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# Applied sport science and medicine of women's rugby codes: a systematic-scoping review and consensus on future research priorities protocol

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## ABSTRACT

Women's rugby (rugby league, rugby union and rugby sevens) has recently grown in participation and professionalisation. There is under-representation of women-only cohorts within applied sport science and medicine research and within the women's rugby evidence base. The aims of this article are: Part 1: to undertake a systematic-scoping review of the applied sport science and medicine of women's rugby, and Part 2: to develop a consensus statement on future research priorities. This article will be designed in two parts: Part 1: a systematic-scoping review, and Part 2: a three-round Delphi consensus method. For Part 1, systematic searches of three electronic databases (PubMed (MEDLINE), Scopus, SPORTDiscus (EBSCOhost)) will be performed from the earliest record. These databases will be searched to identify any sport science and medicine themed studies within women's rugby. The Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for Scoping Reviews will be adhered to. Part 2 involves a three-round Delphi consensus method to identify future research priorities. Identified experts in women's rugby will be provided with overall findings from Part 1 to inform decision-making. Participants will then be asked to provide a list of research priority areas. Over the three rounds, priority areas achieving consensus ( $\geq 70\%$  agreement) will be identified. This study has received institutional ethical approval. When complete, the manuscript will be submitted for publication in a peer-reviewed journal. The findings of this article will have relevance for a wide range of stakeholders in women's rugby, including policymakers and governing bodies.

## INTRODUCTION

Rugby codes (rugby union, rugby league and rugby sevens; herein referred to as 'rugby') are played by men and women at junior, senior, community and elite levels. Rugby match play is characterised by intermittent high-intensity actions and collisions (eg, sprinting, tackling) interspersed with low to moderate intensity actions (eg, walking, jogging).<sup>1</sup> The popularity and professionalisation of women's rugby has grown dramatically in recent times,

## Key messages

### What is already known

- ▶ The popularity and professionalism of women's rugby has recently grown dramatically.
- ▶ A scoping review is appropriate for the applied sport science and medicine of women's rugby to examine the extent and range of the evidence base, and identify research gaps in the literature.
- ▶ The Delphi method has been used widely in sport science and medicine, and offers a scientifically rigorous technique to determine research priorities.

### What this study could add

- ▶ This will be the first scoping review of applied sport science and medicine research on women's rugby.
- ▶ This review will use a range of stakeholders with sports science and medicine expertise to identify research priorities within women's rugby.
- ▶ The findings of this article will have relevance and benefit for a wide range of stakeholders in women's rugby, including policymakers and governing bodies.

with participation in rugby league and rugby union growing by ~30% between 2017 and 2019.<sup>2,3</sup> In 2016 at the Rio Olympics, women's rugby sevens was introduced for the first time.<sup>4</sup> Furthermore, financial investment into both rugby league and rugby union in England was seen in 2017 with the introduction of the Premier 15s (Rugby Football Union) and Women's Super League (Rugby Football League) competitions. Similar trends have been observed worldwide, with the National Rugby League Women's Premiership in Australia introduced in 2018. These developments have contributed to bringing further attention to women's rugby.

As little as 4% of studies within applied sport science and medicine research include women-only cohorts, demonstrating the need for more research.<sup>5,6</sup> Given the disparity between male and female cohorts, there is only a small body of evidence reviewing

specific topics within women's rugby codes. To the authors' knowledge, this evidence base comprises only three reviews, which have investigated injury incidence in women's rugby league<sup>7</sup> and women's rugby union,<sup>8</sup> and match demands, anthropometric and physical qualities in women's rugby sevens.<sup>9</sup> In contrast, there are several reviews published since 2020 within the applied sport science and medicine of rugby with male-only cohorts.<sup>1 10–18</sup>

A recent call to action, which proposed further research within women's rugby, was a vital step in supporting sportswomen with an evidence-based framework.<sup>19</sup> To begin development of an evidence-based framework, a scoping review can be used to understand the current evidence base. Scoping reviews map the broad key themes and identify knowledge gaps of developing research areas,<sup>20</sup> and have recently been undertaken in rugby for determining health outcomes,<sup>16</sup> and in women's football to understand the quantity of research.<sup>21</sup> A scoping review is appropriate for the applied sport science and medicine of women's rugby to examine the extent and range of the evidence base, and identify research gaps in the literature. Once the current evidence base has been established, determining the research priorities is then important. Research priorities should be co-constructed from a range of stakeholders with sports science and medicine expertise, to ensure the research has translational impact and benefit.<sup>22 23</sup>

When considering sports science and medicine research for women's rugby, a Delphi method offers a technique to problem solve, generate ideas or determine priorities.<sup>24</sup> A key strength of this method is that it allows balanced participant participation, which minimises the risk of bias, thus enhancing scientific rigour.<sup>24</sup> The technique has been used widely within sport science and medicine, for example, to inform return to play after hamstring injury in football,<sup>25</sup> and to determine consensus on a video analysis framework in rugby.<sup>26</sup> The purpose of this article is therefore twofold: Part 1: to undertake a systematic-scoping review of the applied sport science and medicine of women's rugby, and Part 2: to develop a consensus statement on future research priorities within women's rugby.

## METHODS

This article will be designed in two parts: Part 1: a systematic-scoping review,<sup>27</sup> and Part 2: a three-round Delphi consensus method.<sup>24 28–30</sup>

### Part 1: systematic-scoping review

#### Search strategy

A systematic search of three electronic databases (PubMed (MEDLINE), Scopus, SPORTDiscus (EBSCOhost)) will be performed from the earliest record available. Using previously published applied sport science and medicine reviews as a guide,<sup>1 8 10 31</sup> search terms will be categorised into primary terms of those pertaining to (1) women, (2) rugby, and (3) applied sport science

and medicine. Primary terms will be combined using the AND function. Secondary search terms pertaining to women ('female', 'women'), rugby ('rugby league', 'rugby union', 'rugby sevens') and applied sport science and medicine ('performance', 'match', 'characteristics', 'peak', 'game', 'competition', 'skill', 'technical', 'anthropometric', 'composition', 'physical', 'strength', 'power', 'jump', 'speed', 'fitness', 'aerobic', 'training', 'qualities', 'neuro\*', 'muscle damage', 'fatigue', 'recovery', 'nutrition', 'injury', 'incidence', 'psychology') will be combined by the OR function. Searches will be performed in title and abstract fields. Searches will be limited to the English language. Reference lists of selected studies will be manually searched for additional eligible papers.

#### Study selection

Titles and abstracts identified by the search strategy will be evaluated against the eligibility criteria independently by two authors (OH and SS). The reviewers will meet to discuss the eligibility criteria in depth, and then proceed to assess the titles and abstracts independently. If the reviewers disagree on the eligibility of a study, it will be discussed with a third reviewer (SE/GR/BJ) whose decision will be binding. A flow diagram will be produced to show the selection process, according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for Scoping Reviews and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Search Extension guidelines.<sup>27 32</sup>

#### Inclusion criteria

- ▶ Research articles are not limited by geographical location.
- ▶ All levels of participation and age.
- ▶ Studies investigate women's rugby union, rugby league or rugby sevens.
- ▶ Studies investigate women's rugby as a sport.
- ▶ Studies investigate the applied sport science of women's rugby from a performance perspective.
- ▶ Studies investigate injury epidemiology within women's rugby.
- ▶ Peer-reviewed original research studies.

#### Exclusion criteria

- ▶ Non-English language studies.
- ▶ Review articles, conference proceedings, editorials, case studies, theses, grey literature.
- ▶ Studies where outcome measures do not differentiate between sex.
- ▶ Studies that do not differentiate outcome measures between rugby and other sports.
- ▶ Studies that use women's rugby players as participants to investigate a broader concept, but do not inform day-to-day practice or have minimal direct application to women's rugby (eg, strength imbalance in team sports).
- ▶ Sex of participants not specified.
- ▶ Male participants only.

## Data charting

Data will be extracted and assimilated as per best practice methodology.<sup>20 27</sup> Studies will be categorised into sport science and medicine themes, determined by primary aims and outcome measures. Similar methods have been used in a recent scoping review.<sup>21</sup> Data charting will be performed by the lead author (OH) and cross-checked by a second (SS) using a predeveloped charting sheet. Any disagreements will be discussed by the research team. The following data will be extracted:

1. Author(s).
2. Year of publication.
3. Country of origin.
4. Code of rugby.
5. Study cohort and sample size.
6. Participant characteristics (age, height, body mass).
7. Study aim.
8. Study outcome measures.
9. Intervention time course and comparator (if applicable).
10. Injury definition (if applicable).
11. Number of matches (if applicable).
12. Key findings.

If unforeseen additional useful data can be charted, then further categories may also be included, or table headings adjusted on the data charting form. Where study full texts cannot be retrieved, attempts to obtain the paper will be made via the university library. Where these attempts are unsuccessful, the corresponding author will be contacted to request a copy. If full text cannot be obtained, the paper will be excluded.

## Part 2: Delphi technique

### Participants

To identify research priority areas within female rugby this project aims to recruit a selection of experts. Participants will include a group of researchers, professionals or players who have experience or affiliation to women's rugby. Consideration will be given to ensure equal representation by experts in sport science (eg, applied sport scientist), medicine (eg, chief medical officer) or governance (eg, director of women's rugby).<sup>28 33</sup> This will be achieved by recruiting an equal number of participants from each discipline. For players to be included within the expert panel they must meet the following criteria: (1) played internationally and (2) actively involved in sport science or medicine (eg, PhD (candidate), lecturer, medical doctor). Although the inclusion criteria for players may limit the number of participants, as per sampling guidelines, it ensures the possibility of players drawing clear inferences and conclusions from the data.<sup>34</sup> All participants will be recruited via a purposeful sampling technique, which involves selecting knowledgeable individuals with specific experience in women's rugby.<sup>35</sup> A sample size of 11–25 is typical for a the final round of a Delphi study.<sup>29</sup> To account for dropout and non-responders, a large sample (>50) of potential participants will be contacted to partake in this study.

### Round 1

In the first round of questioning, the expert panel will be provided with, and asked to read, the main findings from Part 1 (overall results from the included studies) in order to inform them on the current sports science and medicine research in women's rugby.<sup>24 28</sup> Using both the main findings from Part 1 and the participants' own experiences, the expert panel will be asked to provide a list of future research areas that they believe to be important. Results from the first round will be grouped by means of thematic analysis, after duplicates are removed.<sup>36</sup> This process involves an abstraction process whereby expert-identified priority research areas will be allocated to subthemes to develop main themes.<sup>36</sup> Data will be obtained via Qualtrics online software (Qualtrics, Provo, USA).

### Round 2

The expert panel will receive the list of priority research areas developed in round 1. Experts will then be required to: (1) rate future research priority of each of the applied sport science and medicine areas from low to high on a 5-point agreement Likert scale (1: very low priority, 2: low priority, 3: medium priority, 4: high priority, 5: very high priority). Panellists will again be provided an opportunity to include any additional sport science and medicine areas that they think are a research priority. Following the completion of rating by each expert, the results will be analysed.

### Round 3

The expert panel will receive feedback on round 2 in the form of descriptive statistics, which will enable reflection before expressing their final opinion. Panellists will be asked to rerate (using the same 5-point Likert scale) the criteria from round 2 that did not reach consensus, including any areas that panel members included in round 2. When assessing consensus, Likert scale ratings will be combined (ie, very low and low priority, and high and very high priority will be grouped). Consensus will be deemed to have been reached if  $\geq 70\%$  of panellists gave the same rating.<sup>29 33 37</sup> As the aim of this Delphi method is to ascertain the research priority of all applied sport science and medicine areas, no areas will be removed on the grounds of low priority. Research areas that do not reach consensus after round 3 will still be reported as they may be important to some stakeholder groups but not to all.

Agreement ratings will be obtained separately for each research area. For each area, the mean agreement ( $\pm$ SD) will be calculated.

## DISCUSSION

To the authors' knowledge, this will be the first scoping review of applied sport science and medicine research on women's rugby. This review will identify broad themes that have been addressed in the evidence base as well as providing consensus on future research priorities, thus

providing alignment and direction for future research. The findings of this article will have relevance for a wide range of stakeholders in women's rugby, including policymakers and governing bodies.

## ETHICS AND DISSEMINATION

This study has received ethics approval from Leeds Beckett University Research Ethics Committee. When completed, the findings of the manuscript will be presented in a variety of formats. They will be submitted for review and publication in a peer-reviewed sport and exercise medicine journal and submitted to be presented at conferences (where applicable). To enhance the translational impact of the manuscript, multimedia resources will be created with the aim of disseminating key findings via other channels (eg, social media platforms).<sup>38</sup>

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**Contributors** OH, KS and BJ conceptualised the manuscript. OH, SE, GR and BJ identified the method and framework for the manuscript. OH and SS proposed the search strategy. OH prepared the manuscript. All authors contributed to subsequent drafts and approved the final version.

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**Data availability statement** All data relevant to the study are included in the article.

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