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'Body on the line': experiences of tackle injury in women's rugby union – a grounded theory study

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ABSTRACT

Objectives Tackle-related injuries account for up to 67% of all match injuries in women's rugby union. The perspective of women players on tackle injury can help key stakeholders understand psychosocial determinants of tackle injury risk and prevention. We aimed to capture psychosocial processes that explain tackle injury experiences and behaviours in women's rugby union.

Methods We conducted a qualitative study using a grounded theory approach. Adult women players, with at least 1-year senior level experience, were recruited from Europe, South Africa and Canada between December 2021 and March 2022. Data were collected through semistructured interviews and analysed in line with grounded theory coding procedures.

Results Twenty-one players, aged 20–48 years with a mean 10.6 years of rugby playing experience, participated. In our analysis, we identified three categories central to participants' experiences of tackle injury: (1) embodied understandings of tackle injury, (2) gender and tackle injury risk and (3) influences on tackle injury behaviours. Participants reported a sense of fear in their experience of tackling but felt that tackle injuries were an inevitable part of the game. Tackle injury was described based on performance limitations. Tackle injury risks and behaviours were influenced by gendered factors perpetuated by relations, practices and structures within the playing context of women's rugby union.

Conclusion Women's tackle injury experiences were intertwined with the day-to-day realities of marginalisation and under preparedness. Grounded in the voices of women, we have provided recommendations for key stakeholders to support tackle injury prevention in women's rugby.

INTRODUCTION

Participation, opportunities and pathways have grown exponentially in women's rugby, with 2.7 million registered players in 2018.¹ The tackle is the most common in-play contact event in women's rugby² and accounts for up to 67% of all match injuries.³ Injury frequency risks long-lasting impact, hence mitigating tackle injury is a high-priority research area for the sport's governing body, World Rugby.

Tackle injuries are multifactorial⁴ and despite prevention programmes (eg, RugbySmart)⁵ and tackle law changes, they remain the leading cause of injury in rugby union.⁶ Existing tackle injury mitigation efforts have been informed by research and frameworks derived from men's rugby.^{4 6} Given the extent of tackle-related injury problems in rugby⁶ and the fact that women remain underrepresented in rugby research,⁴ understanding the experiences of women rugby players in relation to

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Tackle injuries pose a considerable burden to training and competition in women's rugby union.
- ⇒ There is a lack of evidence on tackle injury experience and prevention in women's rugby union.

WHAT THIS STUDY ADDS

- ⇒ Women's experiences of tackle injury are shaped by social and cultural values in rugby that normalise injury and encourage 'putting your body on the line' to gain respect in a sport that does not necessarily account for women's own preferences for play.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Clinicians, coaches and sport organisations can advance tackle injury prevention strategies in women's rugby union through an understanding of the perspectives and playing contexts of women players, and of the social and cultural barriers that exist for women players in their sport. Future research and policy should be conducted in consultation with key stakeholders to inform contextually relevant evidence-based injury prevention in women's rugby union.
- ⇒ Tackle injury prevention should prioritise multilevel engagement to create safer, inclusive and equitable playing environments for women rugby players.

injury broadens the tackle injury prevention debate and helps ensure that tackle safety strategies are relevant and representative of the playing population. Finch⁷ proposed the Translating Research into Injury Prevention Practice, which stresses the importance of understanding the implementation context in relation to sustainable sports injury prevention.⁸ Understanding stakeholder attitudes and behaviours regarding injury risk and prevention are critical, as they influence players' adoption of prevention strategies.⁸ The socio-ecological model (S-EM) is widely used for understanding these influences on human behaviour.^{9 10} For instance, qualitative studies reveal cultures that shape concussion injury risk perceptions in rugby^{11 12} and similarities between men and women in their adherence to the 'sport ethic'.¹³ However, the contexts in which men and women play, do differ in terms of training age, performance pathways and gendered training environments.^{14 15}



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Understanding athletes' injury experiences and behaviours is necessary to bridge the gap between tackle injury prevention and its implementation¹⁶—in this case, in women's rugby. The aim of this study was to capture key psychosocial processes that explain tackle injury experiences and behaviours in women's rugby union, from women rugby union players.

METHODS

Study design

We conducted a qualitative study using a grounded theory (GT) approach to generate concepts and categories from our data.¹⁷ Broadly, GT is set of techniques and procedures to build concepts, and in many cases theory, from qualitative data.^{18 19} GT is concerned with psychosocial processes of behaviour and how and why people behave in different contexts. We sought to identify psychosocial processes that explain tackle injury experiences and behaviours in women's rugby union. In this study, a constructivist GT approach¹⁷ was taken. A key premise of constructivist GT is that the researcher is fully implicated in the construction of the data. The study is reported according to the Consolidated Criteria for Reporting Qualitative Research guidelines²⁰ (online supplementary table 1).

Equity, diversity and inclusion statement

The author group come from different professional backgrounds: a current elite rugby player and practising sports medicine clinician (KD); health sciences academic and practising sports medicine clinician (FW) and health sciences academic with expertise in qualitative design (GF). KD has experience of being injured in the tackle and of tackling where other players have been injured. This positioned us to decipher and understand the contexts in which women players operate. The study population included senior women rugby players of a spectrum of ages, and playing experiences; however, despite efforts to recruit from Global South settings, we acknowledge that this cohort may underrepresent individuals from these communities. We will discuss the influence of gender on our findings in the discussion.

Patient and public involvement

A player stakeholder reviewed both the study proposal and study findings for relevance and has advised on the dissemination of the findings. The stakeholder is from an Indigenous community

in the southern hemisphere, started playing rugby in adulthood and has played rugby at an international level.

Sampling and recruitment

Between December 2021 and March 2022, 21 participants were recruited through rugby social media networks. Participants were eligible for inclusion if they were: >18 years old; playing senior women's rugby union; playing senior rugby for at least 1 year; and able to converse in English. Initial sampling was convenient by participant self-selection (n=8). During convenient sampling, we reviewed the composition of our sample so that in further sampling, we could balance the representation of athletes from diverse geographies and playing backgrounds. Hence, purposive sampling was used to recruit athletes (n=2) from Global South settings to increase diversity and inclusiveness in the sample. Sampling proceeded from purposive to theoretical sampling (n=5) based on emergent findings in the data.¹⁹ After interviewing 21 participants, key concepts which emerged in the data were fully dimensionalised for their properties and characteristics.¹⁷

Participants

The experiences of 21 women rugby players from Europe (n=16), South Africa (n=2) and Canada (n=3) (table 1) are presented. Playing experience varied from club to international level with a mean of 10.6 years of experience. Age ranged between 20 and 48 years. Players from diverse playing backgrounds and sporting systems are represented. Participants' introduction to rugby varied, but the majority of players (n=16) commenced playing rugby in adulthood.

Data collection

Prior to participation, participants provided written informed consent and completed a brief demographic questionnaire which included participants' age, playing position, the highest level of competition achieved and years playing rugby (online supplementary table 2).

Once eligibility was confirmed, participants engaged in a semistructured interview on the video conferencing platform Zoom.²¹ Both KD and FW conducted the interviews. Interviews lasted between 35 and 67 minutes and none of the participants had a prior relationship with the interviewers. The interview guide was informed by the findings of a recently published scoping review on the physical and technical demands in female field collision sports² (box 1). The health-belief model²² was

Table 1 Participant and site characteristics

Participant characteristics	Ireland	England	Canada	South Africa	Scotland
Participants	11	4	3	2	1
Participants age range	20s–30s	20s–40s	20s–30s	20s	30s
Playing experience (mean years)	1–19 (10)	7–20 (12)	8–16 (12)	2–10 (6)	11
Competition level	Club first and third division, Provincial, International	Club first and third division, Provincial, International	College first division	International	International
Playing position	6 backs, 5 forwards	2 backs, 2 forwards	1 back, 2 forwards	1 back, 1 forward	1 forward
Country characteristics					
HDI, 2019 (world ranking)	0.955 (2)	0.932 (13)	0.929 (16)	0.709 (114)	0.932 (13)
World ranking	9th	1st	4th	13th	11th
First year participating in Women's Rugby World Cup	1994	1991	1991	2006	1994
First year of professionalism	2022	2019	–	–	2022
Note: first women's rugby world cup took place in 1991. HDI, Human Development Index.					

Box 1 Interview questions

1. Tell me about your playing career to date? (probing: journey into rugby, enjoyable aspects of rugby)
2. In your own experience, how is women's rugby perceived? (probing: home environment, media coverage, coaches, club members)
3. Tell me about the barriers you've experienced to playing women's rugby? (probing: individual, interpersonal, club and institutional environment/resources, society)
4. What comes to mind when you think about tackling in women's rugby? (probing: cognitions, emotions)
5. Tell me about how you learned to tackle? (probing: tackle coaching experiences, learning environments)
6. How confident are you in your tackling ability? (probing: understanding, preparedness, self-efficacy)
7. Tell me about your experience of tackle injuries in women's rugby? (probing: tackle injury beliefs, perceived susceptibility, severity, behaviours, risk perceptions, barriers and facilitators to injury mitigation)
8. After reflecting on your experiences, is there something else you would like to add?

also used to support the development of the interview guide and two pilot interviews were conducted to explore the suitability of questions. The interview guide was revised by all authors to ensure focus on the topic and to allow for flexibility in the interview for further interrogation of key concepts.²³

Interviews were audiorecorded and transcribed verbatim. Field notes were made during and following each interview by the interviewers. After each interview, the interviewers wrote a case-based memo reflecting the interview. Interviews were member-checked by participants whereby each participant reviewed their transcribed interview. Minor adjustments were made to the wording where necessary. KD then reread all transcripts and memos to fully familiarise themselves with the data.

Data analysis

We collected and analysed data in tandem and emerging findings guided sampling and questions. While the above interview guide was generally followed, the interviews also allowed for prompting and probing of participants in the direction of the emergent concepts, in line with theoretical sampling.²³ For example, when data were indicating the influence of gender, the probing questions in **box 1** were asked in a way to further interrogate the influence of gender.

KD was guided in the analysis by both FW and GF, the latter is skilled in GT analysis. KD analysed the data using initial, focused and theoretical coding. NVivo V.1.6²⁴ was used to code data and to demonstrate how codes formed concepts and categories. Data were analysed using the constant comparison method. First, in initial coding, data were broken down into discrete units of meaning ('codes'). Comparing data with data aggregated these codes to build concepts and categories (larger concepts). During focused coding, key concepts and categories were interrogated further for variation (difference) and meaning. As sampling proceeded from the convenience and purposive to theoretically based on emergent findings, we found that participants' experiences of tackle injury were underpinned in many incidents, by gender.²⁵ From this insight, we went on to recruit more diverse participants who were in a position to give us a comprehensive understanding of the processes behind categories (eg, players

who were able to account for experiences that they felt were rooted in gender). During the final stage of analysis (ie, theoretical coding), relationships between key categories were then fully examined to identify key context-related psychosocial processes explaining the experience of tackle injury for participants.

The case-based memos, combined with summary tables, conceptual diagrams and more conceptually oriented memos formulated by KD, were used at each stage of analysis. Memos functioned as an audit trail for how key concepts emerged in the data. Regular team meetings between the researchers allowed for collective examination of our assumptions about the data and about our analysis of the data. Once categories and concepts were finalised, each category was mapped to the S-EM. Peer debriefing with other stakeholders working with rugby players was used to consider biases and assumptions made by the authors. Peer debriefing was conducted during the latter stages of data collection and analysis and on completion of data collection and analysis. Peer debriefing helped further contextualise the data to the playing environment of participants.

Findings

Through the analytical processes of abduction¹⁷ in which the researchers made inferences between the data, we identified the various experiences of tackle injury expressed by the participants in the following categories: (1) embodied understandings of tackle injury; (2) gender and tackle injury risk and (3) influences on tackle injury behaviours. **Figure 1** illustrates the categories and the concepts which comprise them. **Figure 1** also outlines the relationships between the categories and concepts. The core category 'body on the line' incorporates all other categories and explains the overall experience and behaviour among participants in relation to tackle injury. Tackle injury was underpinned by specific embodied understandings of tackle injury grounded in gender-related experiences of play, experiences which were shaped by both personal and broader subcultural and societal influences. Categories and supportive quotes for different levels of the S-EM are provided in online supplementary tables 3–5.

'Knocks and bumps': embodied understandings of tackle injury

Participants' bodily experiences of playing rugby and approaching the tackle were rooted in how they perceived themselves in the environment in which they played. Participants had all suffered various degrees of pain and injury from tackling. Normalising and downplaying tackle injury, defining acceptable risk and coping with injury were primary dimensions common to all participants' embodied understanding of tackle injury.

Normalising and downplaying tackle injury

Injuries were viewed as 'inevitable' (P13) and 'part and parcel' (P15) of players' engagement in rugby, and in 'an environment that normalises it' (P18). Participants agreed that it was unreasonable to expect not to play with pain and injury due to 'the physicality and brutality of the sport.' (P2):

You have to be either brave or stupid, don't you?...I think if you weren't brave you wouldn't play it...I don't think anybody's 100% fit if they play rugby. (P15)

Participants described a culture of hardiness in which players demand everybody around them to be 'brave' (P20) and 'put your body on the line' (P2). One player described how interactions with teammates shaped her understanding of tackle injury:

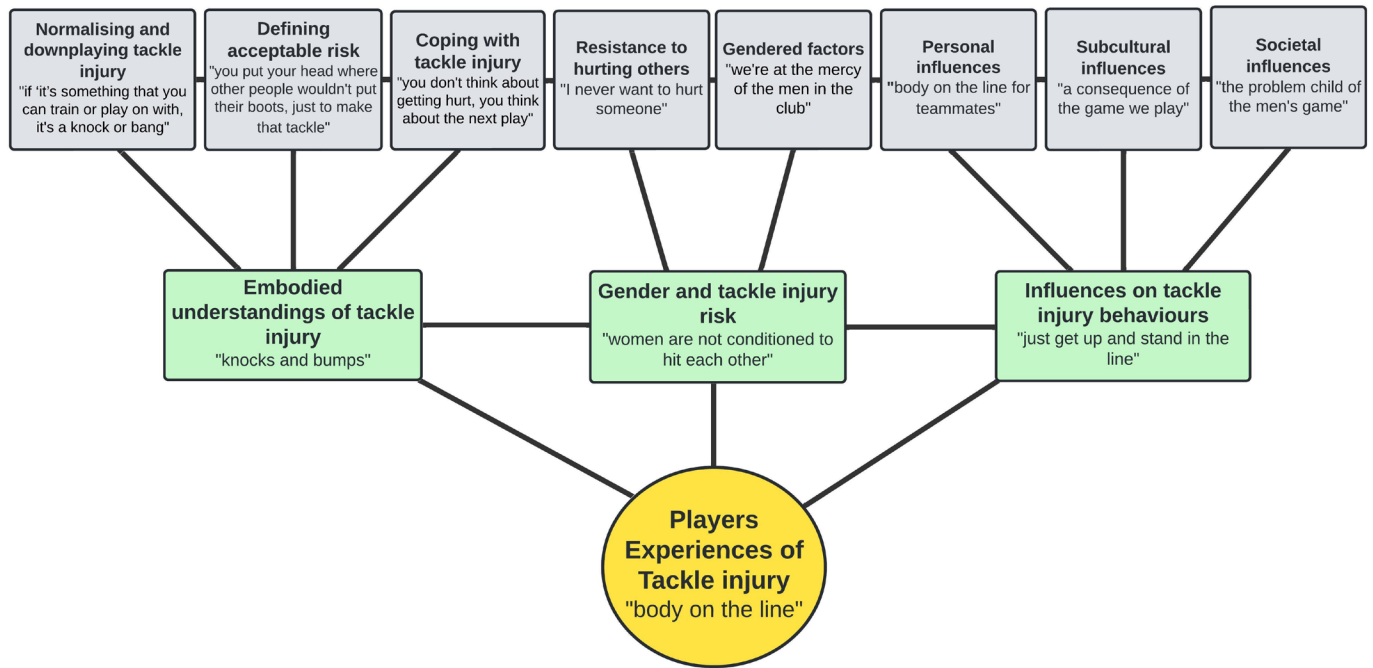


Figure 1 Explanation of the experiences of tackle injury in women's rugby union.

I broke my finger in the warm-up before an international game and one of the girls turned and said to me that 'it's just a mindset', and it was. You just play the game, strap it up, get a load of pain killers into you and just play the game. (P5)

Non-medical descriptive language (eg, 'knocks and bumps') (P1) was used by participants to recall tackle injuries. An injury was commonly defined by participants as something that 'keeps you out for a game or training' (P2) whereas if 'it's something that you can train or play on with, it's a knock or bang' (P2). Players experienced countless injuries during their careers that were severe, but which they labelled as 'nothing major' (P1). Participants described themselves as 'lucky' (P3) not to have sustained more injuries.

Defining acceptable risk

Participants did not view pain as a serious impediment to playing, with many continuing to play with an implicit trust in their bodies. They judged their ability to continue to play on the metric of being able or not to 'be a body in the line' (P6), and they were intentionally dismissive of injury by using casual language to rationalise it:

I played a match on Saturday, and it [wrist] was a wee bit niggly... it was fractured...It happened at some stage during the match, but I played with it so it wasn't too bad. (P10)

Owing to the latest media attention on brain health and rugby, there was an understanding that there was a point of diminishing returns where continuing to take such physical risks became harmful to their long-term health:

That's the only thing I am most scared about, I would really think about my career if I got any more concussions, and I think that's the only thing that would make me stop. (P5)

Tackle injury behaviours

Participants used strategies to manage and hide the effects of tackle injuries and continue to play in such situations for fear of missing subsequent games:

I would absolutely just push through [a concussion] or if...my head was really pounding I'd probably take some time off and say "oh I rolled my ankle". I would probably have tried to avoid admitting that I hit my head until maybe something happened or my head hurts so much it was like "Oh, this is serious." (P11)

Despite tackle coaching, a common issue was that under match conditions, players tended to revert to 'whatever it takes to get her down' because 'it's not our first instinct to have a proper tackle technique' (P21). In the context of downplaying injury, almost all participants described actively negotiating an ever-present 'fear of injury' or 're-injury' (P3) while tackling:

We knew that each other was scared. You just crack on don't you, just play. You internalise a lot of it and then when someone says get off the line, you get off the line...When you are on the pitch you can very easily just be in that environment, zone out of the fear and pretend it's not there. (P18)

Overall, participants' understanding of tackle injury was embodied and constructed through complex negotiations with oneself, interpersonal interactions and with the cultural values (eg, toughness) that they felt defined the sport.

'Women are not conditioned to hit each other': gender and tackle injury risk

Gender and tackle injury risk perceptions

Participants' perceptions of tackle injury risk were in many cases, related to meanings associated with gender. Participants acknowledged that friends and family made judgements about the risks associated with playing a 'masculine appropriate sport' (P7). Participants felt conflicted between their agency and others' gendered assumptions of their vulnerability. Gendered language and messaging from coaches were perceived to augment participants' embodied limitations and perceptions of tackle injury risk in women's rugby:

When coaches are teaching tackle tech to boys it's like "okay hit the thing" and there's no soft language, and with girls it's like "oh you won't get hurt" so even framing it in that way you are going to

picture yourself getting hurt. It is using that soft language because it's a woman or girl...Subconsciously you'll have girls thinking of this "brutish physical game" and they will question their ability as opposed to the guys where that is never brought up and it's not given a second thought. (P7)

Participants described 'being at the mercy of the men in the club' (P13) in terms of access to facilities, quality coaching, and support staff stating 'we should just be happy for what we've got' (P4). Experiences of negligent oversight from coaches manifested as 'throwing players into the deep end' (P7) which participants perceived to increase their fear of injury:

Coaches assume that every player has played from a grassroots level and has been through that setup...Women are not men. We don't have traps, the neck strength and also other elements of S&C...it's okay to be scared in the contact situation...There are games where I was absolutely s*****g myself...In that situation I don't think we talk about that enough because it is "yeah we play rugby, let's hit each other!" I reckon on any pitch there are half of the players s*****g themselves about who is running at them...I think that explains a lot of missed tackles in the women's game...it is natural fear of "you are going to hurt yourself"...I know players who have stopped playing because they're scared, but that is not what they said when they retired Internationally. (P18)

Resistance to hurting others

Gendered experiences uncovered in the interviews included participants' resistance to 'hurting people' (P18). Inflicting a mild degree of physical pain to the opposition was viewed by participants as a consequence of tackling in rugby, but 'intentionally going out to hurt someone' (P6) was not a legitimate tactic. Resistance to hurting others also extended to fears of injuring teammates which resulted in a reluctance to 'go live' (P5) in training. This they felt contrasted with the motives of 'reckless' male players who 'don't care who they hurt' (P17):

Everyone was like "yes [nickname] that is an epic hit" as you have just broken someone's leg, and heard it break, and they are screaming. That is the element of rugby that is confusing as a player. I was always actually quite scared about hurting people... always had to be aware in training that I would go half effort but in a game, I had to smash people...I was a fearful, scared player most of the time. I cared more about the opposition than me...I absolutely annihilated my body but I did always feel bad for slightly injuring someone. (P18)

Troubled by the prospect of hurting others, participants felt conflicted by gendered messages from coaches that encouraged excessive aggression and hurting opposition in the tackle contest:

I don't think women are really aggressive...there are definitely coaches that I've had in the past that try and teach you and encourage you, motivate you to go into the tackle to hurt someone. "You hit to hurt"... "we need to be more aggressive"...I don't agree with that. Sometimes I try to bring more aggression to it but I never want to hurt someone. (P13)

Overall, not wanting to intentionally hurt other players in the tackle mitigated the risk of tackle injury for some participants. Importantly, the resistance to hurt others clashed with what they perceived as a masculine-type aggression in the tackle, an aggression they felt was encouraged by their coaches.

'Just get up and stand in the line': influences on tackle injury behaviours

Participants reported that they were willing to play while injured and 'just get up and stand in the line' (P6). Feeling the need

to play when in pain and while injured were shaped by both personal and subcultural-based concerns that weakness in the face of pain or injury meant that women do not belong 'in a man's sport' (P2).

Personal influences

The most prevalent personal reasons for playing through pain were 'putting your body on the line for your teammates' (P2):

You know you're hurt but you've got a role to do...the main thing is just not letting your teammates down...I don't really think about winning or losing...it's more like I'm letting down my teammates and I don't want to do that. (P7)

Subcultural influences

For all participants, tackle injury perceptions and behaviours were clearly embedded in their own subcultural context of playing rugby union. Participants experienced pressure from coaches to sacrifice their bodies for the benefit of the team:

This is four weeks of destroying your body and trying to hold on for dear life until the end of season. (P17)

Conversely, some participants described coaches being supportive of their injuries. The level of support, or pressure, differed among participants and was influenced by factors including coaching style and player and coach relationship:

We were very close with our coach, so we felt comfortable to go to them. You didn't feel shame for being hurt or not feeling comfortable [to play]. (P16)

Importantly, in a subculture which they felt requires and rewards playing while injured for rugby success, many participants provided accounts of differences in the organisation of men's and women's rugby (ie, career pathways, career opportunities and refereeing) that impact women's tackle injury behaviours. Participants reported experiences of 'second rate' (P7) coaches who were perceived to use women's rugby as 'a stepping stone to progress into the higher levels of the men's game' (P18):

It just stems from where you first learn to tackle...so it's not half-a*****g it with a volunteer that doesn't know how to tackle... suddenly teaching young girls this fundamental skill and teaching it wrong. That is going to become a habit and she will carry that through and it's quite difficult to remould it...they [coaches] don't bring out the best in their female players...It's always the bare minimum...you will see under 18 guys have access to really good coaches and specialty coaches and with the girls it's again the same thing of like who's free to volunteer to do it? Getting second rate coaches, because it's fine like "what's the bare minimum that we will accept", so that we won't anger the public if they ever find out. (P7)

Societal influences

Against a backdrop of constraining gender stereotypes that assume that women rugby players are more injury-prone, 'less skilled' (P1), and 'butch lesbians' (P10), participants reported being systemically marginalised within clubs, unions, and wider society. Consequently, participants felt the need to prove their value through bodily sacrifice to 'make it a product worth selling' (P21) and earn resources aligning with their male counterparts:

There's still a kind of stigma around that because if you introduce yourself to anyone nowadays...you see their eyes widen and they say "touch rugby?"... "is it not sore, doesn't it hurt?" and I don't think men get those questions. They are immediately a superhero wherever they go because they play rugby...but we are on a path of

Recommendations to support tackle injury prevention in womens rugby union

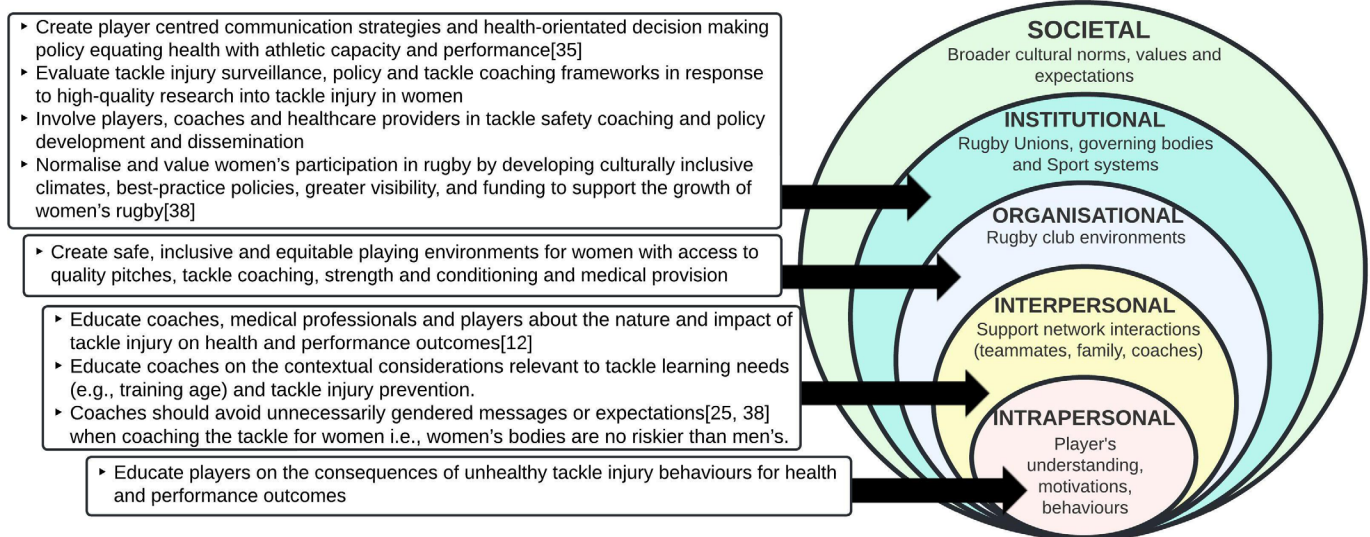


Figure 2 Recommendations to support tackle injury prevention in women's rugby union applicable to the socio-ecological model.⁹

making it a product worth selling and worth watching but it's still a far way out...when the quality of rugby picks up and when they see that we can do similar things as the men can do on the field, I think that will definitely make it better. (P21)

DISCUSSION

The aim of this study was to capture key psychosocial processes that explain tackle injury experiences and behaviours in women's rugby union, from the perspective of women rugby union players. The normalisation of pain within rugby culture was pervasive and compromised participants' physical and emotional health. Participants' understandings of injury risk were shaped by an awareness of the cultural and societal struggles that underpin their involvement in rugby such as the material conditions of play. Gendered embodied experiences forged personal understandings of what was an appropriate level of risk. Participants' desire for respect and recognition in rugby meant that to prove their belonging in the sport, they played through injury and 'put their body on the line'.

Our findings resonate with other sports including football and rowing^{12 13 26 27} where the functional definition of injury underpinned participants' irreverent attitudes towards injury. Our findings provide new insight into how injuries are perceived and negotiated in women's rugby. Despite educational campaigns,⁵ there was a widely held view among participants that tackle injuries are inevitable and based on performance limitations. While participants used trivialising language to manage their acceptance of tackle injury risk, there was an embodied understanding and bodily negotiation that lay at the foundation of this process. Participants externalised the injured body part, distancing themselves from the physical and emotional consequences associated with it.²⁸ While participants agreed that injury behaviours are largely the players' responsibility, some critical factors regarding injury risk reduction are out of players' hands (eg, tackle coaching, referee behaviour, and results-driven playing environments). A player's safe tackle technique could be improved through 'boosting' coaching and refereeing competencies.⁴ The multiple contextual features of tackle injury perceptions and the inequitable gendered practices that persist in rugby indicate the complexity inherent to tackle injury. Our findings are relevant

for the development and implementation of sports injury surveillance systems and prevention strategies that reflect the centrality of performance in players' definition of tackle injury.⁸

Consistent with other sports, we found that women's rugby union players commonly play while injured and manage injuries through matches.^{12 13} Most players felt that they were not pressured into playing with an injury which may be demonstrative of the 'risk-transfer' process in 'sportsnets' (a term for webs of interaction in sport) where athletes believe the decision is made by them, but in practice, is influenced by a myriad of cultural and structural factors.²⁹ In our study, toughness and behaviours associated with men's rugby appeared to dominate and organise the playing context in women's rugby union. Tackle injuries were normalised for participants and they were encouraged by teammates and coaches to sacrifice their bodies for the benefit of the team. When tempted to express anxiety about their pain or injuries, participants faced retorts from teammates and were advised to continue playing. Support of this kind has the latent function of maintaining the subcultural norms of the 'sportsnet' and regulating risk-taking behaviours. Participants in this study revealed a system of rewards in rugby for adopting the behaviours expected of players.

Participants felt compromised by their tackle injuries and in many cases felt that the prevailing culture and structures did not allow them to disclose their injury fears. Players' internalisation of injury fears resonate with what Goffman³⁰ refers to as activity at the 'back stage' that is 'inconsistent with the appearance fostered by the performance' at the 'front stage'. Similarly, Sabo³¹ noted that "athletes gradually learnt to stifle awareness of their bodies and to limit emotional expression." Extrapolating Sabo's and Goffman's concepts to the issue of downplaying and concealing tackle injury in our cohort, it is not difficult to see how participants are predisposed to not speak up given the cultural permeation of this ideology.^{29 31} Conformance to the 'sport ethic' incurs a greater number and severity of injuries^{32 33} and may have longer-term implications on player health and well-being.³⁴ The concept of 'risk transfer' recognises that it is not just athletes who are constrained by the need to perform in sport. Coaches and medical staff are under pressure to produce winning performances which may then create a culture where

the pressure to perform with pain is present. In particular, the specific context of women's sport is heavily dependent on successful performances for commercial success. Such behaviours should be addressed through targeted education for players, coaches and other stakeholders on the health and performance consequences of unhealthy tackle injury behaviours. Excessive social pressure within the sports network could be targeted by establishing health-oriented decision-making regulations and athlete-focused communication strategies.³⁵

This study expands on current research by exposing previously under analysed factors such as gender,²⁵ that significantly impact women's tackle injury experiences. Participants identified how their status as women and late starters in rugby increased their injury susceptibility because of inadequate physical preparedness (eg, younger training age and restricted gym access), technical preparedness (eg, maladaptive coaching practices) and tactical preparedness (eg, game exposure and understanding). Gendered structural barriers such as the unequal distribution of resources influenced participants' tackle injury risk perceptions and behaviours. Financial incentives, injury stigmatisation and deselection were not reported to be relevant to the experiences of women rugby players despite being common behavioural influences in other sports.^{12 13 26 27} This may be because women's rugby is striving to reach parity with their male counterparts in terms of commercialisation, participation and professionalism. Consistent with other women contact sports, the participants recounted day-to-day experiences of gender ideologies, stereotypes, homophobia and stigma linked to being women in 'a men's game',^{36 37} which left them feeling undervalued, trivialised, and interlopers in their sport. In the face of these experiences, it appears participants were just as willing as their male counterparts to sacrifice their bodies as part of the game. However, their reasons were tied to transgressing inequitable gender practices and reaffirming their belonging in rugby. Institutions and organisations should focus on increasing the number of women with 'a seat at the table' and increase awareness of the implicit gender bias in rugby, taking deliberate actions such as changing policies and systems to create a more equitable, culturally inclusive playing climate.³⁸ Such action may help combat unhealthy tackle-injury beliefs and behaviours and indirectly benefit tackle injury prevention in women's rugby.

While participants in our study appeared to adopt many of the injury behaviours endemic in the men's game,^{27 29} they also experienced a form of cognitive dissonance when injuring others. Indeed, concerns about injuring others were nearly as salient as concerns for personal safety, if not more so. Teammates were viewed as family, even to the point that participants highlighted their discomfort with tackling teammates in training. This contrasts with men's experiences, as they often relish such physical contact with friends.³⁹ This has implications for the design and implementation of tackle coaching strategies in women's rugby.² Of note, resistance to the dominant prescriptions of rugby culture was detected, specifically to coach messages of 'hitting to hurt' opposition. Amid media attention on concussion lawsuits in rugby codes, many participants reported modified behaviours as a result of concerns for the long-term brain health consequences of injuries.

Clinical implications

Our findings reveal that tackle injury experience and behaviour for women players in rugby union is embedded across multiple contexts ranging from the microlevel to the macrolevel. Beyond the stakeholders directly related to the players (eg, teammates,

coaches, family), there are other dimensions (eg, club environments, national unions and wider society) that affect tackle injury experiences.⁹ To develop comprehensive injury prevention strategies, all stakeholders should be involved and engaged. While it may not be possible to avoid tackle injuries, based on our reporting of the findings, we outline recommendations to support tackle injury prevention in women's rugby union (figure 2).

Limitations

The findings of our study are not generalisable to all players in women's rugby and may also limit comparability to other sports and settings. The findings are limited to players from a small number of countries and most participants who were recruited were from Ireland. Data collection was limited to interviews and did not include other qualitative data collection methods (eg, observation, large-scale documentary analysis across contexts). We did not arrive at a theory per se to explain tackle injury behaviours and experiences of women rugby union players. However, using GT methods and procedures enabled the generation of concepts and categories that offer rich explanation of tackle injury in the playing context of women's rugby union. In addition, the study did not incorporate the perspective of male players and other stakeholders (eg, coaches and medical personnel) on the tackle injury. Future research involving the perspectives from these groups is needed to understand how widespread the experience of and behaviours surrounding tackle injury are.

CONCLUSION

Women's tackle injury experiences were often sources of conflict and fear and were intertwined with the day-to-day realities of marginalisation and underpreparedness. Women were socialised into an understanding that to be accepted and respected in rugby, they must internalise injury fears and conform to subcultural values which reward 'putting your body on the line'. Grounded in the voices of women, we have provided recommendations for key stakeholders to support tackle injury prevention in women's rugby.

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Supplementary material

Supplementary Table 1. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist.

No Item	Guide questions/description	Comment/page no.
Domain 1: Research team and reflexivity		
Personal characteristics		
1. Interviewer	Which authors conducted the interview or focus group?	KD and FW, page 7
2. Credentials	What were the researchers credentials? E.g. PhD, MD	KD: BSc, FW: PhD, GF: PhD
3. Occupation	What was their occupation at the time of the study?	KD: PhD Student, Discipline of Physiotherapy GF: Assistant Professor in Occupational Therapy FW: Associate Professor in Physiotherapy
4. Gender	Was the researcher male or female?	All researchers (data collection, coding/data analysis) were female
5. Experience and training	What experience or training did the researcher have?	GF has conducted and published numerous qualitative investigations. FW has expertise in mixed-methods research. KD received training in interviewing skills. Authors experienced in both quantitative and qualitative research.
Relationship with participants		
6. Relationship established	Was the relationship established prior to study commencement?	No prior relationship, page 8
7. Participant knowledge of the interviewer	What did the participants know about the researcher? E.g. personal goals, reasons for doing the research	Participants were aware of the rationale for the study and the researcher's level of training, page 8
8. Interviewer characteristics	What characteristics were reported about the interviewer? E.g. bias, assumptions, reasons and interests in the research topic	The interviewers' level of training, experience, and occupation are reported.
Domain 2: Study design		
Theoretical framework		
9. Methodological orientation and theory	What methodological orientation was stated to underpin the study?	Grounded theory, page 5
Participant selection		
10. Sampling	How were participants selected?	Convenience, purposive. and theoretical sampling, page 6
11. Method of approach	How were participants approached?	Rugby social media channels, page 6
12. Sample size	How many participants were in the study?	21 participants, page 6
13. non-participation	How many participants refused to participate or dropped out? Reasons?	One participant dropped out of the study prior to interview secondary to unforeseen time difficulties.
Setting		
14. Setting of data collection	Where was the data collected?	Zoom video conferencing, page 7

15. Presence of non-participants	Was anyone else present besides the participants and researchers?	No
16. Description of sample	What are the important characteristics of the sample? E.g. demographic data, date	Participant characteristics are reported in table 1, page 7
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Semi-structured guides were developed. Interviews with probes to guide as necessary. Piloted prior to use in the study, page 8.
18. Repeat interviews	Were repeat interviews carried out?	No
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Interviews were audio recorded and transcribed verbatim, page 8
20. Field notes	Were field notes made during and/or after the interview?	Yes after the interview, page 8
21. Duration	What was the duration of the interviews?	Interviews lasted between 35 and 67 minutes, page 8
22. Data saturation	Was data saturation discussed?	Yes, page 6
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	Participants were asked to check their transcripts for content. One transcript had minor adjustment for content, page 8
Domain 3: Analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	One coder KD, page 9
25. Description of the coding tree	Did authors provide a description of the coding tree?	Authors described data coding process, page 9
26. Deviation of themes	Were themes identified in advance or derived from the data	Inductive – concepts and categories derived from the data, page 9
27. Software	What software was used to manage the data	Nvivo software, page 9
28. Participant checking	Did participants provide feedback on the findings?	No, but an external player representative provided feedback on findings, page 6
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the findings? Were these identified e.g. P1	Yes, participant quotations were presented to illustrate the concepts and categories. Each quotation was identified only by the interview number to maintain assurances of confidentiality, pages 10-18, and supplementary tables 3-5.
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, the quotes explicate the concepts and categories as presented, pages 10-18, and supplementary tables 3-5
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes, the major themes are presented throughout the results section with representative quotes.
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes, presented across the results section, pages 10-18.

Supplementary Table 2. Participant demographic questionnaire**Personal Information**

What age are you? _____ years

Rugby History

What position(s) do you play? _____

How long have you been playing rugby? _____ years

What is the highest rugby competitive level that you have played at? (please tick)

Club	<input type="checkbox"/>
Provincial	<input type="checkbox"/>
National	<input type="checkbox"/>

Please give details: _____

Supplementary Table 3. Category: “Knocks and bumps”- Embodied understandings of tackle injury

Category: “Knocks and bumps”- Embodied understandings of tackle injury	
S-EM level	
Concept	Normalising and downplaying tackle injury
Intrapersonal	It’s probably something that is found just in rugby...it relates to the nature of the injury or the seriousness of the injury and for some people maybe it’s downplaying it or it’s just a word that has invaded your vocabulary and you use it now without thinking that you're downgrading the nature of it. (P2)
Interpersonal	My coach here is like “all right, this is four weeks of destroying your body and trying to hold on for dear life until the end of season and then for the rest of the semester it's recovering and getting better.” (P17)
Institutional	You don't really hear people telling you to “suck it up” in rugby because everybody just kind of already has that mentality. It's implemented more into rugby culture. (P17)
Concept	Defining acceptable risk
Intrapersonal	I'm really bad at being told “no”. I don't think I've ever played very many matches where I haven't had some sort of ache or something so you're used to playing through something whether it's muscle pain, or whatever...I was never gonna miss a match due to being sore, I am just about missing matches due to this [broken wrist]. (P10) The people around me that are more concerned about my physical welfare than I am. (P5)
Concept	Tackle injury behaviours
Intrapersonal	As soon as the whistle goes everything goes out of your brain, you just want that ball and you want to do anything to get the ball and win the match. I was nervous for a good 30 seconds but then the game started and there wasn't time for that. (P21)
Institutional	I remember a physio at one point describing rugby players as the functionally injured, that everyone's got a niggle that they're dealing with...but you're functional enough to still be able to play...I think just the nature of rugby and it being a contact collision sport, I think it's just a higher risk sport for getting injured. I don't think we can shy away from that. In theory, I'd like to think that the more the women's game progresses the more time we have to train, the more time we have to recover and take care of ourselves and potentially, that will lower the injury rates. (P13)

Supplementary Table 4. Category: “Women are not conditioned to hit each other” - Gender and tackle injury risk

Category: “Women are not conditioned to hit each other” - Gender and tackle injury risk	
S-EM level	
Concept	Gender and tackle injury risk perceptions
Intrapersonal	I see the difference between men and women's rugby because we don't have the physicality, we don't have the speed of the men. But as far as tackling goes, we don't hold back, there's no “oh I'm sorry”, it's the same. (P9)
Embodied limitations	I think it's a given the women will probably get injured more than men and I say that simply because of genetics, biology and then also men become more used to that because if you're if you're my age you've probably not been playing since you're five years old whereas the boys have, their body kind of adapts to that. (P15) I'd say men have no issue in smashing into each other and their own teammates, because it's even banter for them...we were doing one on one tackling, I was up against our vice-captain and she had actually said to me “you're more likely to get hurt if you don't go in with the intent of bringing somebody down because that is when you're more likely to hurt yourself”. That was something that stuck in my head for any kind of tackling training for the future...if you don't do it right, then you are at more risk. (P8)
Interpersonal	I feel it's all about the coaching, it's very evident as a player which coaches really care about your safety and which coaches just kind of want you to run around and do your best. (P11)
Coach influence	
Family influence	My husband's saying things like “please be careful” and I have got an injury at the moment and he is saying “what if this happens again?”...I don't see him saying that to my brother who plays and he's had his fair share of injuries...I don't think there's ever any conversation around “Oh do you maybe think you should give rugby up because it is quite dangerous?” (P8)
female frailty	My mother would be the same, she would try to get to every game just for fear that something happened to us. (P5)
Organisational	As female rugby players you don't always have high-quality coaches, especially at grassroots level. And there isn't the grassroots level available to younger people...you probably wouldn't have high quality coaching because it's [women's rugby] so new. So, I think a lot of girls wouldn't have had the coaching that I had, and I am lucky that I did. (P5)
Gendered experiences of coaching	I definitely played for the first few years winging it when it came to the contact situation. It is dangerous...Did we get taught the tackle? Nothing more than, tackle below the hip...I would often go in on the wrong side. I remember academy coaches saying “[nickname] you keep getting knocked out because of your tackle technique”. But there was never any 1 on 1, this is your tackle technique...I've knocked myself out quite a few times in the fall after the tackle...We were never really taught to fall, other than...some MMA training...That was a game changer for me actually in terms of body awareness, controlling my body...I stopped getting knocked out every week. (P18)
Gendered Rugby club environments	We are still very much an amateur/semi-professional club and we are on paid to play contracts. But everyone has a full-time job, I'm a full-time student, and so everyone trains in the evening in their spare time. So, it's very much still a hobby for us and we're at the mercy of the men in the club and what they want to do is the priority and then we have to fit in and around them. (P13)
Institutional	It is your gain line you do everything to protect it so whether you have to put your body on the line or your head in the line I think it's silly that we do it but we still do it...If I'm putting my body on the line I'm hoping the person beside me is putting their body and the line and that's when success comes. if I'm lying on the ground someone is covering a space that I should be in. Even if I can stand and be a body in the line that might take pressure off someone else on the team. (P6)
Collective values	
Societal	women are not conditioned to hit each other. I think there are some women who are conditioned to hit each other, there are some women who can be conditioned to hit each other. I think by naturally saying you want to play Rugby, you appreciate that you are going to hit other women. But I do think that in any rugby team there are different personality types, I do think that goes into how you feel about the contact area. (P18)
Traditional gender norms	
Gender roles	There are so many people that think we shouldn't play at all because we are women and we would get hurt and then we wouldn't be able to make their lunch. (P3)

Concept	Resistance to hurting others
Intrapersonal	Boys rugby in general just seems way more reckless like they don't care who they hurt, if they hurt themselves or others. But girls were like I don't want to get hurt, so I certainly don't want to put you in a position to get hurt so like it's just we're here to have fun, not actually pound each other. (P17)
Reluctance to hurt teammates	In training you're up against your own teammates and you don't want to hurt your teammates and you don't want to make a really aggressive dominant tackle against a teammate. (P8)
Interpersonal	That phrase 'hit to hurt' I don't really buy into it. Everyone is playing to play the game so I wouldn't. I would never go out to intentionally hurt someone to be honest, play the fairest game possible...That mentality of hit to hurt or send someone off injured by tackling, is not in the spirit of the game for me...maybe some people use it as that switch on... There are plenty of people who go out to hurt people, I just hope me or my team aren't any of them. (P6)

Supplementary Table 5. Category: “Just get up and stand in the line”- Influences on tackle injury behaviours

Category: “Just get up and stand in the line”- Influences on tackle injury behaviours	
S-EM level	
Concept	Personal influences
Intrapersonal Team allegiance	We have such a bond. We were like a sisterhood right...you want to keep going for your team...If you get hurt in the first five minutes you don't want to give that up so easily and you want to be there and be a part of your team. I definitely think it's cultural. (P16)
Concept	Subcultural influences
Interpersonal	
Family influence	My dad will watch Rugby and my mum might but she doesn't really like watching me play and that is probably linked to gender a little bit. I'm not sure if she would be the same if I were a boy or man? It's not expected as a thing that women should do, as a nice proper lady. (P12)
Teammate influence	One of the girls said to me “if your arm is not broken...even if you have to stand in the line, just get up and stand in the line” now that's all well and good, until someone probably runs at you. Maybe the safer thing to do is lie down but I think it's the nature of the game people get up and play on. You know your arm is sore, someone comes out with an ice pack for two minutes and you go off and do it again. I think adrenaline probably gets you through, more than anything in those scenarios and then afterwards you worry about it. (P6)
Coach influence	There is a lot of expectation on me, they're like “[nickname] you are massive, like hit people”. (P18) I remember the first game that I played no one actually taught me how to tackle. Someone ran past me and I tried to shoulder barge them like you might in football, so people sort of laughed a bit and they scored a try. My friend who was on the team taught me how to do a tackle in the try area, while they were taking the kick. So you grab someone and say “I don't know what I'm doing here can you help me please?” ...I don't really remember a high level being taught how to tackle because I guess it's assumed that you have that skill ingrained already. (P12)
Organisational	Even if we look at our own club, you know, we're probably not valued and appreciated to the extent that we could be...things like how they view us and the quality of rugby that we play, like we were playing [X team] a couple of weeks ago, and some of the lads like the J3's or something...were like, “you actually play okay rugby” and we were like “yeah we f*****g know, it's [top level]” There still is that kind of perception that like women's rugby is years behind the men's game. I think a lot of men probably don't watch women's rugby so don't realise that it is of a good standard. (P2) We're very lucky we have a physio or a first aider...but in all the games we've had so far this season, the opposition haven't. So they've used ours...And that's quite common sometimes it's just someone carrying the first aid bag and will just patch you up...it should be completely normal but it's not. Quite often it's the people that carry the water that are the same people that carry the first aid bag. (P9)
Institutional	
Gender inequities-physical and social supports	There is still the small group that feel “why does women's rugby need support, need funding or investment? Why do they deserve it? They haven't got the results, they aren't performing, they aren't playing very well”. Like with any female sport it's the perception of “well you need to give me something back in return right now”. From a gender point of view, men's sport has been invested in from day 1 and the output is a reflection of the investment. The shortsideness of those comments of the infrastructures generally is that it is reactive, similar to the coaching for the tackle. I still think that how we fund women's sport is reactive, based on problem solving and leak fixing as opposed to investing wholly in the sport...unfortunately there's that perception that it is a money pit for unions that isn't going to give them a return. The problem child of the men's game. In terms of physicality it isn't what we want to see women playing. (P4)
Pregnancy	For the first 12 weeks I hadn't told anybody yet [pregnant]. I told people that I hurt my back and that I wasn't able to play matches. During training sessions if there were contact elements I would just say “don't worry I will hold the bag, it's my bad back”. But I still participated in training sessions until it got to the point where I just really couldn't, it became dangerous or whatever. I think World Rugby says that you shouldn't do any training or play rugby at all when pregnant but I thought to myself that this is a tiny cell at the moment and I've got a big body. As long as I don't do any contact training I can continue to do on pitch stuff. Now if I got knocked over or somebody bumped

	<p>into me I would be pretty upset...Particularly in the first trimester there is no information about exercise. It is really so fluffy like "see how you feel" "be careful" ...I've heard women saying "I'm so lucky that my husband was happy to do that" and it's like, it shouldn't be lucky it should be "Of course, I will look after the child, my child" ...There are a lot of barriers there and societal ones as well as physical ones. I didn't have much in the way of formal support from my club when coming back to playing, it was finding your own way. (P14)</p>
A seat at the table	<p>I was at a meeting not too long ago with a load of [X province] chair people and myself, and another one of the [X club players]. We were the only females in the room and the rest were made up of white males of a certain age...That got my back up a bit. Why are there not more females making decisions in the [national Rugby Union] in this day and age? A little bit annoying. (P9)</p>
Trivialising athletic ability	<p>We're not really recognised as high performance at all. (P14)</p>
Rugby is a male preserve	<p>It's not as good quality or to the same standard as the males. The standard is male and there is just a completely different standard of female. You are judged always in comparison to your male counterparts as opposed to, as a female, a female sport. (P13)</p>
Referee standards	<p>I don't think that the refereeing standard of the women's game is appropriate...which in turn is then having bad behaviours and injuries...Yes, I understand that the women's club game is amateur they don't have that level but in the men's game anything that remotely resembles a high tackle is sanctioned straightaway, and the female game you're seeing way worse tackles and which are being allowed to happen and then, as a result of that is having a knock on effect on the coaching...I know from a personal point of view, within [X province] we're struggling to facilitate referees in the women's game. That's in the top flight of the [X province] so you're not getting referees, let alone, like a good enough referee of a certain standard. (P10)</p>
Fast tracking	<p>I realised I've been in training for two weeks with the [X International] team. We don't really do full on contact, so we do a thing called body check where it's more like a hug so you just tell the person that you actually hit them. So I'd never been tackled or ever made a tackle. When I stood there for my first game I was just like "you know what we'll see what happens." (P21)</p>
Later entry to rugby	<p>I was always a bit behind in terms of that technical side of tackling and I think when you come in and join the sport a bit older, it's always going to be a little bit more unnatural to you. (P8)</p> <p>The nature of women's rugby is that it doesn't lend itself the same way as the men's game. Where it is easy for them at our age to be class at tackling because they've done it in the minis. Whereas a lot of women start Rugby later in life. The pathway won't be as straightforward. It's a skill that needs to be learned, it needs to be learned quicker and needs to have more information and education given on it (P10)</p>
Concept	Societal influences
Societal	<p>You only have to look on twitter or hear some conversations where they say everyone is gay...when people have a view on gender specific norms and watching women playing is a strange thing. My own parents were homophobic and confused by women playing rugby so I've lived that first-hand...I think a lot of discrimination is against the straight girls that I wouldn't say it's homophobia I don't know what we call that but I think that's the problem. (P18)</p>
Lesbian stereotyping	
Physical stereotyping	<p>People refer to female rugby players as "oh there's no way that's a female" in this day and age. (P9)</p>