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SPORTS PERFORMANCE

Understanding elite rugby league players' experience of collision, effective contact coaching techniques, and player contact psychology: A focus group study

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ABSTRACT

The current study performed a series of online focus groups to understand elite rugby league players' experiences of collision. Eighteen rugby league players comprising different playing positions from four teams were recruited to participate in a series of online focus groups, via the Microsoft Team's platform, facilitated by a moderator. Players were competing in Europe's elite rugby league competition, the European Super League (ESL), during the 2021 season. All focus group data were transcribed, coded and analysed using reflexive thematic analysis guide to ensure robust exploring, interpreting and reporting through pattern-based analysis. The findings are split into five key themes: 1) the three-man tackle – the perceived optimal defensive strategy with simultaneous contact, 2) not all collisions are the same; matchplay events change the collision intensity, 3) bracing and blindsiding – two factors that influence experiences of collision and concussion, 4) coaching philosophies and orientations, 5) psychological readiness for collision. Collision sports have an inherent risk of injury; however, in some players' subjective experiences, there are collision types that have a greater association with risk or intensity (blind-sided collisions or long closing distances). It is essential that future research comprehends the effects of these collision types and the further themes.

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Rugby league; injury & prevention; coaching; team sports; focus groups

Introduction

Rugby League is an intermittent collision sport, played over two 40-minute halves, comprised high-intensity activities (sprinting, change of direction, collisions and wrestling) interspersed with short periods of low-intensity activity (jogging and walking) (Twist et al., 2014). Typically, four positional groups are used, hit-up forwards (props), wide running forwards (second rows and loose forwards), adjustables (hookers and half-backs), and outside backs (wingers, centres and full-backs) (Cummins & Orr, 2015). These positional roles are in place given their contrasting focuses during matchplay. For example, adjustables are at the core of directing the attacking play, whereas hit-up and wide running forwards are involved in significantly higher amounts of physical collisions in defence and outside backs with offensive physical collisions. During match play, players are exposed to multiple physical collisions in the form of defensive (tackles) and offensive (ball carries) actions. Collision actions substantially affect rugby league match play by increasing internal and external demands, whilst reducing peak running speeds and increasing muscle soreness (Mullen et al., 2015). Due to the generation of force between two bodies and their chaotic nature, collisions are associated with player injuries, particularly concussions (Fitzpatrick et al., 2018). Nonetheless, collisions are ubiquitous in rugby league match play and a facet of the game that can influence the outcome (Kempton et al., 2017). As such, they warrant further investigation.

Recently, Naughton et al. (2020) demonstrated the considerable gaps underpinning the analysis of collisions, highlighting the lack of clarification in interpreting this phenomenon. Current coaching practices continue to be deprived of definitive insights into player collision demands and research has few alternative avenues to explore than the ones previously travelled, i.e., video and microtechnology-based methods. Whilst future research may strengthen the effectiveness of quantitative measures by incorporating machine learning methods into microtechnology, qualitative measures remain a void in the collision literature. Addressing this will provide an understanding of the intricacies of collision through the lens of the players who experience them. Together with existing quantitative work such qualitative insights can assist policymakers to connect research and practice.

Qualitative research can be utilised in the exploratory phases of an investigation to refine future research questions or topics and bring creative solutions to light (Kitzinger, 1995). For example, Murray et al. (2022) have documented the ability of qualitative research to highlight novel themes from lived experiences in elite rugby and draw conclusions that may not have been possible from a quantitative perspective. There are various methods qualitative researchers may use in the process of collecting data such as interviews and focus groups (Sparkes & Smith, 2014). Focus groups work particularly well in exploring the perceptions of participants (Krueger & Casey, 2014). This approach assembles a group of individuals to discuss a specific

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Table 1. Focus group topic guide.

Focus Group Theme	Specific Question
Offensive and Defensive Collisions	Can you tell me about the collisions you experience whilst defending during a rugby league match?
	Can you tell me about the different types of contact when defending?
	Can you tell me what you would describe as the optimal tackling technique?
	Can you tell me about the collisions you experience whilst attacking during a rugby league match?
Collision Monitoring	Can you tell me about your experiences of how collisions are monitored?
	Are there any determinants that may make a defensive collision more intense than another one?
	Can you tell me about your experiences of collisions in training versus collisions in a game?
	Can you tell me about the variables that may affect how intense a ball carry is?
Defensive Coaching Philosophies	Can you tell me about the philosophies of coaches coaching defence?
	Can you tell me about the techniques used to coach collisions?
	Can you tell me which role in the tackle is the most important in determining the success of it?
	Can you tell me about the defensive systems in place to nullify the attack?
Psychology	Can you tell me about the influence of psychology on performing collisions?
	Can you tell me about the feelings associated with being psychologically ready for collision?
	Can you tell me whether your psychological readiness for collision is ever altered?
	Can you tell me about the differences in psychology for collision in a training session versus a game?

research topic that generates collective views and analysis of the meanings that lie behind those views (Nyumba et al., 2018). Accordingly, the current study aimed to perform a series of online focus group discussions, with elite rugby league players, to ascertain players' perception of collisions in training and match play to allow a greater understanding of the technical strategies, coaching philosophies, injury mechanisms and psychology of collision.

Methods

Participants

With institutional ethics approval, and in keeping with qualitative approaches (Sparkes & Smith, 2014), the first author purposively recruited participants with direct experience of the phenomenon. Purposive sampling was employed to ensure a diverse representation of European Super League (ESL) players. The reason for this was twofold; firstly, rugby league players have shown varied match demands across their respective positions (Glassbrook et al., 2019), and secondly, a distinct difference in match demands between the top 4 and the bottom 4 teams has been shown, as demonstrated by Gabbett & Hulin (2018) and the polarities in skill involvements (play the balls, missed tackles and offloads) between teams finishing at the top of the table (1^{st} – 4^{th}) and the bottom (13^{th} – 16^{th}). Eighteen rugby league players consisting of forwards ($n = 6$), adjustables ($n = 7$) and outside backs ($n = 5$) were recruited to participate. Players were competing in Europe's elite rugby league competition, the ESL during the 2021 season. The mean ± SD age and playing experience in elite rugby league were 29 ± 4.6 and 9.3 ± 6 years. Four clubs were recruited from the ESL, two with a win percentage above 0.500 ($n = 9$) and two with a win percentage below 0.500 ($n = 9$). All participants were provided with a participant information sheet and an explanation of the study, including the risks and benefits of participation and written consent was obtained. Exclusion criteria were in line with the Rugby Football League (RFL) medical standards (no player unsuccessfully performed a head injury assessment, resulting in a sports-related concussion within the previous 2 weeks or experiencing persistent post-concussive symptoms).

Design

Focus groups were the preferred method of data collection due to their advantage in generating rich amounts of data across a diverse breadth of participants (Bader & Rossi, 1998). The focus groups were conducted online, utilising the Microsoft Team's platform, for over 1 hour and were facilitated by a moderator. A semi-structured interview schedule was developed to guide the discussion, termed the topic guide for the analysis, with the following four areas discussed: 1) offensive and defensive collisions, 2) collision monitoring, 3) defensive coaching philosophies and 4) the psychology behind collisions. Specific questions in the themes were discussed, however, given the dynamic nature of the focus group approach, the researcher adopted a pragmatic approach to probe and enquire before returning to the focus group guide. The questions used in the topic guide are exemplified in Table 1. The focus groups ranged from three to seven participants in line with Barbour's (2007) recommendations. All focus groups were recorded and transcribed utilising the Jeffersonian transcription system, which records the detailed features of talk and interaction (Sidnell & Stivers, 2013).

Analytical approach

Thematic analysis minimally organises and describes the data set in rich detail by identifying, analysing and reporting patterns (themes) within the data (Braun & Clarke, 2019). The strengths of thematic analysis lie in the detail and breadth it offers across a sample; however, a limitation is the inadequacy of the systematic process behind the method. To enhance analytical rigour, a reflexive thematic analysis was performed inspired by Braun and Clarke's six-phase guide. As recommended, the guide was not employed as a rigid process but as a systematic tool to ensure robust exploring, interpreting and reporting through pattern-based analysis of the dataset. First, we familiarised ourselves with the dataset, initially transcribing, and then thoroughly re-reading the transcriptions

whilst making notes. After this, initial codes were generated from features of the data systematically. All data was then gathered, and codes were collated into potential themes. The themes were reviewed by checking if they worked in relation to the coded extracts. Specifics of each theme were refined, creating clear definitions and names for each theme. Extract examples were then selected in the final analysis relating back to the research question and previous literature to produce a dialectic report where the findings of a qualitative study are considered with existing quantitative research.

Rigour

Rigorous qualitative research aspires to obtain credible and transparent accounts of participants' experiences. To enable this, open-ended and neutral questions were utilised during the focus groups to provide time and space for participants to share their experiences. Nonetheless, the researcher remains influential during all focus groups, and accordingly, it is good practice to reflexively detail their role and credentials (Hill & Dao, 2020). The lead author who undertook data collection has a degree qualification in sport and exercise science and a postgraduate qualification in strength and conditioning. He has been a professional rugby league player for 15 years competing in the Championship and European Super League competitions for five separate clubs. He experienced six recorded concussions and once finished inside "Super League's top three most tackles" with a career-high of 931 tackles over a full season. These background experiences enabled the lead author to credibly access an elite sample, and develop rapport with participants which led to open and frank focus groups. Notwithstanding this, there remains a possibility that the analysis could be tainted by personal bias. To mitigate this, data analysis involved the other authors. The second author is an experienced qualitative researcher in sports psychology, having worked in elite rugby league and football, with a focus on performance psychology. The third author is a senior lecturer in sports coaching and physical education, with expertise rooted in care in sports coaching. The fourth author is a professor of sport and exercise science and has an extensive background in rugby league, focusing on the training and monitoring of team sport athletes. Finally, the last author is an ex-professional rugby league player and professor of human physiology, working in elite rugby union, rugby league, football and golf, enabling an emphasis on theory to practice. In keeping with recent developments in thematic analysis, these authors did not seek to demonstrate inter-coder agreement but sought to critically question and identify differences in perspectives as a means of refining codes and themes. Additionally, member reflections were undertaken, where each participant was provided with the fundamental outcomes of the study (Smith & McGannon, 2018). Through this process, participants confirmed that the analysis was a credible account of the focus group.

Results and discussion

This section is divided into five themes. Utilising the transcribed raw data, 67 first-order codes were developed, following 30 second-order codes being established and from this, the five themes were generated which are set out below. The theme table may be found in the supplementary file.

Theme 1: The three-man tackle – the perceived optimal defensive strategy

Simultaneous contact (two players contacting an attacker's upper body at the same time, followed by a third lower limb tackler) was a common theme mentioned by several players from different positions to illustrate the "perfect" collision in defence. The forces of two shoulders contacting the upper body and stopping momentum were described as a key indicator as to why this method was advantageous. For example, "Jordan" (P2G4) describes his perception of the perfect tackle. "Yeah so the perfect tackle would be simultaneous contact two of ya um stop him in his tracks and then the third man just coming in". Below is a segment by "Ricky" (P3G3) in which he furthers "Jordan's" perceptions of performing a collision simultaneously.

> 'Ricky': The best is to be two-man contact so you wanna hit together with your teammate next to you um down their end especially and well as often as you can really um good defences does that it's just um I say if someone is carrying on my right shoulder I hope my teammate hits his left shoulder so he can so you both can put forces together into the tackle and um onto just one guy so the force is just times two really. (P3G3)

Tackling proficiency has been documented throughout the literature in both match play and training, with studies such as Gabbett (2008) largely focused on one-on-one collisions. Although no studies in elite rugby league literature mention simultaneous contact, a video analysis study by King et al. (2010) showed most tackles from the 2008 season involved two or three tacklers, with contact to the hip and mid-torso of the ball carrier. "Ricky" illuminates the perceived benefit of players utilising simultaneous contact as forces of each shoulder affect the attacker at the same time. This, in turn, allows the "play the ball" speed (i.e., the ruck) to be controlled because the attacker's momentum is stopped. Momentum is described by Gabbett et al. (2010) as a key indicator of collision intensity and continuing momentum in the collision is a signal of a collision loss for the defensive team. In a further focus group, two instances from "Carlo" (P3G2) show that although performing simultaneous contact is the initial aim of the collision, there is still an optimal process that follows to complete the tackle with the third man.

> 'Carlo': Yeah generally you want to do a simultaneous tackle . . . two men up top the person that has got the ball-carrying arm will wrap the ball up the other person will just get his body in front and then we hope we're looking for a third man then to come around the legs and take his legs away. (P3G2)

Interestingly, the mechanisms of tackle selection and injury risk to the attacking player have been documented in prior studies (King et al., 2012). Yet, the effect on match demands from performing the different roles in the tackle is a notable literature gap and an area for future research.

Theme 2: Not all collisions are the same; matchplay events change the collision intensity

Certain facets of rugby league match play such as kick-offs, dropouts and kick returns potentially facilitate players increasing their speed into a collision due to the increased distance between teams. In this theme, players conveyed that collision closing distance (the distance travelled between two players before the collision) does affect the intensity of match-play collisions, given the increased speed of the players. Interstingly, no player mentioned the risk of injury in association with this type of collision, which may demonstrate that speed into contact is not the only indicator of risk of injury in a collision. Below, "Carlo" (P3G2) and "Derek" (P4G2) from one focus group cite, in reply to the moderator, kick-off carries or wingers returning the ball as some of the most intense collisions during match play.

> Mod: Are there any other determinants of where a collision might be more intense than another one?
>
> 'Carlo': Kick-off carries. (P3G2)
>
> 'Derek': [Yup]. (P4G2)
>
> 'Carlo': Or wingers returning the ball when they've got a twenty-thirty metre run up so it's the time time to pick up full speed isn't it. (P3G2)

Two different focus groups reiterated this theme with "Lennox" (P1G3) stating "kick-offs dropouts and probably kick returns for backs are probably the most um high-intensity" and "Ricky" (P3G3) "for the carries and the tackles the heaviest they are is when like long metres in front of you so kick-off and taps even taps like when you find touch get a penalty".

Concussion rates in rugby league are higher (7.4 per 1000 hours) than in other contact sports such as soccer (0.06 per 1000 hours) due to a multitude of factors e.g., frequency of high-impact collisions performed being the foremost (Nilsson et al., 2013). Collision closing distance and head impact biomechanics have been the subject of a considerable amount of literature in recent years (Ocwieja et al., 2012). The outcome of this research is mixed with some studies suggesting American football players on special teams experience greater head impacts on plays over long closing distances and other literature such as Campolettano et al. (2019) finding no link. Nevertheless, the National Football League (NFL) have altered the rules to reduce the number of kick-offs returned and to limit the speed of the players on the kick-off coverage team. This is noteworthy because the set restart kick in rugby league is very similar to the new set restart distance that special team players experience in American football. Cautiously there are differences including the blockers that are present in the NFL but absent from rugby league. Nevertheless, there is no current research in rugby league considering the effect of closing distance on collision-related injuries. It would be reasonable to surmise; therefore, that the most intense collisions potentially carry some of the highest risks, primarily given the role of speed in the closing distance and the influence of speed on the difficulty of the technical execution of a tackle. However, when contemplating rule changes it is recognised the objective is to maintain as much of the identity of the sport whilst reducing as much of the risk of injury as possible. Whilst the removal or reduction of collisions with large closing distances could be an area for future research, the lack of association with collision-related injuries and this match event mentioned by players may suggest other areas to take precedence.

Theme 3: Bracing and blindsiding – two factors that influence experiences of collision and concussion

Bracing and blindsiding were two factors demonstrated by players in the current study to have associations with collision-related injury risk. This theme explores the ability of players to anticipate where the collision is coming from and the different exposure for players in the middle and adjustable position. The influence of bracing for the tackler is also investigated and the role of fatigue for defensive players making a collision. "Ross" (P1G4) demonstrates this below.

> 'Ross': I had the luxury of testing out the middle this week so and as bad as that sounded I actually found it easier carrying the ball in the middle because I knew I was gonna carry the ball so I was set for being whacked as opposed to tryna open some space up for me teammates on an edge … I honestly think twenty times I've been concussed where I've gone to the line irrelevant on whether I've thrown it or um or dummied and been whacked in the side below the jaw and it's knocked me out and nothings touched me head. (P1G4)

Here, Ross not only highlights the danger of "blind side" tackles but also identifies how this is most likely to occur to a player on an "edge" rather than the middle i.e., adjustables.

Previously, Kung et al. (2020) documented the potential effects of visual performance, oculomotor behaviour and anticipation on the severity and frequency of head impacts. In anticipation of contact, the head and neck are suggested to brace, improving dynamic stabilisation of the head and reducing concussion risk. Despite bracing for collision being novel among rugby league literature, Garraway et al. (1999) showed in Scottish rugby union that 25% of injuries materialised as a result of tackles occurring from players' blind spots and 40% of injuries occurring when a player is tackled from behind. Nonetheless, the link between bracing for impact and being tackled from behind has not been explored. This is an important area for future work with "Gary" (P2G3) and "Ricky" (P3G3) also suggesting that the worst collisions are the ones they do not expect when they are attacking.

> 'Gary': The blind side the one where you get blindsided are again the ones where you're not expecting it so you're not bracing generally when you're tackling you know that the contacts coming so you brace for it and you prepare for it whereas the contacts when you're not expecting it are the worst ones. (P2G3)
>
> 'Ricky': For me as Gary said like for us it's more like the blind-sided one um who gets heavy. (P3G3)

While "Gary" (P2G3) expands on a player's inability to brace for blind-sided collisions, he states that defensive players know where the contact is coming from when tackling. Contrarily, from another focus group, "Tim" documents the inverse below citing that as a defender the point of collision could change at the last second, with the element of

fatigue making it harder to react. "Tim's" mention of this was the only instance in the focus groups, yet, prior research (Delves et al., 2023), suggests the tackler is 1.7 times more likely to experience a head injury assessment (HIA) than the ball carrier. This difference in experience may be due to interposition discrepancies as stated by Ross, Ricky and Gary of the adjustable group. However, one component of Tim's comment that is of note, is the role of fatigue in defensive collisions. This is especially significant given the introduction of rules such as the "six-again" and the impact this has in increasing fatigue, heightening the exposure to collision-related events such as carries and tackles (Rennie et al., 2021). This point was echoed in a further study by Naughton et al. (2023) who demonstrated the influence of technical-related fatigue on aspects of match performance including collision. Tim expresses that the combination of the unpredictability of collision as a defender and fatigue reduces reaction times and makes it more likely for tackle technique breakdown through poor head positioning. Nonetheless, the recurrent characteristic of both the bracing and reactive/anticipatory elements is their substantial reliance on oculomotor behaviours and anticipation. "Tim" (P2G1) and "James" (P4G1) discuss this point below.

> 'Tim': Well the ball carrier knows where he's going doesn't he but as a defender you don't know where the collision is going to be so all you're doing is you're accelerating into collision but the point of collision could change at last second so that's the most like we were saying before the more fatigue comes in the harder it is to react and the more likely you're gonna get your head in the wrong place as a defender. (P2G1)

> 'James': Yeah it's so unpredictable as a defender isn't it. (P4G1)

As Kung's review suggests, exploring sports vision training may assist with concussion risk reduction through improved visual-motor control and eye quickness. It is also unequivocal that rule changes such as the "six-again" are shown to have a crucial effect on all aspects of match play (King et al., 2022). Before the 2022 season, two on-field disciplinary guidances were altered for the grading of high tackles and dangerous contacts (Rugby Football League, 2022, June 20). In an effort to reduce concussive and sub-concussive impacts, the "excessive flexion" terminology was removed to lower the threshold for off-the-ball contacts. Taking into consideration "Ross" and "Gary's" accounts, it is evident that some players agree, that these types of blind-sided collisions carry significant risk. Similarly, it is also apparent that other rule changes like the "six-again" according to "Tim's" account, could potentially have some detrimental effect on players' ability to execute the optimal technique due to increased fatigue. Undoubtedly, the governing body (RFL) has aimed to augment the spectacle of the game whilst making it as safe as possible. Still, despite some rule implementations rightly attempting to aid player safety by potentially avoiding the blind-sided collisions mentioned above and some aiming to aid the spectacle of the sport, the players' experiences illustrated in this study provide additional insights as to how to increase player safety whilst maintaining the essence of the game.

Theme 4: Coaching philosophies and orientations

Coaching philosophies reflect the foundation that can direct and guide many aspects of the coach's delivery and coaching practice. The current theme describes contrasting coaching philosophies and how they influence the types of collisions players make. The influence of tackle proficiency metrics in coaching philosophies is examined along with optimal ways to cultivate player buy-in into defensive systems. One of the key underpinnings of this theme was that defensive coaching philosophies in rugby league derive from one of two main thoughts, collision-orientated, and wrestle-orientated. "Allan" (P3G1) and "Gary" (P2G3) from two separate groups elucidate these philosophies.

> 'Allan': Our coach as an example at the minute like Coach A was like ((hand motions forward)) kill kill kill and it was all about hard collision hit um as hard as you can whereas like Coach B has come in and it's a bit more hit the ball wrestle. (P3G1)

> 'Gary': Like I said, sometimes people would rather have a team of cuddlers and make it slow play the ball. (P2G3)

This was followed by the thought that although a new coach may prefer players to tackle in a certain way (collision or wrestle-orientated), players would perform collisions the way they felt suited their attributes. "Ricky" (P3G3) shows this account. "When the new coach but it might be he wants us to tackle a bit differently but then at the end of the day it's what suits you best really".

Literature grounded in rugby league coaching philosophies has centred around managing players, assisting players with off-field issues and teaching improvement (Bennie & O'Connor, 2010). This is quite removed from the iterations noted in this theme relating to coaching philosophies. Recently, Hollander et al. (2021) found a lack of association between players' knowledge of collision and actual tackle contact technique, suggesting players may benefit from referring to a coach for technical contact cues. Interestingly, no player mentioned proficiency metrics prominent in non-injurious events as opposed to concussive events raised in studies such as Hendricks et al. (2016) namely, head placement on the correct side of the ball carrier, shoulder usage and leg drive upon contact. Another study by Hendricks et al. (2017) illustrated this point further; they found that regardless of coaches recognising the importance of teaching the technical components of collision, only 16% of the total training volume manifested as technique training. The second significant segment of this theme is entrenched in coaching behaviours and their effect on collision frequency and intensity training. 'Ross' (P1G4) cites how collisions may be increased for poor defensive performances as a punishment.

> 'Ross': You get irrational coaches who are desperate to keep their jobs or desperate to win and they think more physicality is the way forward or they wanna punish you for being soft ((inverted commas)) and missing a tackle and I've never seen it really work and I've seen it over and over and over again – more often than not it's a technical side of thing or a lack of effort because people's minds are not fully behind it and umm and you end up with a few more injuries and it slowly starts to spiral downhill um so yeah I think a lot of its reactionary stuff not I don't see the best coaches doing. (P1G4)

This kind of reactionary behaviour was not perceived by players to be implemented by the best coaches. Research by Gibson &

O'Connor (2023) identified two decisive phases integral in responding to loss in elite sports. First was the pre-losing streak phase in which coaches would set the cultural direction of the team before the season begins. In this phase, individual motivations and aspirations are used by coaches to attach the highest personal meaning to performance to access greater responsibility and accountability. The second prominent phase was during the losing streak when it was noted that some coaches emphasised the need to work harder during this period as their team was not playing hard enough. Unfortunately, this resulted in a suffocating effect, eliminating the fun and enjoyment aspect of training. This echoes the sentiments in the existing study of players' experiences of coaching behaviour which "Allan" (P3G1) and "David" exemplify below.

> 'Allan': That's down to what coaches do some coaches don't do any whack like you hear Club X and that I mean I wasn't there. (P3G1)
>
> 'Tim': [Yeah]. (P2G1)
>
> 'Allan': What do you think with that David it wasn't like that was it. (P3G1)
>
> 'David': No no not at all um just more technique um he wouldn't have let us chop legs or anything in training um and if anyone did go overboard he he would pull em out um similar Coach Y was a bit like that if you remember. (P6G1)

It is apparent across focus groups that coaches influence the types and intensities at which players perform collisions in training and matchplay. However, how this influences the team's performance, specifically in defence, is not clear. It is also imprecise what effect this has on the mechanisms of collision-related injuries that players following the different protocols may attain.

Theme 5: Psychological readiness for collision

Two main psychological elements arose in the focus groups, psychological readiness for collisions in training and the psychology of collisions in games. In the primary component, players described how training collisions hurt more than match collisions, they do not enjoy performing collisions in training and they felt the same arousal was not in place to offset the pain from collisions. This was also documented to continue from the training week into games and affect match collisions, as "Terry" (P2G2) demonstrates below.

> 'Terry': I always feel the contact in training hurts more than the game because obviously that boils down to the psychological side of it because obviously in training it's not competitive you don't really wanna be doing it. (P2G2)

A different focus group reemphasises this with "Gary" (P2G3) stating "You've just not got the same chemicals in your body and adrenaline to deal with them big contacts" and "Ricky" (P3G3) following this up with "Yeah adrenaline just get you out of like pain really you don't feel". To the authors' knowledge, this is the first evidence of a reduction in psychological readiness to perform collisions in training for elite rugby league players. It would be of substantial interest to establish the influence of psychological readiness to perform collisions on training performance and if this is a difference shown between superior performing clubs or not. The focal point of the second segment was the opposition's effect on the preparation and readiness of collisions during games. Players outlined that "big games" would influence their preparation positively, and conversely, matches they perceived to be easier may result in a lower intensity and aggression in their contact due to a lack of preparation. "Terry" (P2G2) exemplifies in the following dialogue the difference in mindset for bigger occasions.

> 'Terry': So that reflects on your line speed on your intensity how much whack you're gonna put into the contacts and that tends to have a better effect where you know them games where you know things in your prep hasn't been the best you've got a few niggles you know you're playing at not necessarily the top. (P2G2)
>
> 'Brian': Club K. (P5G2)
>
> 'Terry': ((Laughing)) Yeah and you go there and you haven't got the intensity you haven't got the aggression contacts not as good you're on the back foot and it carries on spirals on the back of that all because your psychological preparation wasn't as good as it can be on bigger occasions. (P2G2)

Similarly, Campo et al. (2012) noted the standard of competition as a key indicator of players' arousal, citing top performers interpreted their anxiety symptoms as more facilitating than non-elite. For the first time, we reveal association between the perceived challenge of the game and the force output of collision. An ability to replicate the "big game" mentality is of significant interest to coaches and players' and is an essential direction for future collision research.

Strengths, limitations & implications

The current study was the first to perform a series of focus groups with elite-level rugby league players to understand their experience of collision. The research reflects the views of those who took part, yet it will not have captured all the views of rugby league players. Therefore, it is not claimed that the perceptions and experiences provided here are generalisable to all involved in elite rugby. Nonetheless, the research reported here offers a rich, in-depth, and credible account of elite rugby league players' experience of collision. As is commonplace in qualitative research, readers can use the transparent information provided to consider the transferability of findings to their context. To enhance the transferability of the current research, future qualitative research could embrace a variety of methods such as surveys and Delphi polls. Furthermore, such work could take place in concert with quantitative studies through a mixed methods approach such that the strengths of both are maximised to bridge the gap between theory and practice. Related to this, we encourage further research in the following areas;

(1) The propensity of the optimal collision type (simultaneous contact with the three-man tackle) in matchplay and the influence this has on match outcome.
(2) Influence of "bracing" and vision upon collisions and the severity and frequency of collision-related injuries such as concussion.

(3) Defensive coaching philosophies in rugby league and their impact on the types of collisions made by players and the defensive success of teams.
(4) How altering psychological readiness affect collisions in training and competition.

Policymakers may also benefit from exploring the players' subjective experience reported herein. Specifically, the iteration whereby "Tim" (P2G1) discusses the influence of fatigue on tackle technique. This should be a key consideration when implementing future rule changes, as previous research such as Cross et al. (2019), has shown the tackler to have a higher association with concussion than the ball carrier. Considerations here could also include retrospectively assessing the effect of previous rule changes that may influence players' tackle technique or fatigue from match demands. Across these areas of future work, an all-encompassing view of collision should be obtained by investigating other stakeholders' experiences including head coaches, medical staff, policymakers and referees. This will provide greater detail of the areas illuminated in the present study, whilst yielding fresh insights into the nuances of the applied environment.

Conclusion

The study aimed to establish players' perceptions of collisions in training and match-play through a series of online focus groups to gain a greater depth of understanding of this phenomenon. Four focus groups were analysed using Braun and Clarke's (2019) reflexive thematic analysis, producing five themes consisting of the (1) three-man tackle – the perceived optimal defensive strategy, (2) not all collisions are the same, e.g., matchplay events such as kick-offs and dropouts change the collision intensity, (3) bracing and blindsiding – two factors that influence experiences of collision and concussion, (4) coaching philosophies and orientations, and (5) psychological readiness for collision. Combined with existing quantitative insights, this research offers a greater understanding of the rugby league collision from the players that perform them and many directions for subsequent research. It moves existing research forward by providing nuanced insights and provides a platform for future research and policies to bridge the theory-practice gap in this significant area.

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Confirmation of ethical compliance

This study was conducted following the established ethical standards and national legislation.

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