Physical Therapy in Sport 58 (2022) 151–159

Contents lists available at ScienceDirect

Physical Therapy in Sport

journal homepage: www.elsevier.com/ptsp

A comparison of the knowledge and attitudes of concussion within higher and lower leagues of the community rugby union game

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ARTICLE INFO

Article history:
Received 15 July 2022
Received in revised form
13 October 2022
Accepted 14 October 2022

Keywords:
Concussion
Rugby union
Return to play
Traumatic brain injury

ABSTRACT

Objectives: The Rugby Football Union (RFU) HEADCASE initiative aims to educate coaches, referees, and players on concussion. Concussion in community rugby is under-reported. Therefore, players can play a role in concussion safety if they have adequate knowledge and safe attitudes. The study aimed to evaluate and compare the concussion knowledge and attitudes and Return to Play (RTP) of the community rugby union game.

Design: A descriptive, cross-sectional study. Participants: Participants (n = 87) were from level 4 or level 8 of the English rugby union league system.

Main outcome measures: A modified Rosenbaum Concussion Knowledge and Attitudes Survey-Student Version (RoCKAS-ST) questionnaire was distributed to semi-professional and amateur clubs to evaluate players concussion knowledge index (CKI) and concussion attitudes and behaviours index (CAI) regarding RTP.

Results: No statistically significant differences existed relating to knowledge, behaviours or attitude. Some worrying gaps in knowledge were identified.

Conclusions: Findings show that community rugby union players are knowledgeable about concussion and have shown safe attitudes, however this doesn't always translate to safe behaviours. There are some gaps in their knowledge that must be addressed relating to coma and coherence of the athlete and in symptom recognition relating to sleep disturbances.

1. Introduction

Sport related concussion (SRC) can be defined as a traumatic brain injury (TBI), a direct cause of excessive biomechanical forces (McCrory et al., 2017). Repeated SRC can result in decreased neurocognitive function, and in extreme circumstances, can lead to death (Kontos et al., 2019; Mizobuchi & Nagahiro, 2016). Repeated SRC's have been linked with chronic traumatic encephalopathy, Alzheimer's disease, early onset dementia and second impact syndrome (SIS), however some of the evidence to support these associations is unclear and requires further study (Engelhardt et al., 2021; Gallo et al., 2020; Lee et al., 2019; Shively et al., 2012; Tator et al., 2019). The incidence of concussion in professional rugby union players has been reported as 21.5 per 1000 match play hours (Rafferty et al., 2019), versus 9.3 per 1000 match play hours in the South African student community game (Brown et al., 2019) and 1.5 per 1000 match play hours in the UK community game (Roberts et al., 2016).

In January 2013, the RFU launched its Headcase programme, which was designed to increase concussion knowledge and awareness across the English game (RFU, 2022b). This was done through its 'recognise, remove, recover, return' message which was implemented by the RFU within the community game (RFU, 2021). However, under current guidelines, not all levels of the game require mandatory annual or regular training of coaches, referees, players or volunteers to be able to take part in rugby in England, contrasting with an initiative in New Zealand, 'Rugby Smart', where coaches, players, and referees are required to regularly complete training surrounding concussion (Gianotti et al., 2009).

Despite this, internationally, athlete attitudes and safe behaviours regarding the identification and management of concussion are lacking in consistency with between 29 and 75% of players from various countries indicating that they would still play knowing that they have concussive symptoms (Walker, 2015; O'Connell & Molloy,

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https://doi.org/10.1016/j.ptsp.2022.10.009

2016; Martin et al., 2017; Viljoen et al., 2017; Olutende et al., 2019; van Vuuren et al., 2020). This is particularly concerning considering the risk of the previously mentioned medical conditions. The large discrepancy in concussion incidence reported in the UK community game when compared against other populations could be a direct reflection of an educational programme, aimed at improving knowledge and understanding of the condition, leading to better technique and conditioning within training (Roberts et al., 2016). However, there could be other reasons for these discrepancies; Liston et al. (2018) coined the term as being "head strong" to explain a certain sub-culture in sport; one of playing injured to assist their team, and under-reporting the severity of acquired injuries despite the risk of exacerbation and affecting one's health. Liston et al. (2018) also described a "functional injury" as one that severity is graded with regards to time lost in the game, rather than a medically accepted definition of severity relating directly to tissue damage, symptom severity, irritability or nature of the injury. This explanation is not exclusive to head injury, but it has been reported that a concussive injury is one that can be "ran off" and often does not require removal from play, unlike a pulled muscle or joint dislocation, which due to their nature are seen to be much more severe. Another reason for this could be due to under-reporting at the community level where the requirements for pitch-side medical cover vary throughout tiers 3–9, investigated by Roberts et al. (2016), and players now having a greater understanding that reporting symptoms of concussion leads to an automatic period of enforced rest. This knowledge and expectation of enforced rest could also contribute to the under-reporting of concussion in the community game and wider sporting arena.

Identification of concussion is a difficult task. Although there are multiple tools available to team doctors, physiotherapists, graduate sport rehabilitators, graduate sports therapists, and/or coaches, to determine whether a player has suffered a sport-related concussion, none of them are considered a gold standard for diagnosis (Albicini & McKinlay, 2018). While players in professional levels of competition are assessed and monitored by qualified medical experts, there is variation with the level of medical provision amongst the community teams on matchdays and during training (Roberts et al., 2016). Level 3 and 4 teams requiring a pre-hospital immediate care practitioner, whereas level 5 and below teams only require an individual trained in emergency first aid (RFU, 2022a). Some teams at level 8 and below may have access to an immediate care practitioner, however most do not due to financial reasons (Albicini & McKinlay, 2018).

Due to the disparity in medical assistance for the community game and the lack of gold standard assessment technique, the players themselves can play a pivotal role in reporting possible concussions to management or medical teams (O'Connell & Molloy, 2016). While previous research has been completed in this area, the comparison of attitudes and behaviours in the higher and lower tiers of the community game has not been evaluated. The safety of all players involved in the sport should be considered, and with players being the primary stakeholders in their own health and wellbeing it provides an opportunity to assess their knowledge, attitude and current behaviours towards concussion. The aim of this study was to evaluate and compare the attitudes and knowledge of concussion and RTP guidelines within the rugby union community game, specifically level 4 semi-professional and level 8 amateur players.

2. Methodology

2.1. Ethical approval

The methodology of this study approved by the xxx Ethics Committee via an independent reviewer's report for an undergraduate dissertation project (Appendix 1).

2.2. Participants

A cross-sectional study design was used. Before partaking in the survey, participants completed an informed consent form. Ninety-five Male Rugby Union players completed the questionnaire. The inclusion criteria were that the players currently played first team rugby at level 4 (semi-professional) or level 8 (amateur) of the English rugby union pyramid, and were aged between 18 and 40.

Eighty-seven participants, mean ± SD age was 28 ± 6 years, met the criteria. Eight participants were excluded from the study as they exceeded the maximum age range for participation. The study sample was divided into two groups, club level 4 players (n = 39, 27 ± 6 years) and club level 8 players (n = 48, 28 ± 6 years).

2.3. Questionnaire

Emails were distributed to club chairmen of two national league (level 4) and two amateur (level 8) rugby union clubs to outline the study and request permission to approach the coaches to distrubte the questionnaires via social channels. Players were contacted to take part via poster, which contained the link to the questionnairethrough social messaging channels. The questionnaire was completed using JISC Online Surveys (https://www.jisc.ac.uk/). Participants completed a modified Rosenbaum Concussion Knowledge and Attitudes Survey – Student Version (RoCKAS-ST) questionnaire (Viljoen et al., 2017) to assess their knowledge and attitudes/behaviour regarding concussion injuries and RTP. The original questionnaire (Williams, 2013) consisted of three sections; The Concussion Knowledge Index (CKI), Concussion Attitudes Index (CAI) and the RoCKAS concussion symptom recognition checklist. As seen in the study by Viljoen et al. (2017), the RoCKAS concussion symptom recognition checklist was replaced with a 16- symptom checklist which increased the reliability and validity of the questionnaire.

The scores from each of the three sections (CKI, symptom recognition & CAI) were then added together to give a total overall score for the questionnaire. In the section for CKI, correct answers were scored with 1 point, while incorrect answers were scored 0. Each correct identification of symptoms was given 1 point in the symptom recognition section of the questionnaire, while each correct identification of incorrect symptoms (by way of omission) was scored with 1 point. Any erroneous identifications (those clicked incorrectly) were scored 0. In the CAI section, safe behaviours were scored with 1 point, whilst unsafe behaviours were scored 0. The range of scores that were available were from 0 to 48.

2.4. Data analysis

Primary analysis involved descriptive statistics of CKI and CAI responses on itemised level and are presented visually on a part-to-a-whole graph (correct vs. incorrect) and numerically as a percentage of correct responses. Continuous data were tested for normality using Shapiro-Wilk's test. Normally distributed data were presented as mean ± SD unless otherwise stated, as appropriate. A Fisher's exact test was used to explore differences in CKI and CAI responses between playing levels and across playing positions. Total questionnaire scores were not normally distributed; therefore, differences between playing level were explored using Mann-Whitney U-tests. Due to the non-normal distribution of the data, Spearman's rank-order correlation test was used to assess whether there was any relationship between CKI, symptom recognition and CAI.

Data were not corrected for multiple testing, as the analysis was considered exploratory. Data analysis was conducted using IBM SPSS statistics for Windows (v25.0, SPSS Inc, Chicago, Illinois, USA). The significance level was set at $p < 0.05$.

3. Results

The largest proportion of all participants were forwards (72%). Seventy-nine percent of level 4 respondents were forwards, with 67% at level 8. Among the level 4 participants, 'Blindside flanker' (38%) was the most played position, with 'scrum-half' being the least played position (0%). Similarly to level 4 participants, the level 8 most played position was also 'Blindside flanker' (31%), with Fly-half being the least played position (8%). Some players stated that they play more than one position.

The level 4 and 8 groups had similar experience at any level of participation with an estimated mean playing experience of 14.0 ± 6.0 and 14.5 ± 5.3 years, respectively. The level 4 group had an estimated mean rugby playing experience at their current level of play of 5.4 ± 4.6 years, compared to the level 8 group with an estimated mean of 7.5 ± 5.0 years.

3.1. Concussion knowledge index

CKI questions were answered correctly 76% of the time for both groups combined. Participants in the level 4 group, on average, identified 76% of the CKI questions correctly, which was similar to the 75% identified correctly by the level 8 participants. Participants showed overall good knowledge by identifying that a concussion can be sustained via a hit anywhere on the body, and not only on the head, with level 4 and level 8 participants answering correctly 97% and 94% of the time, respectively.

Only 15% of the level 4 group and 21% of the level 8 group correctly identified that an athlete who gets knocked out after getting a concussion is experiencing a coma (Fig. 1, Q7). Similiarly, only 21% of the level 4 group and 19% of the level 8 group correctly reported that a person can be perfect in every way but forget who they are and not recognise others; with (Fig. 1, Q6).

Only 56% level 8 and 60% level 4 participants believed that if they had suffered a previous concussion, they were more likely to suffer another (Fig. 1, Q12). Misconceptions were also found when participants were asked about sustaining one concussion; 44% of the level 4 and 31% of the level 8 participants believed that sustaining just one concussion wouldn't affect a person's health and wellbeing negatively (Fig. 1, Q3). Furthermore, 38% level 4 and 56% level 8 believed that a concussion could be detected via identification of physical damage using brain imaging (Fig. 1, Q5).

As assessed using Fisher's exact test, no significant differences were found between playing level and CKI data on an itemised level. No significant differences were found between playing position and CKI data on an itemised level using Fisher's exact test.

3.2. Symptom identification

Symptoms were correctly identified by both groups 87% of the time. Confusion, blurred vision, dizziness, and headaches were the symptoms that both the level 4 and 8 groups were most familiar with. Notably, 21% of the level 4 and 29% of the level 8 participants did not correctly identify "sleep disturbance" as symptom of concussion (Fig. 2). Some respondents however failed to identify symptoms of concussion. Most notably, 36% and 37% of level 4 and level 8 respondents respectively did not identify that "weakness of neck range of motion" was a symptom of concussion. Additionally 26% and 27% did not identify neurological neck symptoms as a symptom of concussion (Fig. 2).

3.3. Concussion Attitudes Index

CAI responses were categorised as either "safe" or "unsafe" depending on whether the answer to the question was a safe behaviour in response to the statements and scenarios evaluating concussion attitude. CAI questions were answered "safely" a mean of 90% of the time for both groups. Participants in the level 4 group had a mean "safe" response of 89% compared to 91% of those at level 8. Some "unsafe" attitudes and behaviours were found, with 33% of level 4 and 29% of level 8 participants stating they would

Fig. 1. Concrete statements and scenarios evaluating the CKI of the Level 4 and Level 8 groups. CKI statements can be found in appendix 2.

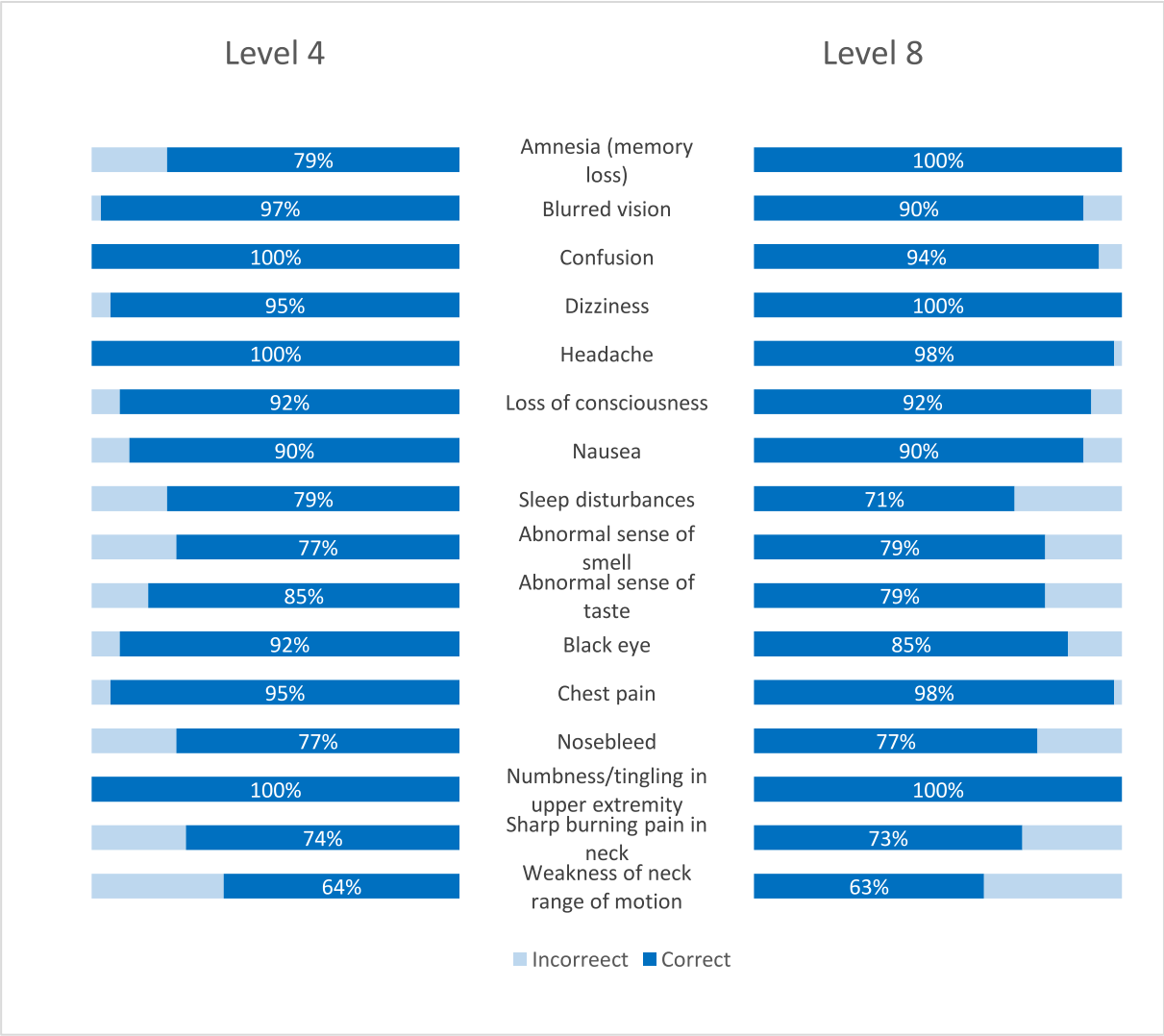

Fig. 2. Concussion symptom identification capabilities of the level 4 and level 8 groups.

continue to play sport with symptoms from a concussion (Fig. 3 Q1).

A slight decline in the assumed viewpoints of most athletes "safe" RTP responses (3% for level 4 and 6% for level 8 participants) towards a hypothetical scenario was noted when playoff games were in question compared to the first match of the season (Fig. 3 Q9 & Q11).

No significant differences were found between playing level and CAI responses as assessed using Fisher's exact test. No significant differences were found between playing position and CAI data using Fisher's exact test.

3.3.1. Total modified RoCKAS-ST score

A Mann Whitney *U* test was conducted to assess whether there were any differences between playing level and total modified RoCKAS-ST score. The distribution of the scores was similar, as assessed by visual inspection. The median (Q1-Q3) total score for level 4 was 41.0 (37–42), and for level 8 it was 40.0 (38–42). These scores were not statistically significantly different.

3.4. Correlation between CKI, symptom recognition and CAI

A non-parametric Spearman's rank-order correlation test was used to determine the relationship between CKI, symptom recognition and CAI. There was a very weak correlation between CKI and symptom recognition ($r_s = 0.25$, $p = 0.02$). There was also very weak correlation between CKI and CAI ($r_s = 0.25$, $p = 0.02$). There was no statistically significant correlation between Sx recognition and CAI.

4. Discussion

The aim of this study was to evaluate and compare the attitudes and knowledge of concussion and RTP guidelines within the rugby union community game, specifically level 4 semi-professional and level 8 amateur players. The results demonstrated some positive knowledge and attitudes towards SRC, however there were some worrying trends. The clinical implications of this are potentially severe.

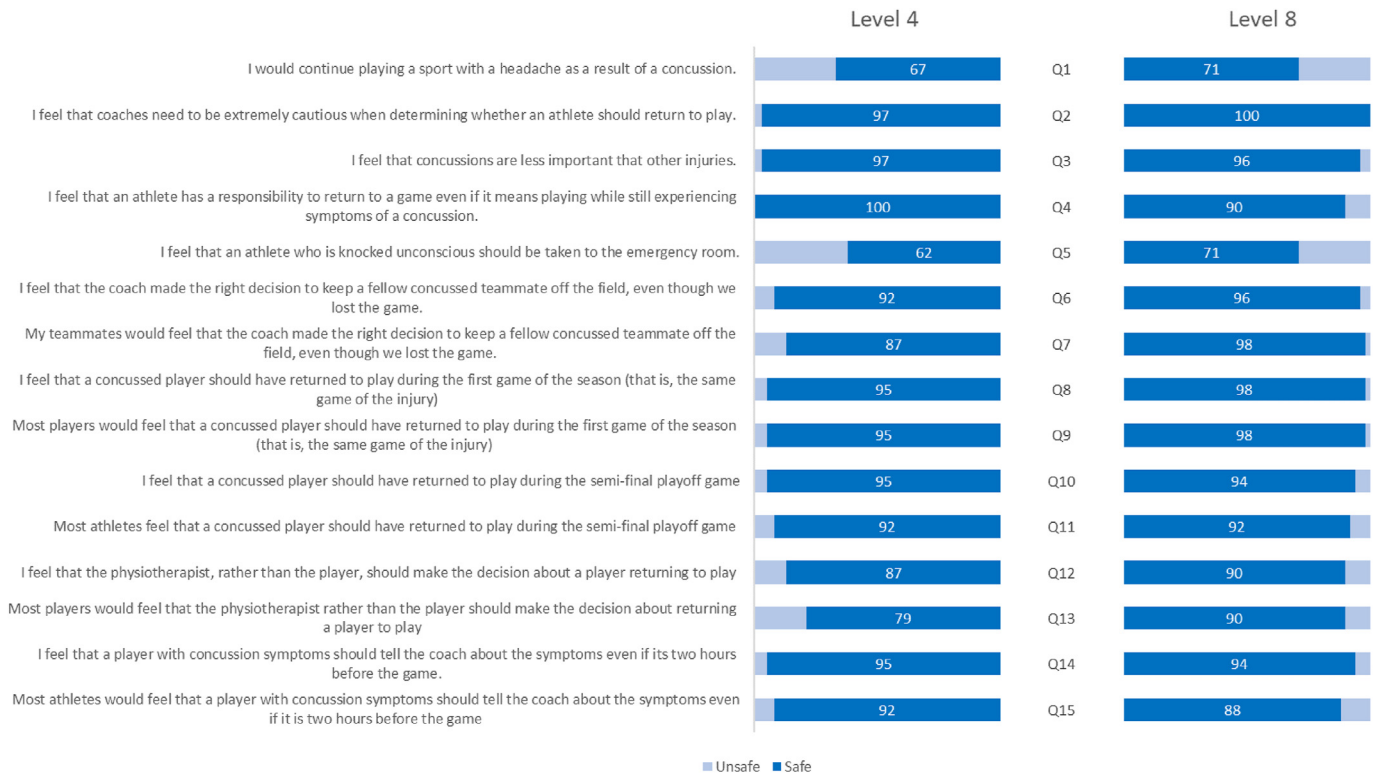

Fig. 3. Concrete statements and scenarios evaluating the CAI of the level 4 and level 8 groups. (Appendix 4).

4.1. Concussion knowledge

The overall knowledge of concussion of the players in both level 4 and level 8 of the English community game was good, with 76% of the CKI questions being answered correctly. This is higher than figures previously seen in studies by (van Vuuren et al., 2020; Viljoen et al., 2017; Walker, 2015). A standout example of differences between the papers is with the knowledge that concussion can be sustained from a hit anywhere on the body, and not only the head, with 97% of level 4 players and 94% of level 8 players providing correct answers. This is compared to 43%,47%, 48%, 54% & 63% in previous studies (Kraak et al., 2019; Oloo et al., 2019; Salmon et al., 2020; Viljoen et al., 2017; Walker, 2015). These differences highlight that despite improving percentages annually, English community game rugby players seem to have a better knowledge of concussion than players internationally, suggesting that the HEADCASE initiative (RFU, 2022b) positively impacts players' knowledge of concussion, possibly by placing more attention on the condition. However it is difficult to say for certain that this is the case, as it is not clear what level of concussion education that participants in previous studies have had, and assumptions were made in the current study relating to the HEADCASE initiative. Despite the positive change, there are still some improvements to be made upon developing athlete's safe attitudes to concussion. This is clearly marked by the fact that almost a third of players at both levels of competition indicating that they would continue to play rugby, even with signs and symptoms of concussion. This even more so when knowing that players would more readily agree to RTP, despite the guidance and the potential for symptoms still present when important matches are at stake.

Although the general trend showed a greater knowledge relating to concussion, there were still some notable misconceptions; only 15% of level 4 participants and 21% of level 8 identified that an athlete who gets knocked out is not experiencing a coma. In comparison, in the study by Viljoen et al. (2017), this was answered correctly by 37% of respondents. Whilst perhaps not the most severe of misconceptions, this highlights that there is still some way to go in educating players with some basic knowledge of concussions.

Some more concerning misconceptions were found, with 79% of level 4 and 81% of level 8 participants incorrectly believing that a person may forget who and where they are, but present as normal in every other way after suffering a concussion. These findings are also in line with Viljoen et al. (2017) who found a high proportion (63%) of their participants believed similarly. This misconception has some potential implications for players at both levels, regardless of the level of medical provision, as there could be underlying pathology that may not be visible, which may require more immediate medical attention (Cunningham J. Broglio S. & Wilson F. (2018)Cunningham, Broglio, & Wilson, 2018s knowledge may be more likely to recognise this.

Only 44% of level 4 and 31% of level 8 participants believed that sustaining one concussion would not negatively impact a person's health and wellbeing, with 95% and 96% of respondents assuming that only repeated SRC's could cause long-term deficiencies. This was a particularly concerning finding as players lack of knowledge relating to single SRC's may be unwittingly placing them at risk of harm. Whilst there is evidence to suggest that repeated SRCs lead to increased susceptibility to longer-term symptoms (Cunningham et al., 2020; Terry et al., 2019; Zhang et al., 2019), it is also possible for a single episode to create lasting physical, cognitive and/or emotional changes (Bloom et al., 2020; Sandel et al., 2017; Yengo-Kahn et al., 2020).

4.2. Symptom identification

Symptoms of SRC were correctly identified 87% of the time in both groups, with players displaying better knowledge than in

previous studies (O'Connell & Molloy, 2016; Viljoen et al., 2017). The most commonly identified symptom of SRC was a headache, which supports findings from Viljoen et al. (2017) and it was the second most commonly identified symptom behind confusion in a study by O'Connell and Molloy (2016). Dizziness was a commonly identified symptom in the current study, with 95% of level 4 and 100% of level 8 participants correctly identifying it. In contrast, only 71% of the participants in the study by Viljoen et al. (2017) correctly identified it. There was also an increase in memory loss as a symptom compared with the findings of Viljoen et al. (2017), with 90% of participants versus 58% of participants correctly identifying it. When compared to other studies, the increased recognition of all symptoms amongst level 4 and level 8 participants may be attributed to the RFU HEADCASE initiative, which focuses heavily on symptom identification (RFU, 2022b). It suggests that there has been more success than the BokSmart initiative in South Africa, where it was found that symptom recognition in adults was moderate (63%) and bettered by junior high school athletes (66%) (Viljoen et al., 2017).

Participants showed reduced knowledge when identifying sleep disturbance as symptom of concussion with only 79% of the level 4 and 71% of the level 8 participants able to identify it. Although these findings were better than those found by Viljoen et al. (2017) and O'Connell and Molloy (2016), who found just 47% and 45% respectively of their adult participants correctly identified sleep disturbance as a symptom, the findings still pose issues to the identification of concussion for the participants of this study. By not identifying this, and continuing to train or play in the following days, these rugby players may be exposing themselves to a risk of SIS or reduced cognitive function (Broshek et al., 2015; Engelhardt et al., 2021; Tator et al., 2019). Based on these results, it is clear that there is still some way to go to improve player knowledge on concussion symptoms recognition. This knowledge gap may be placing players at risk of permanent injury. It is therefore imperative that this symptom is highlighted to players and staff as a matter of urgency, and an educational strategy should be updated to highlight this factor.

4.3. SRC attitudes and behaviours

Despite some misconceptions about SRC knowledge and symptom identification, players at both levels displayed safe responses overall regarding attitudes and behaviours. Much safer behaviours and attitudes were displayed than in previous studies (O'Connell & Molloy, 2016; Viljoen et al., 2017). These findings were refreshing, as knowledge alone has previously been shown not to be a good indicator of player attitudes or behaviours in rugby union or across other sports (Kroshus et al., 2014; O'Connell & Molloy, 2016; Viljoen et al., 2017; O'Reilly et al., 2020; Theadom et al., 2020).

In the current study, 33% of level 4 and 29% level 8 participants stated they would continue to play sport with symptoms from a concussion. This is worrying, as most participants (Level 4, 87%, Level 8, 83%) understood the potential risk of death when a second concussion is sustained while already concussed. This would suggest that despite knowledge of the potential severe consequences of SRC, players choose to ignore them, which is a worrying trend. It is not fully understood why players choose to display unsafe behaviour despite having knowledge of concussion. Research is therefore warranted to attempt to understand player psychology further due to knowledge alone appearing insufficient, as highlighted by Bowman et al. (2020). Whether educational strategies alone would be unsuccessful in community athletes may be challenged, as previous work by Bowman et al. (2020) in collegiate athletes suggested that dishonesty still remains. However, other work by Register-Mihalik et al. (2020) has suggested that perceived social norms can influence intentions to disclose concussive sympotms, an area that warrants investigation in the English community rugby union game.

Some unsafe attitudes/behaviours during playoff versus the first game of the season were seen among all participants. However, these findings were less apparent when compared to O'Connell and Molloy (2016), who found that 75% of their participants reported that they would continue to play with a concussion in important games. They further reported that players showed these unsafe behaviours as they did not want to 'let the team down', furthering the theory that community rugby union players prioritise sporting success over health-related values in some instances. It is important that educational strategies are derived from the findings of this study to try to challenge the stigma amongst community rugby players that they must prioritise the teams results opposed to their individual health.

When asked whether an athlete is responsible for returning to a game with symptoms of concussions, greater unsafe responses were seen in level 8 players compared to level 4 which raises concern. Firstly level 8 match day requirements are to provide one emergency first aider, whereas level 4 requires a Pre-Hospital Immediate Care practitioner (England Rugby 2019). Further, a healthcare practitioner is needed to assess a player using the SCAT5 tool, which is unlikely at level 8 making it less accessible to lower-level community clubs (Albicini & McKinlay, 2018). The findings of this section are of concern, as typically lower level clubs do not have the available budget to employ an advanced practitioner. It is suggested that deeper levels of concussion education are provided to pitchside emergency first-aiders so that athletes are not responsible for theor own decisions in a state of reduced cognitive function. Further, in line with research by (Salmon et al., 2020), coaches should be more assertive in ensuring that players are removed from play, as they have been shown to have a generally superior knowledge of symptoms.

5. Limitations

The current sample was drawn from only two playing levels. Consequently, the findings cannot be reliably generalised beyond this specific playing level context, making a general assessment of concussion knowledge, attitudes, behaviours, and RTP across all English levels unrealistic. With no prior research assessing the concussion knowledge before the implementation of various RFU educational initiatives such as HEADCASE, the extent to which any initiative may have succeeded or failed in improving player knowledge could not be determined.

There was a poor representation of scrum halves from the responses to the questionnaire. The reason for this was unknown. In contrast, there was a large representation of flankers from both levels of the game who responded to the questionnaire. It is possible that the responses of the scrum halves may have differed from those of the rest of the playing positions, as typically they are not involved in as many collisions as forwards (Schoeman et al., 2015). However, anthropometrically, they are usually smaller in stature than forwards, which may make them more susceptible to head contact and thus concussive events (Chéradame et al., 2021). Future study should therefore address the knowledge and attitudes of this playing position at the community level.

The questions asked do not consider the psychological status of the players involved in relation to concussion. Comparisons need to be made between those who have suffered with concussion, and those who have not. Bloom et al. (2020) recommended that sports psychology professionals assist with the recovery and well-being of athletes suffering from SRC. Moving forward, this should be

considered as part of the Graduated Return to Play protocol.

We consider this analysis hypothesis-generating and place the emphasis on the descriptive statistics as oppose to inferential between group differences. We therefore chose not to correct for multiple comparisons, which introduces a greater risk off type 1 errors (the incorrect rejection of null hypothesis). Whilst this approach has limitations, they are somewhat a formality given no differences were observed between groups.

6. Conclusion

This research makes unique contributions to sport concussion literature due to it being the first study to look at knowledge of concussion and safe attitudes/behaviours regarding concussion and RTP within the English community game, with previous research focusing on coaches, referees, the elite men's game, youth rugby and/or other countries (Boffano et al., 2011; Clacy, et al. 2015; Griffin et al., 2017; Liston et al., 2018; O'Connell & Molloy, 2016; Viljoen et al., 2017; Walker, 2015; White et al., 2014).

The study highlights that players at level 4 and level 8 of the RFU pyramid generally show better knowledge and attitudes to concussion than participants globally (van Vuuren et al., 2020; Viljoen et al., 2017; Walker, 2015). Despite this, some worrying trends need targeting to improve the understanding of the condition in players at both levels. It is suggested that findings of the study are communicated with club medical teams throughout the community game so that they are aware of potential knowledge and attitude deficits of their players. Educational content should be created specifically addressing the areas where clear deficits in knowledge and attitude do not always translate into safe behaviours. Future study should seek to address behavioural change strategies relating to SRC in community level rugby union players alongside structured educational interventions based on the findings of this study.

Ethical Statement

The University of Hull ethics committee granted the ethical approval for this study via an independent reviewer's report for an undergraduate dissertation project.

Declaration of competing interest

The authors report no conflicts of interest in preparing this report.

Appendix 1. Ethical approval.

Ethics Independent Reviewer's Report.

If the application outcome listed above is 'Approve':
You are now cleared to start your project.
If the application outcome listed above is 'Revise':
You are not currently cleared to commence your project and data collection.

1. Please see your **supervisor** about the reviewer comments listed on page 2.
2. Address all of the reviewer comments listed on page 2. Then the **student** must resubmit the modified ethics application (**EC1-EC3**) and the **EC7** re-submission form to the **Ethics Application module CANVAS site** in the appropriate **assignment box** with the appropriate modifications.
3. If all correct your **supervisor** will then upload a final **Independent Reviewers Report EC6** for approval on **CANVAS.**

If the application outcome listed above is 'Reject':
Your application has been rejected and you are **not cleared to commence your project and data collection**. Please see your **supervisor** to determine what to do next.

Appendix 2. Concrete statements and scenarios evaluating Concussion Knowledge

Statements - 17 Questions, Answer True/False.

1. A concussion can only occur if there is a direct hit to the head.
2. A history of multiple concussions will affect a player's health and well-being negatively.
3. A single concussion will affect a player's health and well-being negatively.
4. After 10 days, symptoms of a concussion are usually completely gone.
5. After a concussion occurs, brain imaging (CAT scan, MRI, X-ray etc.) typically show visible physical damage (bruise, blood clot) to the brain.
6. After a concussion, people can forget who they are and not recognise others but be perfect in every other way.
7. An athlete who gets knocked out after getting a concussion is experiencing a coma.
8. Being knocked unconscious always causes permanent damage to the brain.
9. Concussions can sometimes lead to emotional disruptions.
10. If you receive one concussion and you have never had a concussion before, you will become less intelligent.
11. In order to be diagnosed with a concussion you have to be knocked out.
12. People who had one concussion are more likely to have another concussion.

Application title	A comparison of the knowledge and attitudes of concussion within higher and lower leagues of the community rugby union game.
Reviewer's recommended outcome	
Student name	XXX
Supervisor name	XXX
Independent reviewer name (not required for systematic reviews and secondary data projects)	XXX
Approve Revise Reject	

13. Playing with concussion symptoms will not affect a player's performance.
14. Sometimes a second concussion can help a person remember things that were forgotten after the first.
15. Symptoms of a concussion can last several weeks.
16. There is a possible risk of death if a second concussion occurs before the first one has healed.

Appendix 3. Concrete statements and scenarios evaluating Concussion Attitude

Statements – 5 Questions, Answer Yes/No.

1. I would continue playing a sport with a headache as a result of a concussion.
2. I feel that coaches need to be extremely cautious when determining whether an athlete should return to play.
3. I feel that concussions are less important that other injuries.
4. I feel that an athlete has a responsibility to return to a game even if it means playing while still experiencing symptoms of a concussion.
5. I feel that an athlete who is knocked unconscious should be taken to the emergency room.

Scenarios – 10 Questions Answer Yes/No.

1. I feel that the coach made the right decision to keep a fellow concussed teammate off the field, even though we lost the game.
2. My teammates would feel that the coach made the right decision to keep a fellow concussed teammate off the field, even though we lost the game.
3. I feel that a concussed player should have returned to play during the first game of the season (that is, the same game of the injury)
4. Most players would feel that a concussed player should have returned to play during the first game of the season (that is, the same game of the injury)
5. I feel that a concussed player should have returned to play during the semi-final playoff game
6. Most athletes feel that a concussed player should have returned to play during the semi-final playoff game
7. I feel that the physiotherapist, rather than the player, should make the decision about a player returning to play
8. Most players would feel that the physiotherapist rather than the player should make the decision about returning a player to play
9. I feel that a player with concussion symptoms should tell the coach about the symptoms even if its 2 h before the game.
10. Most athletes would feel that a player with concussion symptoms should tell the coach about the symptoms even if it is 2 h before the game

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