

Collisions and physical contact with other athletes, or the playing environment, are fundamental aspects of many sports. These can result from intentional high-impact actions (e.g. tackling in rugby, throws in judo), and/or incidental actions (e.g. contesting an aerial challenge in netball, blocking a ball in football). With the unprecedented growth and professionalisation of women's sports that include collision events, the physical and mental demands on female athletes have significantly increased. Female athletes should be empowered and supported to perform contact sports well, with appropriate skill and physical/mental preparation. We question whether the collective sports community (e.g., coaches, strength and conditioning professionals, sports scientists, and sport and exercise medicine practitioners) is adequately preparing female athletes for collisions in sports, or whether a gendered sports environment (1) may be holding them back from necessary preparation? The editorial presents contemporary challenges to preparing female athletes to collide safely and skillfully during sport.

The Gendered Environment and Injury Discrepancies

Injury risk in women's sport is often discussed, and investigated, solely in the context of isolated physiological and/or biomechanical measures related to sex. The menstrual cycle or quadriceps (Q) angle are frequently highlighted as factors that can contribute to a higher injury incidence in female athletes compared to their male counterparts, while other potential confounding factors are largely neglected (2). The current state of research on the menstrual cycle in the context of injury risks, for example, is conflicting and often methodologically flawed (3), resulting in ambiguous conclusions that may overemphasise isolated attributes and fail to acknowledge the multifactorial nature of injury risk. There are notable proposals to emphasise a gendered environmental approach to understanding the sports injuries landscape in women's sport (1). Whilst a more comprehensive evidence base needs to be established to better understand and change the discrepancies in injury aetiology between female and male athletes, coaches, scientists, and other sports professionals working with female athletes should focus on preparation strategies that adequately prepare athletes for in-game scenarios (4), whilst also potentially influencing injury prevention.

The rapid professionalisation of women's sport across many codes has increased overall exposure to competition, the physical demands placed on female athletes, as well as the need for improved technical and tactical skill sets. It is questionable whether the professionalisation of women's sport has been underpinned by sufficient physical and technical preparation to

match tactical advances and increasing speed-of-play, alongside adequate rest and recovery periods, to support players performing safely at the top level (5). This has contributed to an increased risk of injury, and factors related to a gendered environment, such as a limited pool of players, leading to more risks taken to field a team, female athletes transferring between sports with little to no training in the new code, and a lack of adequate age-group performance pathways (6). Furthermore, access to adequately qualified and experienced performance services, such as coaches, strength and conditioning experts, physiotherapists, rehabilitation specialists, and medical support, remains limited, and performance support structures are still in their infancy in many women's sports teams (7). Successful athlete development requires time and cannot be rushed or neglected when considering the health, safety, and performance of female athletes.

Future Directions for Skillful Collision Sport Training

To ensure the health and performance of female athletes in contact situations, research, reflection, and key actions in a gendered sporting environment are imperative. For example, female athletes may be more likely to incur head impacts through contact with the ground (8) thus, preparation strategies for intentional and incidental collisions should be appropriately implemented by developing fundamental movement skills like falling, rolling, twisting, balancing, skipping, and landing in various positions on different body parts.

Self-efficacy and self-belief in confidently and effectively executing high-demand activities, and repeatedly tolerating imposing demands, are also crucial considerations. It is particularly important to understand that these underpinning motor skills for tolerating collisions cannot be developed only through closed or isolated drills, but require the inclusion of decision-making components, creativity, and openness in drill design. Coaches, trainers, and practitioners need to create pathways and opportunities for female athletes to achieve a similar training age, and develop parallel motor competencies, to their male counterparts by the time they reach a high-performance level, in order to reduce injury risk and occurrence.

With the urgency to grow and achieve high level performance in many female athletes, fast-tracking can be common. It is important to ensure that these athletes are sufficiently prepared. It is necessary to take calculated risks in training sessions and expose female athletes to situations that require, and develop, fast decision-making, self-awareness, and confidence. It is important to note that preparation should not be isolated to the physical aspects, but mental preparation for physical contact should be prioritised as well. In understanding optimal

preparation strategies for female athletes, it is crucial to determine the prevalence and risk factors of injuries resulting from collisions in sports. However, this awareness should not be used to instil fear or reluctance towards exposure to physical contact and collisions during training, but rather it should be discussed openly with athletes to harness adherence to injury prevention strategies. While addressing injury risks is important, an excessive focus on protection may inadvertently hinder female athletes' development and performance. The same level of caution should be applied to both male and female approaches.

A shift in perspective towards athlete performance may mitigate injury risks

Societal barriers further complicate the landscape of women's sports, with perceptions of the female body as fragile often influencing training approaches. Academic and practical discussions frequently centre on the perceived "issues and problems" of female athletes compared to their male counterparts (9). This hyper-focus may inadvertently limit the development and design of performance training programs tailored to female athletes.

Researchers are invited to explore coaching practices and education of coaches around motor learning and different development stages of girls and female athlete physiology, in order to develop educational material about safe and valuable contact training, and close an important gap of under-representation of female athletes in sport and exercise medicine research (10, 11). An increase in training quality from a physical and technical-tactical perspective, as well as sufficient recovery time and post-collision training, might produce better preparation and outcomes than just reducing the collision frequency (12).

A paradigm shift towards approaching strength and conditioning, as well as collision and contact training, from a performance standpoint rather than solely an injury prevention perspective, could be more beneficial and accepted by female athletes. By prioritising physical and technical preparation for performance enhancement, we can better address societal barriers and elevate overall training quality for female athletes. This shift in perspective emphasises maximising athletic potential, while still ensuring appropriate measures are in place to mitigate injury and collide skillfully.

Competing interests

Nothing to declare.

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KE: conceptualisation, writing – original draft, writing – review and editing, visualisation, project administration; **ZS:** conceptualisation, writing – original draft, writing – review and editing, visualisation, project administration; **EO:** conceptualisation, writing – original draft, writing – review and editing, visualisation, project administration. Zoe Saynor is guarantor.

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