International Journal of Sports Science & Coaching

Original research

The rugby *tug-of-war*: Exploring concussion-related behavioural intentions and behaviours in youth community rugby union in New Zealand

International Journal of Sports Science & Coaching
1–13

DOI: 10.1177/17479541211047661
journals.sagepub.com/home/spo
SAGE

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Abstract

Rugby union is a popular team sport, with a high rate of concussions. In adolescents, concussions are further complicated by issues of under-reporting. To encourage more responsible concussion behaviours, it is imperative to understand the factors that influence youth players' behaviours, including the attitudes and behaviours of their coaches and parents. The aim of this study was to explore concussion-related behavioural intentions and behaviours that may influence effective concussion management across a youth rugby system. The study adopted a pragmatic, descriptive qualitative design and included high schools from four youth rugby catchment areas in New Zealand. Nineteen focus groups and 2 individual interviews were conducted with n = 75 players, n = 22 parents, and n = 8 coaches (N = 105) during the 2018 rugby season. A thematic analysis was conducted, guided by a system's approach and the Theory of Planned Behaviour. The themes generated reflected a 'tug-of war' between various behavioural intentions and reported behaviours present in a youth rugby system. Additionally, the behavioural intentions and reported behaviours of coaches, parents, players and their teammates are intricately linked and collectively influence effective concussion management. Being aware of concussions and caring about their management and consequences was a strong theme present across the system. However, these favourable attitudes and behaviours were countered by players, parents and coaches disregarding the system, downplaying the seriousness of concussion, being competitive and driven to win, regardless of the risks. In players the warrior mentality theme, which included bravado, being tough, and playing through the pain further complicated effective concussion management. The findings suggest that there is not always a strong, favourable network in place that would facilitate similarly favourable concussion-related behaviours. To effect change, a system-wide approach, that takes the unique needs of each stakeholder into account and ultimately aims to reconcile performance and brotherhood with positive concussion related behaviours, is needed.

Keywords

Attitudes, sports injury, team sport, theory of planned behaviour, traumatic brain injury

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Introduction

Rugby Union (rugby) is a popular team sport worldwide. As a full contact sport, rugby has a high incidence of concussion (3.89 per 1000 playing hours).[1] Further, uncertainties regarding the long-term adverse consequences of multiple concussions are concerning[2,3] and has recently attracted significant media attention in this regard. To address these concerns, numerous efforts, such as World Rugby's concussion guidelines[4] and New Zealand Rugby's community concussion initiative[5] have been directed at improving player welfare around concussion.

In New Zealand (NZ), rugby is played by approximately 40,000 high school athletes (males and females) between the ages of 13–18 years (New Zealand Rugby National Rugby Database, 2019). Reports from NZ's Accident Compensation Corporation (ACC)—the government's no-fault national insurance system—indicate that this age group (hereafter referred to as youth) has the highest rate of sports-related concussions, of which 25% occur while playing rugby.[6]

A swift diagnosis is a key component of an efficient injury management process and may help to facilitate recovery as well as reduce the risk of complications and further injuries.[2] Nonetheless, with its varied and sometimes subtle presentation, concussions are often difficult to diagnose.[2] Diagnosis relies to a great extent, on self-reported symptoms. However, under-reporting and sub-optimal management of concussions are prevalent issues in youth sport.[7–11] In addition, medical support is often limited in the amateur sport settings where players have minimal concussion management support and often return to play without being properly cleared, placing them at risk of repeat concussions and/or magnified neurological consequences.[2] Barriers that prevent honest disclosure in athletes include not wanting to be removed from competition or not thinking the injury is serious enough to report.[10,12]

These concerns continue to strengthen the need to protect player welfare and ensure that there is a better understanding of concussion-related attitudes and behaviours that may influence effective concussion management. By taking a systems approach to concussion, New Zealand Rugby (NZR) has developed a concussion management pathway (CMP) that identifies the key stakeholders or 'actors' who may be best placed to influence a more positive concussion management environment.[13] The NZR CMP uses technology to operationalise the recognition and removal of a player from field following a suspected concussion and supports the referral of the player to the doctor for a diagnosis and medical clearance prior to their return to contact training.[13]

To better assist the goals of the NZR CMP, it is imperative to understand the factors that influence stakeholder behaviours. In this regard, behavioural and social science theories can inform and enhance efforts to increase the adoption of injury prevention strategies.[14] Ajzen's Theory of Planned Behaviour (TPB) is a popular conceptual framework for the study of human behaviour.[15] According to TPB, the most important determinant of behaviour is intention. Intention is directly predicted by attitudes (beliefs around the consequences of a behaviour), subjective norms (beliefs around the views of important others), and perceived behavioural control (beliefs about the ability, or confidence to perform the behaviour).[15] Previous studies have shown that TPB constructs are valuable in explaining concussion-reporting behaviours in athletes.[10,16,17]

In the fields of safety, as well as sports injury prevention and aetiology, injury prevention has also shifted from linear or reductionist approaches towards a more complex, multifactorial perspective.[18,19] From this 'systems' approach, contributing factors such as the decisions and behaviours of actors across different levels of a system are considered concurrently.[19,20] Thus, rather than focusing on those injured, this approach aims to understand the network of systemic contributory factors involved in the injury. In rugby specifically, Clacy et al.[19] adapted and applied Rasmussen's[21] risk management framework to illustrate the levels and hierarchical organisation of a community rugby union system. (Figure 1). In the context of youth rugby, players may be strongly influenced by other actors, including their coaches and parents,[19] who play important roles in the early recognition and management of return-to-play processes following a concussion. Previous research has shown parental attitudes about concussion influenced athletes' own concussion-related perceptions.[22] Similarly, coaches' attitudes and beliefs around injury have consequences for the management of the player's injury.[23] The coach has also been identified as the key individual for the provision of concussion information and disclosure of symptoms for players.[8] As such, the beliefs and behaviours of coaches and parents form part of the player's complex ecological system.

Guided by a systems approach and TPB, the aim of this study was to explore and identify concussion-related behavioural intentions and behaviours that may influence concussion management in youth rugby from the perspectives of players, parents, and coaches. Using a pragmatic qualitative approach, this study aims to obtain a deeper understanding of these attitudes and behaviours, which in turn can assist in tailoring context-relevant injury prevention strategies.[24] The findings of this study will further inform the development and delivery of NZR's CMP.

Methods

The study represents one component of a broader programme of research and followed a pragmatic, descriptive, qualitative approach, using focus group discussions and individual interviews.[25] A pragmatic approach seeks to

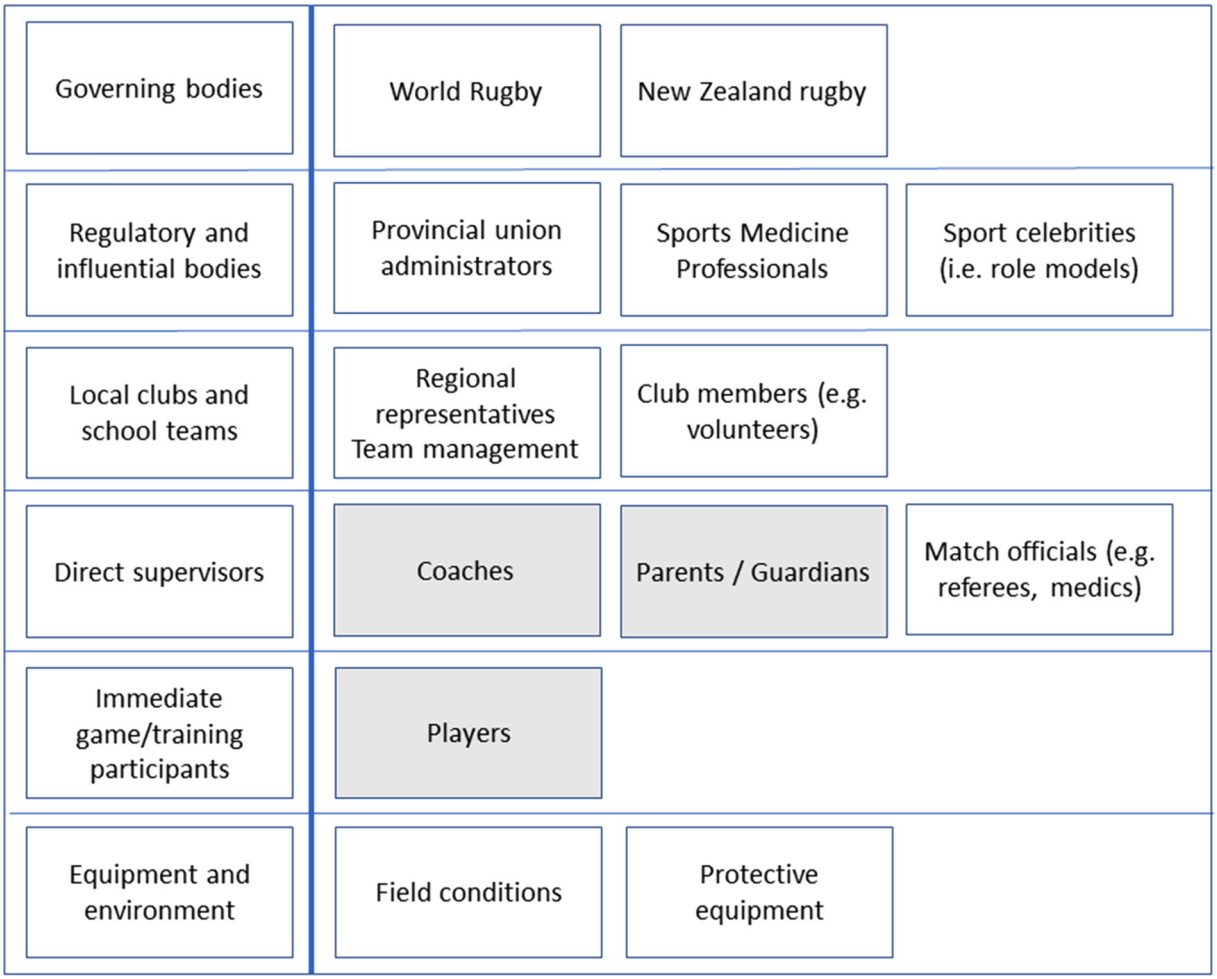

Figure 1. Adapted actor map used to inform analysis, based on the application of Rasmussen's risk management framework illustrating the hierarchical organisation of the community rugby union system.[19]

discover and understand a phenomenon through the perspectives of people involved, and provide a descriptive representation of participants' accounts.[25] The focus of a pragmatic approach, is to find the best way to provide practical solutions to real-world problems[25,26] and thus a critical component of the current study design. The construction of the study and the interpretation of data were guided by a system's approach and TPB.[15,19] Ethical approval was granted by the University of Otago human research ethics committee (approval 18/087).

Sampling and recruitment

Participants were sampled from four administrative rugby catchments called Provincial Unions (PUs) in NZ who were participating in the broader CMP project. Players, parents, and coaches were invited by telephone/email to participate. Nineteen focus groups were conducted, which consisted of 12 focus groups with players (n = 75), four focus groups with parents (n = 22) and three focus groups with coaches (n = 6). Two individual interviews were conducted with coaches (n = 2), as it was not logistically possible to include these coaches in a focus group. In total, the study included 105 participants. Informed consent was obtained from all participants, including parents/caregivers for players aged <16 years. A paper-based questionnaire was used to collect the sociodemographic characteristics of the participants. See Tables 1 and 2 for a description of the study participants.

Data collection

The focus group discussions/ individual interviews were facilitated by four interviewers experienced in qualitative methods who were not involved in delivering the CMP. Semi-structured questions explored participants' perceptions about: (a) concussion knowledge, (b) attitudes towards concussion reporting c) actions taken in concussion management, and (d) roles and responsibilities in

Table 1. Focus groups descriptions (n = 103).

Focus group code name	Number of participants	Age (mean and SD)	Ethnicity
Male Players			
MalePlayers1	8	16.5 ± 0.5	Pasifika: 8
MalePlayers2	4	17.3 ± 1	Māori:2; NZ European: 1; Pasifika: 1
MalePlayers3	8	16.6 ± 0.7	Māori:1; NZ European: 7
MalePlayers4	7	14.4 ± 1.1	Māori:3; NZ European: 2; Pasifika: 2
MalePlayers5	3	17 ± 1	NZ European: 3
MalePlayers6	2	17.5 ± 0.7	NZ European: 2
MalePlayers7	10	16.9 ± 0.7	Māori:10
MalePlayers8	6	14.8 ± 0.8	Māori:2; NZ European: 2; Other: 2
MalePlayers9	4	16 ± 0	Māori:2; Pasifika: 2
Female Players			
FemalePlayers1	6	16.8 ± 1.5	NZ European: 6
FemalePlayers2	7	15.4 ± 1.3	Māori:2; NZ European: 4; Pasifika: 1
FemalePlayers3	10	14.6 ± 1.1	Māori:3; NZ European: 5; Pasifika: 1; Other: 1
	Total: 75 (52 Male; 23 Female)	Average age: 16 ± 1.4	Total: Māori: 25; NZ European: 32; Pasifika: 15; Other: 3
Parents			
Parents1	9 (6 Male; 3 Female)	45.1 ± 5.2	NZ European: 9
Parents2	4 (1 Male; 3 Female)	51 ± 3.6	NZ European: 4
Parents3	5 (1 Male; 4 Female)	45 ± 4.1	Māori:1; NZ European: 3; Pasifika: 1
Parents4	4 (3 Male; 1 Female)	49.3 ± 3.1	Māori:1; NZ European: 3
	Total: 22 (11 Male; 11 Female)	Average age: 46.7 ± 4.8	Total: Māori: 2; NZ European: 19; Pasifika: 1
Coaches			
Coaches 1	2 (Male)	49.5 ± 12	Māori: 1; Pasifika: 1
Coaches 2	4* (2 Male; 2 Female)	35.5 ± 12.9	Māori: 2; NZ European: 1; Pasifika: 1
Coaches 3	4* (2 Male; 2 Female)	37.8 ± 8.2	Māori: 1; NZ European: 3
	Total: 10 (6 Male; 4 Female) *Total coaches: 6 (4 Males; 2 Females)*	Average age: 40.9 ± 11.03	Total: Māori: 4; NZ European: 4; Pasifika: 2

* These two focus groups contained 2 coaches and 2 administrators each. An additional two coaches were interviewed individually, as described in Table 2.

concussion management. All data collection discussions were audio recorded.

Data analysis

Audio recordings were professionally transcribed and organised in NVivo 11 (QSR International) and data were analysed thematically.[27] Additionally, a community rugby systems framework was used to guide and focus the analysis.[19] For the purpose of this study, the analysis at the immediate/game level (players) and the direct supervisors (coaches and parents) of the system (Figure 1) were the primary focus.

Table 2. Individual interviews with coaches (n = 2).

Interview code name	Age	Male/Female	Ethnicity
Coach 4	48	Male	NZ European
Coach 5	47	Female	NZ European

Focus group and interview transcripts were coded and organised according to the levels of the community rugby system's framework. Thereafter, codes were further refined and organised into descriptive categories according to the constructs of TPB (Appendix 1). In addition, the perceived roles and responsibilities of coaches, parents, and players were included in the analysis to further contextualise concussion-related behavioural intentions in these groups. Finally, overarching themes were generated and revised in an iterative fashion, by revisiting the codes and categories within each actor and TPB construct, and exploring how these themes present across the data set. Within the focus group transcripts, and focus group quotes presented below, participant names are replaced with 'P' and a numeral. Additionally, focus groups and interviews are labelled according to the corresponding stakeholder group (Tables 1 and 2).

Findings

A summary of the main themes is presented in Figure 2.

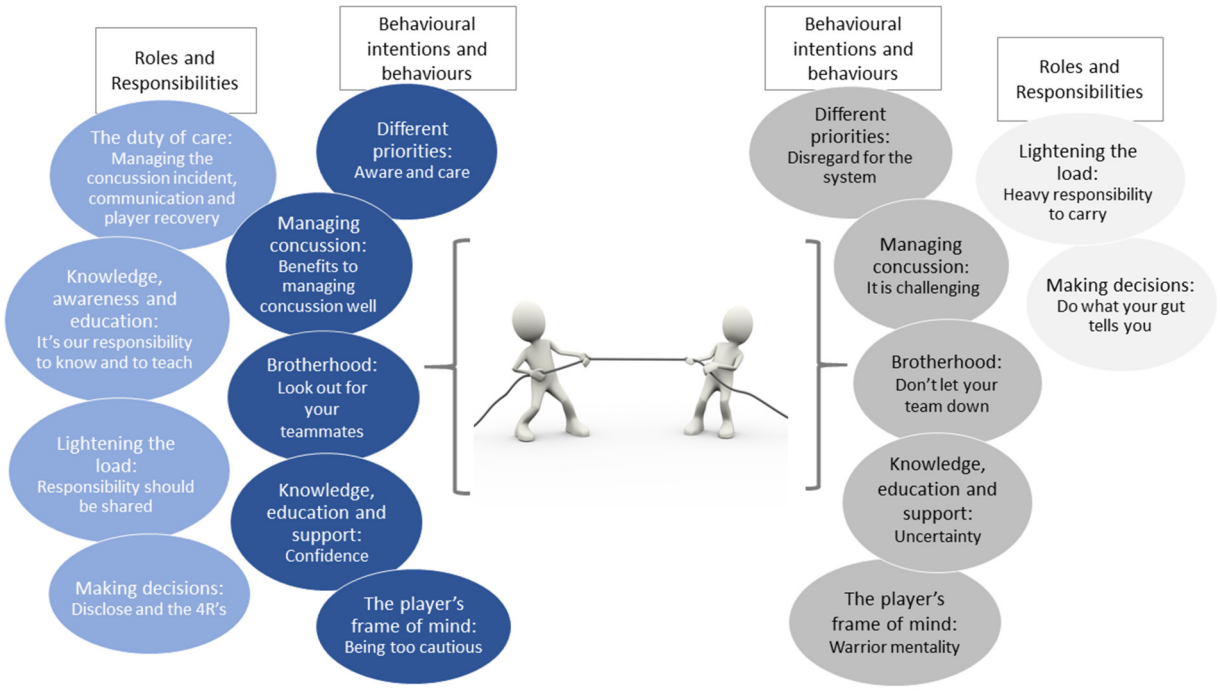

Figure 2. Main themes representing the 'tug-of war' of behavioural intentions and behaviours in a community youth rugby system.

Actor roles and responsibilities – coaches and parents

The duty of care: Managing the concussion incident, communication and player recovery. There was some overlap between coaches and parents' perceived roles and responsibilities. Both coaches and parents described their roles in managing the concussion. For coaches, this meant following the protocol, making decisions around whether players should be playing, communicating with parents and other stakeholders, and finally not pressuring players to return to training or play. Parents' roles were focused more towards the management of player recovery and taking over the duty of care from coaches:

> P4: I think it is to take the duty of care away from the coach as quickly as possible, …taking responsibility for your kid. [Parents4]

For parents, management of player recovery meant taking their child to medical appointments and ensuring they do not return to play before advised.

Knowledge, awareness and education: 'it's our responsibility to know and to teach'. Both coaches and parents also identified their role in knowledge and education. Coaches felt this facilitated buy-in from other actors, whilst parents placed importance on their responsibility to educate themselves and their child:

> P1: We were pretty clueless and the hospital didn't give us much information, we could have sent him back playing, if we didn't listen to the coaches who said no…so, I think it's the responsibility of the parents to know more about it…[Parents1]

> As a coach it's to ensure that they are aware that it's a serious injury and that they understand the mechanism of the injury so if it does happen they are not as quick to try to pretend that it hasn't happened and that it needs to be respected…their brain is probably the most important organ to look after. [Coach4]

Lightening the load: 'A heavy responsibility to carry' and 'responsibility should be shared'. Coaches were cognisant of the level of responsibility placed on them and that this was at times a heavy responsibility to carry. Coaches emphasised that it should not just be their responsibility and that other actors, including medical professionals, parents and players all had to help share the responsibility:

> P1: As a coach you are watching the game, but if parents know what's going on in terms of head injuries, they might be able to spot something…instead of having one set of eyes on it, you have lots of eyes on it. [Coaches2]

Some parents agreed with this perspective that, although difficult, they had a supportive role to play in reinforcing the coach's decision, but also in terms of 'spotting' concussions. Although parents equally felt that responsibility should be shared, some parents did however also voice

that the team management's responsibility remains paramount at game time and the coach still has the 'authority with the team'.

Actor roles and responsibilities – players

Making decisions: disclose and follow the 4R's or 'Do what your gut tells you'. Most players indicated it was their role to disclose a suspected concussion in themselves, or their teammates. In this respect, players frequently discussed the importance of getting tested for concussion, as well as optimal recovery behaviours, which included following the stand-down (mandatory period in which player is not allowed to return to play) and rehabilitation processes. In contrast to disclosing and following the 4 R's, some players also indicated that their responsibility was just to 'do what their gut told them', which meant they would keep on playing and decide if the incident was serious enough to disclose. This was also influenced by the significance of the game (e.g. a final compared to early season matches).

Behavioural intentions and behaviours

Different priorities: 'aware and care' versus 'disregard for the system'. Aware and care: A major theme, 'aware and care' was present for all three actor groups. As an attitude or belief, this theme referred to being cognisant of concussions and taking them seriously. For coaches specifically, it meant being cautious and placing player safety first For parents, the importance of being educated and respecting the concussion protocols were also emphasised. For players, this theme meant a shift in taking concussions more seriously:

> P1: I used to think oh just suck it up, it'll be right. But not anymore. Seeing people being concussed, it looks a lot worse than what I originally thought it was…because I'd seen concussions on TV, I'd never actually dealt with them before.

> P2: I think just knowing the long-term affect it can have, just being more serious about it. [MalePlayers6]

Some players appeared to take concussions more seriously if they had been exposed to, or had experienced, a severe concussion. Additionally, female players described a heightened sense of caution or fear around returning to play after a concussion, compared to male players.

During the discussions, participants also described their perspectives of other actor's views. Many (but not all) parents and players felt coaches cared about player welfare, that they were trying to manage concussions to the best of their ability, and respected and understood the dangers of concussions. Similarly, coaches and parents felt that players were taking concussions more seriously than before.

As a behaviour, this theme in coaches related to acting in line with the CMP and communicating with all stakeholders. These behaviours included recognising suspected concussions in players, removing them from play and referring them for medical attention and was both a self-reported behaviour and a behaviour identified in them by parents and players. For parents, apart from following the protocols, this behaviour was also characterised by standing up to the coach when they felt it was necessary to ensure player safety. Players self-reported some behaviour that was in-line with the CMP and this was confirmed by coaches and parents. These behaviours in players were mostly related to recognising and disclosing symptoms (although not always immediately), removing themselves from play and seeking a diagnosis.

Disregard for the system: Coaches and parents did not self-report any attitudes that displayed 'disregard for the system'. However, in contrast to the norms described in 'aware and care', some parents and players identified competitiveness (not wanting to remove players from the field) or placing pressure on players to return to play, in coaches.

> P1: He's the kind of coach that will probably make you still play with a concussion.

> P2: for example…in the last minute and we were losing by a few points and you're concussed and you're on sub and he'll just be 'oh I want you to come play…to let you get that try. [MalePlayers9]

Coaches also felt that not all parents were taking concussions seriously. Similarly, parents spoke about attitudes they observed in other parents; being overly competitive, not turning up for education sessions, pressuring their kids to keep playing or downplaying the seriousness of concussion:

> P4: Sometimes…even parents go: 'I've been knocked out so many times and I'm still fine' [Parents1]

In contrast to the positive coach behaviours reported, players and parents also reported unfavourable behaviour in coaches, such as keeping potentially concussed players in play or not adequately guiding concussion management:

> P2: You have certainly seen that in the coaching environment 'we are behind by so many points, we need you, I am going to turn a blind eye' type thing. I actually had that last time when I pulled a kid off because he was stumbling…he was on his knees at half time. So I intervened but I certainly wasn't spoken favourably to by the coach. 'We needed him – there's no use if he's not there'. [Parents2]

These behaviours were also seen in some parents, which included competitiveness, placing pressure on the coach or player, or acting in ways that showed they were not taking concussion seriously.

> P1: As a parent, one of the things I'd love to see disappear is parents on the side-line saying 'oh just harden up, there's nothing wrong' [Parents3]

The player's frame of mind: 'warrior mentality' or 'being too cautious'. Warrior mentality: Specific to players, this theme describes bravado, aggression and playing through the pain. Players themselves described not taking concussion seriously or adopting a 'tough guy' position:

> P6: I've never had a concussion, I give concussions… [MalePlayers1].

Similarly, ignoring or downplaying symptoms when they do occur was reported across all player focus groups. Players may have suspected they have sustained a concussion, but would 'push through' and keep playing:

> P2: It depends how long I'm seeing double for…but if it's mild, just keep playing…see if it fades out…[MalePlayers4]

The pressure to win would also influence players' decisions to disclose or to keep playing. When asked why he did not get off the field when feeling dizzy after a hard knock, a player replied: 'cause I just [want to] play, that was our final game … I was not [going to] give up' [MalePlayers1].

Both coaches and parents similarly recognised these attitudes in players, which included the desire or pressure to keep playing regardless of injury, and the desperation to return to play if they did get removed:

> I'm forever reinforcing to them [players] about it's important to communicate to us as coaches if they get a head knock so that we can manage it, sometimes they're reluctant to say anything because they don't want to not play… [Coach5]

Additionally, some parents were also concerned with the aggression and bravado displayed by players and that there was a need 'to get the culture right' [Parents4]:

> P5: You do see a couple of guys who just [want to] hammer everyone, basically it's just dirty foul play… [Parents3]

All actor groups reported witnessing these behaviours in players; downplaying symptoms, not disclosing a suspected concussion or continuing to play even when they suspect they were concussed:

> He tried to hide it because [physio] went on and he [the player] said 'no I'm alright, I'm alright, I'm alright' and [physio] came and saw me and said 'look I'm sure he's got a knock in the head but he thinks he is tough'… at the end he couldn't hide it anymore [Coach1]

Being too cautious: Although not as frequently or broadly reported as the warrior mentality theme, a couple of coaches felt that all the awareness around concussion could also potentially lead to players being too cautious and that 'even if it was just a head knock opposed to a concussion, they wanted to pull themselves off' [Coaches3]. One coach felt that girls were more likely to 'over-react' with regards to concussion:

> Especially with girls, they get hard knocks and they think they are dead. So I have to balance it where, you know I don't want to say 'take a concrete pill.' … They don't realise there is a 3 week stand down and your season's gone and they just get a little bit precious … but then you don't want … there's a fine line… [Coach5]

Brotherhood – 'don't let your team down' but 'Look out for your teammates'. Don't let your team down: A strong theme of *brotherhood* was evident in some focus groups. Players did not want to let the team down, and as such, they would 'put their bodies on the line' for their team:

> P1: I … put my body on the line for the boys.
>
> Interviewer: Where does that mentality come from?
>
> P1: It comes from just … chemistry of the team.
>
> P2: Brotherhood.
>
> P3: I will play for the team … (if I have to) … get carried off on a stretcher. [MalePlayers9]

It appeared that when it came to dealing with their own concussions, the effect of the team's culture and attitude had an opposing effect in terms of player welfare.

> I felt bad for our team because yeah, we didn't really have enough subs (substitutes) for either forwards or backs, so if something happened, then you wouldn't really go off. [FemalePlayers2]

Look out for your teammates: On the other hand, players often discussed 'looking out for each other' as part of their roles and responsibilities to their teammates. This was also a player behaviour recognised by parents and coaches.

> When our player got concussed like he didn't actually get a blue card from the ref but the boys that were on there, they actually pointed it out to our medic who just pulled him off [Coaches1]

> And I think they are more looking out for each other than perhaps they would've been. With some who are a little hesitant, then they're saying 'na you need to go off…' you know? [Coach5]

Managing concussion: 'benefits to managing concussion well', but 'It can be challenging'. Coaches, specifically, felt that there are benefits to managing concussion well, as good management enhances trust and credibility. However, coaches also reported that managing concussion can be challenging. These challenges included difficulties with identifying concussions and the pressure experienced when deciding on whether to remove a player from the field:

> You want to look after them, but you also want to make sure that they're not being wasted … and not available to play a following week … where it puts you in a really stressed position as a team [Coach1]

Coaches struggled with a 'one-size fits all approach' as concussions would vary in severity and presentation. Additionally, coaches felt that not being able to constantly see and control everything from the side-line made management difficult. Similarly, parents acknowledged that coaches face many challenges when trying to manage concussions, and that it was difficult for them as parents as well when trying to 'spot' for concussions if coaches did not take their opinions seriously.

Knowledge, education and support: 'confidence' or 'uncertainty'. This theme described the importance of concussion knowledge and education in instilling confidence in actors' own actions and those of others.

Confidence: All actors identified knowledge as a factor that facilitated effective concussion management.

> P2: I think having had the education, I was more likely just to plough forward [managing the concussion] you know? If I hadn't had the education, I probably wouldn't have backed myself. [Coaches3]

> P1: I think it taught me … to actually talk about it, because I was able to, I was better informed. [Parents3]

Players felt that knowledge around the signs and symptoms of concussion increased their confidence in recognising a suspected concussion and communicating with the coach or other players in this regard.

Uncertainty: In contrast to the perceived value of knowledge, all actors spoke about the uncertainty they still experienced around the identification of concussion:

> P3: What if I'm concussed but I don't know that I'm concussed … 'cause I've never been concussed? [FemalePlayers1]

This knowledge gap made the management of concussion difficult and created anxiety. When asked about what factors presented obstacles for coaches around managing concussions a typical response was:

> P1: I am not from a teaching background or medical background. It's quite daunting to take on the responsibility because you don't want someone to die on your watch. You wouldn't want to be the one … you know with unions and all that getting prosecuted? [Coaches2]

In parents, uncertainty was also evident around issues such as the stand-down period or determining when a player should be taken to the doctor. As such they wanted more information regarding the management process, education or tailored guidelines:

> P2: You don't know whether you're doing the right thing. I mean I did struggle with it, I sort of thought … should I take her, should I not, you know is it just a headache… [Parents3]

Additionally, some of the female players were anxious and felt they lacked confidence in returning to tackling after sustaining a concussion fearing they would potentially hurt themselves again. Female players also felt they were in a more difficult position when trying to deal with concussions compared to males, as they did not have a team physiotherapist (common for male teams in the larger rugby schools in NZ) or enough substitute players. In general, parents and players felt that coaches needed more education:

> P2: The coach needs educating, doesn't he? To be honest, seriously he needs educating. [Parents4]

One female player mentioned that more support was needed from coaches 'as it can't always just be up to the players to stop the game' [FemalePlayers2]. Parents also felt that 'some coaches are old school rugby players who have been knocked out a few times' and see it as part of the game, thereby perpetuating a culture of downplaying the seriousness of concussions. Both players and coaches often mentioned that parents needed more education, so that they could understand the seriousness of concussion to better support its management. In one group, some players also felt that their parents did not really understand the seriousness of concussions:

> P7: If our parents knew how a concussion can affect someone, they will have the feeling 'oh nah, I shouldn't let my son continue to play…' [MalePlayers1]

Conversely, some parents identified the need for more education in other parents as they did not take the injury seriously enough:

> P3: Parents are like 'ok I'm going out tonight, I can't be waiting at the emergency room for the next five hours…' So no professional person has actually had a look at him to say 'yes Johnny's actually got a concussion', and then he comes to training on Tuesday and goes 'oh yeah I'm alright'. [Parents4]

Discussion

Guided by a systems approach and the TPB, this study explored concussion-related behavioural intentions and behaviours that may influence effective concussion management in youth rugby. At a time when concerns about concussions in rugby are at an all-time high, as far as we are aware, this is the first qualitative study that included the collective perspectives of different actors (coaches, parents and players) within a youth community rugby system. Coaches, parents, players and their teammates are intricately linked and collectively exert significant influence over the concussion management process. Examination of this focus group and interview data revealed a dichotomy, or 'tug-of-war', between conflicting behavioural intentions and behaviours reported by participants. This 'tug-of-war' between what an actor does and what they think they should do, is a key factor that should be considered in future work that supports stakeholders to make positive behavioural choices through the lens of a systems approach.

According to the TPB, behavioural intention is the most important predictor of behaviour.[15] Previous research using the TPB has shown that attitudes, subjective norms, and perceived control are all associated with the intention to report concussions in high school athletes.[10,16] In this study, positive attitudes towards concussion management such as the 'aware and care' theme were countered by common stories of coaches, parents, and players disregarding concussion guidelines ('disregard of the system', 'warrior mentality' and 'brotherhood'). 'Disregard of the system' pertains to actors ignoring or downplaying symptoms and being competitive and driven to win regardless of the risk to their health. In players specifically, further complexity was found in the 'warrior mentality' theme, which included bravado, being tough, and playing through the pain. Similar findings of players pushing through injuries[28] or not leaving the field when they suspected a concussion as they feared it would make them look weak[17] have previously been reported. In this study, the warrior mentality was strongly linked to 'placing their bodies on the line' for their team (brotherhood). Even though players recognised their responsibility in disclosing and following reporting guidelines, they also saw their role as deciding whether the suspected concussion was 'serious enough' to disclose. These findings are reflected in the study of Chrisman et al.[17] who found even though athletes seemed to know that concussion could be dangerous, the majority of players would keep on playing and see how they felt. The notion of coaches and players buying into the 'sport ethic' has been acknowledged for some considerable time in the literature[29,30] with playing on through the pain and 'doing whatever it takes' lauded as worthy of the highest respect in both male and female sport. These norms are often reinforced in the media, with a prominent example in NZ being All Blacks captain Richie McCaw playing on with an injury and persevering to win, despite being in pain.[31,32]

To some extent, these themes for males could also be explained by Pringle's[33] earlier NZ based study that explored the notion that rugby, with its cultural and historical significance in NZ society[34] creates the space for a dominant discourse of 'manliness' and 'being a tough guy' to be reproduced. Being tough is closely linked to the theme of 'brotherhood' and the importance of not letting the team down. Of note, 'warrior mentality' was also present in some female players in this study and as other studies have shown, females may equally 'play through the pain'.[17,35]

Subjective norms are an important predictor of youth behaviour.[36] Players reported that coaches displayed both caring attitudes and pressure to play regardless of injury. These norms may likely have an important effect on the eventual behaviour of the player – whether it is a player reporting a suspected concussion, because the coach has created an environment conducive to symptom disclosure, or instead playing through a suspected concussion as this is the perceived expectation from the coach. 'Brotherhood' was similarly identified as a social norm with strong influence on player attitudes and behaviours. Parental attitudes and beliefs about concussion have also been shown to have an influence on athletes' concussion-related perceptions.[22] In this study, players' and coaches' thoughts regarding parents were mainly centred around parents' lack of concussion education or knowledge. A lack of parent concussion management knowledge is not likely to add a sense of 'seriousness' or emphasise the consequences of unfavourable concussion behaviours in players. These findings re-iterate the need for targeted educational efforts for parents.[37] Within the parent focus groups, parents also described instances of other parents placing pressure on players to 'suck it up' and continue playing, further complicating the decisions players are left to make themselves. Collectively, these descriptions of disconnect within parents and coaches, are not likely to provide consistent behavioural modelling. The findings also suggest that female players, and those who work with female players may require additional support. Factors such as not enough players to act as substitutes or

having fewer medical resources may negatively influence female players' concussion management. Worryingly, some coaches' attitudes that 'girls over-react' is a factor that needs to be addressed in coach education.

This study found disconnect between what actors perceived as best practice and positive reporting decisions and the challenges that arise when knowledge is lacking, or when internal or external pressures contradict what is viewed as best practice. Several coaches felt parents needed more education and engagement, which was also acknowledged by parents themselves. However, parents indicated they were also wary of stepping over the line into what they viewed as the coaches' domains. These findings illustrate the complexity involved in effective concussion management. Previous research found that coaches were less likely to implement concussion guidelines when they felt they lacked appropriate knowledge and skills.[38] Education on concussion management is included as an essential part of NZR's injury prevention programme, RugbySmart, which is an annual compulsory course for all coaches and referees.[39] However, the findings of this study suggest that additional concussion education for coaches is warranted. The uncertainty, especially around concussion identification, makes it difficult for them to fulfil their roles and responsibilities and points toward a need for additional support for these coaches. In a recent review, Yeo and colleagues[40] concluded that there is a need to further educate coaches on the less commonly recognised symptoms of concussions as well as misconceptions about concussion-related management. Even so, it is also important to acknowledge that some coaches will fail to remove a player following a suspected concussion due to competitive pressure, as noted by all actor groups in this study.

The importance of concussion management knowledge and education was a recurrent theme identified by all actors in this study. Knowledge may be a moderator of behavioural intentions, for example, when a player knows what the symptoms of a concussion are, it may increase the likelihood that they will self-identify when they suspect a concussion. However, for this to occur, they likely also need to believe that reporting the concussion has a positive outcome, feel confident to self-disclose, and be in a team environment where their team and coach support disclosure.[41] Players indicated that knowledge of the symptoms of concussion increased their confidence in recognising a suspected concussion and reporting it to the coach. Previous research has shown similar associations between players' symptom knowledge and reporting behaviours.[42,45] As such, the knowledge gap and uncertainty identified by all actors, remains an important consideration. The uncertainty around many aspects of concussion may eventually tip actors towards undesirable (although perhaps unintentional) reporting behaviours. However, it must also be taken into consideration that concussions are complex conditions, with diverse and variable symptoms and is not always easily identifiable or diagnosable.[2] Individuals may have sufficient knowledge of concussion symptoms but the difficulty and uncertainty stemming from the non-specific nature of the condition may pose a challenge to the identification regardless of level of knowledge.

Register-Mihalik et al.[10] found favourable attitudes toward reporting and perceived social norms to have the greatest impact on the intention to report concussion symptoms. In this sense, it is important to note that positive attitudes, norms and behaviours were reported across all actors in this study. However, these favourable constructs appear to compete with a myriad of opposing factors within the complexity of the system. This raises the question of what is needed to diffuse this 'tug-of-war' situation and tip the scales further towards behavioural intentions and behaviours that have the best chance of facilitating effective concussion management. When considering health promotion campaigns in the wider society, it is clear that changing health-related behaviour is a complex process.[43] Providing information about the dangers associated with certain health behaviours is unlikely to be successful on its own.[43,44] The difficulty with changing behaviours occurs when there is a disconnect between the information provided and the norms and cultures within a context.[44] Liston et al.[44] argue that actions such as continuing to play, even when hurt, or prioritising sport above health, are deeply institutionalised practices within the game of rugby. Of course, characteristics such as toughness and persistence are also desirable for reaching success in sport. The challenge is to align concepts such as sporting performance and 'brotherhood' with positive concussion and health related behaviours.

Practical application

Although the data for this study was collected in 2018, the systemic issue of concussion non-disclosure in players is still being reported in recent publications,[8,45] suggesting that these themes are pervasive in this area of research. However, the change in perspective to a wider systems approach is novel, allowing us to see both the communalities and disconnect throughout the system, and provides opportunities for deeper intervention. Firstly, the findings re-iterate the interconnectedness of stakeholders in a community rugby system. However, current player welfare and education initiatives are still targeted to individual stakeholder groups, rather than to the system as a whole. To encourage real systemic change, meaningful education programs are needed to address underlying components of behaviour change for players, coaches and parents.

Secondly, in this study, 'brotherhood' included wanting to play through injury in the interest of achieving the team's shared goal of winning, which supported a culture of non-disclosure. Future work should consider how the theme of

'brotherhood' can be repurposed to empower players to look out for one another, instead of contributing to the culture of systemic non-disclosure reported in rugby.[45] Looking out for one another would mean supporting and encouraging each other to make decisions that have their long-term health in mind. Additionally, the shared motivation to win could be utilised to create an understanding in players; that playing with a suspected concussion may mean they would not be able to perform to their peak ability, which would impact the team's overall performance.

Shifting these perspectives would also require a deeper understanding of what it means to be a 'warrior', and how risky behaviour associated with this mentality may be mitigated. In this sense, both coaches and parents are ideally suited as mentors and to create and foster a culture of safety that does not support playing through an injury or winning at all costs. In general, this study has emphasised the need for future research that explores opportunities for effecting system-wide change towards more positive behavioural intentions in stakeholders.

Limitations

This study used a systems approach to examine players, coaches and parents in a complex microsystem. We acknowledge that this mircosystem is part of a larger macrosystem where additional actors play important roles in the management of concussion, but were not included in the current study. Nonetheless, the sampling strategy from diverse areas and the wide capture of participant groups within this microsystem, is a particular strength of this study.

The number of participants in some focus groups were relatively small. The disadvantage of smaller groups is that it may limit the total range of experiences. However, various authors have argued that the group dynamics in smaller groups, still facilitates sufficient participant interaction, a distinctive feature of a focus group.[46,47] Smaller focus groups, of 2 or 3 participants, also have the advantage of greater opportunity for participants to describe their experiences in more depth.[47,48] In this way, a small group of participants in conversation, extends the data beyond what would routinely be available in a one-on-one interview.[48] Similarly, larger groups hold both advantages and disadvantages. Our main concern was to ensure maximum variation in views. Although the number of participants in some focus groups were limited, our total number of focus groups was substantial ($n = 19$) and sampled from geographically diverse areas in NZ. In this sense, we believe we have captured a broad range of views, according to what was practically and pragmatically possible during data collection. This is also the reason for the inclusion of the 2 individual interviews. These participants were not logistically able to join a focus group. However, we felt that including their views, even if not as part of a focus group, was necessary and valuable.[47] Additionally, within the hierarchical nature of the community rugby system, the ratio of coaches to players and parents is much less and reflects the reality of the composition of this level of the system. Given the high prevalence of these common themes across demographics, regardless of the size of the focus groups, it could be proposed that the outcomes of the study are indeed an accurate reflection of the key stakeholders' perspectives on the target issue.

As part of the broader study, focus groups were also conducted with administrative personnel, such as rugby union representatives, team leads or directors of rugby. Two of these administrative focus groups were included in the current analysis, as they contained participants that were both coaches, and had administrative roles. Role multiplicity is characteristic of a community rugby system[19] and it was decided that the inclusion of these specific coaches in the analysis allow for additional variation and depth in the findings. However, this also poses a limitation to the study, as these focus groups also contained participants with a purely administrative role. Focus groups elicit collective views about a specific topic. Although the focus was on the coaches' responses during the analysis, these responses still form part and is influenced by the collective conversation. It is possible that for these coaches, their additional roles, such as being a Provincial Union representative, or a director of rugby may influence their concussion views differently to the other coaches that formed part of study. Finally, these participant's administrative roles and responsibilities were not included in the analysis and the focus was on their experiences dealing with concussions as part of the teams they coach.

Secondly, behavioural models such as the TPB are conceptualised as linear processes, while complex systems are non-linear and include interactions between factors. This means that factors not contained within the TPB may add to our understanding of how actors perceive and act upon concussions. As such, it also suggests that the application of behavioural models to complex sports systems may benefit from new conceptualisations to enhance depth and contextual clarity.

Conclusion

This study demonstrated the importance of a systems approach to gain a deeper understanding of concussion attitudes and behaviour. Some system-wide themes reflected a 'tug-of-war' between conflicting behavioural intentions and behaviours reported by participants. The inclusion of coaches and parents illustrated how these actors' behavioural intentions and behaviours cannot be removed from the consequence for the player. To effect change, a system-wide approach that takes the unique behavioural intentions for each stakeholder into account, is needed.

Author contributions

DMS, SW, AC, JC, JR, SJS, SK and CW were involved in conceptualising the overall study design. JC, DMS, JR and SK were involved in collection of the data. MB and JC were responsible for data coding. MB, SW and AC were responsible for analysis of the data. MB, DMS, SW, AC, JRM and ZK were responsible for the interpretation of the analysis. DMS, MB and SW wrote the first draft the manuscript. All authors were involved in editing subsequent drafts of the manuscript.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work is sponsored by the New Zealand Rugby Foundation, The Accident Compensation Corporation, and World Rugby.

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Supplemental material

Supplemental material for this article is available online.

References

1. Prien A, Grafe A, Rössler R, et al. Epidemiology of head injuries focusing on concussions in team contact sports: a systematic review. *Sport Med* 2018; 48: 953–969.
2. McCrory P, Meeuwisse W, Dvořák J, et al. Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med* 2017; 51: 838–847.
3. Cunningham J, Broglio SP, O'Grady M, et al. History of sport-related concussion and long-term clinical cognitive health outcomes in retired athletes: a systematic review. *J Athl Train* 2020; 55: 132–158.
4. World Rugby Player Welfare – Putting Players First, https://playerwelfare.worldrugby.org/concussion (accessed 15 April 2021).
5. Salmon D, Sullivan J, Romanchuk J, et al. Infographic. New Zealand rugby's community concussion initiative: keeping kiwi communities RugbySmart. *Br J Sports Med* 2020; 54: 300–301.
6. Malpas K and McEwen H. Sport New Zealand Injury and Participation Project. 2016.
7. Delahunty SE, Delahunt E, Condon B, et al. Prevalence of and attitudes about concussion in Irish Schools' rugby union players. *J Sch Health* 2015; 85: 17–26.
8. Salmon DM, Mcgowan J, Sullivan SJ, et al. What they know and who they are telling: concussion knowledge and disclosure behaviour in New Zealand adolescent rugby union players. *J Sports Sci* 2020; 00: 1–10.
9. Beakey M, Tiernan S and Collins K. Why do adolescent rugby players under-report concussion? An examination into the variables that influence their behavioural intention to report across three samples. *Eur J Sport Med* 2017; 4: 65–76.
10. Register-Mihalik JK, Guskiewicz KM, McLeod TCV, et al. Knowledge, attitude, and concussion-reporting behaviors among high school athletes: a preliminary study. *J Athl Train* 2013; 48: 645–653.
11. Register-Mihalik JK, Linnan LA, Marshall SW, et al. Using theory to understand high school aged athletes' intentions to report sport-related concussion: implications for concussion education initiatives. *Brain Inj* 2013; 27: 878–886.
12. Oddo A, O'Conor E, Shore S, et al. Making headway for discussions about concussions: experiences of former high school and collegiate student-athletes. *Front Neurol*. 2019; 10: 689. DOI: 10.3389/fneur.2019.00698.
13. Salmon D, Romanchuk J, Murphy I, et al. Infographic. New Zealand rugby's concussion management pathway. *Br J Sports Med* 2020; 54: 298–299.
14. McGlashan AJ and Finch CF. The extent to which behavioural and social sciences theories and models are used in sport injury prevention research. *Sport Med* 2010; 40: 841–858.
15. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991; 50: 179–211.
16. Kroshus E, Baugh CM, Daneshvar DH, et al. Understanding concussion reporting using a model based on the theory of planned behavior. *J Adolesc Heal* 2014; 54: 269–274.e2.
17. Chrisman SP, Quitiquit C and Rivara FP. Qualitative study of barriers to concussive symptom reporting in high school athletics. *J Adolesc Heal* 2013; 52: 330–335.e3.
18. Bittencourt NFN, Meeuwisse WH, Mendonça LD, et al. Complex systems approach for sports injuries: moving from risk factor identification to injury pattern recognition – narrative review and new concept. *Br J Sports Med* 2016; 50: 1309–1314.
19. Clacy A, Goode N, Sharman R, et al. A knock to the system: a new sociotechnical systems approach to sport-related concussion. *J Sports Sci* 2017; 35: 2232–2239.
20. Salmon PM, Goode N, Taylor N, et al. Rasmussen's legacy in the great outdoors: a new incident reporting and learning system for led outdoor activities. *Appl Ergon* 2017; 59: 637–648.
21. Rasmussen J. Risk management in a dynamic society: a modelling problem. *Saf Sci* 1997; 27: 183–213.
22. Register-Mihalik JK, Williams RM, Marshall SW, et al. Demographic, parental, and personal factors and youth athletes' concussion-related knowledge and beliefs. *J Athl Train* 2018; 53: 768–775.
23. Whatman C, Walters S and Schluter P. Coach and player attitudes to injury in youth sport. *Phys Ther Sport* 2018; 32: 1–6.
24. Bolling C, van Mechelen W, Pasman R, et al. Context matters: revisiting the first step of the "sequence of prevention" of sports injuries. *Sport Med* 2018; 48: 2227–2234.
25. Savin-Baden M and Major C. *Qualitative research: the essential guide to theory and practice*. London: Routledge, 2013.
26. Feilzer MY. Doing mixed methods research pragmatically: implications for the rediscovery of pragmatism as a research paradigm. *J Mix Methods Res* 2010; 4: 6–16.

27. Braun V and Clake V. Using thematic analysis in psychology. *Qual Res Psychol* 2006; 3: 77–101.
28. Kneavel M, Ernst W and Brandsma L. Collegiate athletes' perceptions of the culture of concussion reporting. *J Am Coll Heal*. 2021; 69(4); 435–443. DOI: 10.1080/07448481.2019.1679816.
29. Nixon HL. Coaches' views of risk, pain, and injury in sport, with special reference to gender differences. *Sociol Sport J* 1994; 11: 79–87.
30. Malcom NL. 'Shaking it off' and "toughing it out": socialization to pain and injury in girls' softball. *J Contemp Ethnogr* 2006; 35: 495–525.
31. Rugby World Cup: McCaw plays through pain barrier – NZ Herald, https://www.nzherald.co.nz/sport/rugby-world-cup-mccaw-plays-through-pain-barrier/EORYOO7CJPSAERDTM7EHOPW5HY/ (accessed 22 December 2020).
32. Rugby: Former All Black Dan Carter reveals awe at witnessing Richie McCaw's World Cup grit – NZ Herald, https://www.nzherald.co.nz/sport/rugby-former-all-black-dan-carter-reveals-awe-at-witnessing-richie-mccaws-world-cup-grit/MNFT7X6CUOTCJVIMWZGBTTS3EI/ (accessed 22 December 2020).
33. Pringle R. Competing discourses – narratives of a fragmented self, manilness and rugby union. *Int Rev Sociol Sport* 2001; 35: 425–439.
34. Walters SR, Schluter PJ, Oldham ARH, et al. The sideline behaviour of coaches at children's team sports games. *Psychol Sport Exerc* 2012; 13: 208–215.
35. Jessiman-Perreault G and Godley J. Playing through the pain: a university-based study of sports injury. *Adv Phys Educ* 2016; 06: 178–194.
36. McEachan RRC, Conner M, Taylor NJ, et al. Prospective prediction of health-related behaviours with the theory of planned behaviour: a meta-analysis. *Health Psychol Rev* 2011; 5: 97–144.
37. Sarmiento K, Donnell Z, Bell E, et al. Barriers and opportunities for concussion communication and management in youth sports: a qualitative study. *J Athl Dev Exp* 2019; 1: 1–12.
38. Rigby J, Vela L and Housman J. Understanding athletic trainers' beliefs toward a multifacted sport-related concussion approach: application of the theory of planned behavior. *J Athl Train* 2013; 48: 636–644.
39. Quarrie K, Gianotti S, Murphy I, et al. Rugbysmart: challenges and lessons from the implementation of a nationwide sports injury prevention partnership programme. *Sport Med* 2020; 50: 227–230.
40. Yeo PC, Yeo QYE, Probert J, et al. A systematic review and qualitative analysis of concussion knowledge amongst sports coaches and match officials. *J Sport Sci Med* 2020; 19: 65–77.
41. Ajzen I, Joyce N, Sheikh S, et al. Knowledge and the prediction of behavior: the role of information accuracy in the theory of planned behavior. *Basic Appl Soc Psych* 2011; 33: 101–117.
42. Bramley H, Patrick K, Lehman E, et al. High school soccer players with concussion education are more likely to notify their coach of a suspected concussion. *Clin Pediatr (Phila)* 2012; 51: 332–336.
43. Kelly MP and Barker M. Why is changing health-related behaviour so difficult? *Public Health* 2016; 136: 109–116.
44. Liston K, McDowell M, Malcolm D, et al. On being "head strong": the pain zone and concussion in non-elite rugby union. *Int Rev Sociol Sport* 2018; 53: 668–684.
45. Salmon DM, Romanchuk J, Sullivan SJ, et al. Concussion knowledge, attitude and reporting intention in rugby coaches and high school rugby players. *Int J Sport Sci Coach* 2021; 16: 54–69.
46. Morgan D. Are We Too Limited on Group Size? What About 2 or 3 Person "Mini-Groups"? | MethodSpace, https://www.methodspace.com/are-we-too-limited-on-group-size-what-about-2-or-3-person-mini-groups/ (accessed 15 March 2020).
47. Braun V and Clarke V. *Successful qualitative research – a practical guide for beginners*. London: Sage Publications, 2014.
48. Liamputtong P. Focus group methodology and principles. In: *Focus group methodology: principles and practice*. London: Sage Publications, 2015 pp. 31–49.