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An investigation of coaches' awareness of injury in elite adolescent rugby union in Northern Irish schools - A qualitative study

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ABSTRACT

Objectives: To examine the decision-making processes employed by schools' Rugby coaches in the management of injured players and to explore the factors that influenced those decisions. A secondary objective was to gauge interest in an education focused toolkit for schools' Rugby coaches.
Design: A qualitative study using one-to-one online interviews.
Setting: Schools who compete in the Ulster Schools' Cup Rugby competition.
Participants: Eleven Rugby union coaches from four post primary schools.
Outcome measures: A thematic analysis approach was used to examine the factors that influence schools' Rugby coaches' decision-making processes in the management of injured players.
Results: Findings suggest coaches are influenced in their decision making by four primary factors: their experience and learning, their relationships with other stakeholders, their knowledge and understanding of the roles and responsibilities of medical staff, healthcare and health fitness professionals, and resources available to them.
Conclusions: Schools' Rugby coaches play a significant role in the supervision of injured adolescent Rugby players, often drawing from their playing and coaching experiences. Schools retain, or recommend the services, of healthcare professionals (HCPs) and health and fitness professionals (HFPs). The role of these healthcare and health and fitness professionals, along with their qualifications and experience is not fully understood by coaches. Coaches acknowledge that there is a need for further training and would welcome education initiatives aimed at increasing awareness of musculoskeletal injury in schoolboy Rugby players.

1. Introduction

The occurrence of injury during sports participation is a primary reason for adolescents to seek medical intervention and such injuries can lead to adolescent athletes dropping out of sports participation (Whatman et al., 2018). Sports coaches can foster an injury prevention ethos in their players by teaching safe playing techniques and encouraging positive attitudes to injury management (Whatman et al., 2018). Whilst it is the elite men's game that represents the higher end of the injury spectrum; Williams et al. (2013) described an injury incidence rate of 88 injuries per 1000 playing hours (88/1000ph), adolescent Rugby union players are still exposed to a significant injury risk (Viviers et al., 2018). Several studies demonstrate relatively high musculoskeletal injury incidence rates in schools' Rugby union players (Archbold et al. (2017), 29.06/1000ph; Barden and Stokes (2018), 77/1000ph; Brown et al. (2012), 47.9/1000ph; Leung et al. (2017), 31.8/1000ph; Palmer-Green et al. (2013), 47/1000ph.) In explaining the comparatively high incidence of injury in adolescent Rugby union (hereafter Rugby), Viviers et al. (2018) cites, in part, the demands of the game and pressure to perform. Given the high incidence of injury and recurrence of injury among adolescent players, a greater focus on

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injury management, rehabilitation and prevention strategies is recommended in schools' Rugby (Anderson, Cathcart, Wilson, Hides, Leung & Kerr, 2020).

Since the professionalisation of Rugby in the mid-1990s, there have been significant improvements in the clinical understanding of concussion, methods of reporting, data collection and management of concussion injury in players (Owens et al., 2019). In the youth game, programmes such as 'RugbySmart', have been successful in increasing coaches' awareness of the risks associated with head injury in adolescent Rugby players (Salmon et al., 2020). However, the nature and extent of coaches' awareness of musculoskeletal injury in schools' Rugby is less clear. Injury monitoring, education, and injury prevention practices as well as access to healthcare providers (physiotherapists, doctors and strength and conditioning coaches) varies significantly from school to school and is influenced by a variety of issues including socioeconomic factors (Leahy et al., 2020). In the amateur game, improving Rugby players' awareness of injury is one method coaches could use to positively influence adherence to good injury surveillance and prevention practices (Yeomans et al., 2018). Both adult and junior Rugby players seek advice from coaches in several areas including warming up and cooling down, safe techniques, physical conditioning, use of protective equipment and injury management (Brown et al., 2018). Implementation of effective injury prevention strategies may be informed by an understanding of the role of injury surveillance and how this can contribute to the management of injured players (Ekegren et al., 2014).

There is currently a paucity of research exploring the management of injured players in schools' Rugby settings. The aim of this study was to gain an in depth understanding of the awareness of injury among coaches, teachers and trainers working with elite schools' Rugby union players. To achieve this, the researchers sought to examine the decision-making processes employed by schools' Rugby staff in the management of adolescent Rugby players with musculoskeletal injuries and to explore the factors that influenced those decisions. A secondary objective was to gauge interest in an education focused toolkit for schools' Rugby coaches. A qualitative methods approach was the most effective means of gaining an understanding of current practices; coaches, trainers and teachers' attitudes, values, and beliefs regarding injury, rehabilitation, return-to-play, and prevention.

2. Methods

2.1. Study design

This study followed an emergent design and thematic analysis approach (Creswell, 2014). An open-ended approach to planning the research was implemented, so that the researchers could learn about issues and problems from the participants' perspective. The researchers then modified the topic guide in response to the findings that arose while conducting the semi-structured interviews (Creswell, 2014).

2.2. Participants and recruitment

A purposive sampling technique was used to recruit participants to the semi-structured interviews. To reflect regional demographics, several schools from each of the six counties of Northern Ireland and from the metropolitan district of Greater Belfast who field teams in the Ulster Schools Cup were invited to take part. The Ulster Schools' Cup is an annual boys' Rugby union tournament involving 33 schools. Each school is assigned to one of four tiers by Ulster Rugby (Ulster Rugby, 2021). Tier 1 represents the strongest performing teams, followed by tiers two, three and four. Schools from all regions of Northern Ireland are represented in each tier. The research team sought to recruit a selection of schools from across the tiers. It was anticipated that four schools representing each tier would provide enough data to answer the research question and to reach data saturation. Data saturation was defined as the point where no new information was discovered, indicating that data collection could be concluded (Fusch and Ness, 2015). Staff who have supervising, coaching, and training responsibilities of Ulster Schools Cup male Rugby players were eligible to take part in this study.

2.3. Procedure

Following ethical approval, the Principal and/or Head of Rugby of each school was contacted by letter. The letter outlined the purpose and conduct of the study. The Principal was invited to discuss the study with their teaching, coaching, and training staff. Rugby coaches (comprising school staff and externally appointed coaches), strength and conditioning coaches, and medical staff were invited to participate. The Principal/Head of Rugby was then contacted by the researcher (DA) by telephone to gauge their interest in the study. After the phone call, s/he was asked if the school would like to be involved. After this initial approval, the researcher (DA) attended a training session at the school to introduce himself to staff and briefly explain the purpose of the research.

An information sheet was given to staff who expressed interest in taking part in the study. Those interested individuals were asked to contact the researcher via telephone or email, and a cooling off period of one week was implemented. Once all participants had completed the consent form, dates and times were agreed for the interviews to take place.

2.4. Data collection

Interviews are an effective means of learning about the interviewee's experiences, emotions, and feelings where the subject matter may be of a sensitive or confidential nature. Furthermore, the purpose of the interview is to gain an appreciation of the interviewee's viewpoint and perspective (Dilshad & Ijaz Latif, 2013). Semi-structured interviews offer the opportunity to ask additional questions where some clarification is required, or to further develop an emerging theme or discussion (Evans, 2018). The interviews were conducted using the University's Virtual Learning Environment conferencing facility.

The interviews were facilitated by the researcher (DA) with one other experienced observer (JC, DK or IW). Their role was to make field notes including observations of the discussions and key points from each session. The sessions were recorded for the purposes of transcription and only the research team had access to the recordings. The recordings were deleted once the data had been transcribed and verified. A topic guide was developed by the research team which addressed the aim of the study; to gain an understanding of the phenomenon of injury and awareness of injury in elite schoolboy Rugby players. The objectives were to gain an understanding of current practices regarding injury recognition and management, return to play strategies (for example, who makes the decision, players' readiness for return to competition and re-injury rates). Participants were asked to reflect on their experiences of working with injured players when answering the questions. Using an iterative approach, following each interview, the recording was reviewed to identify probes for the next interview. After the fifth interview, the research team agreed that there was no further need to amend the topic guide (Please see topic guide in Appendix 1).

2.5. Data analysis

The purpose of thematic analysis is to identify and subsequently analyse themes to address the research question (Castleberry & Nolen, 2018). The online video recordings were transcribed in full, and each transcript anonymized. The research team independently read and coded the transcripts. Codes and themes were then agreed by consensus (Green & Thorogood, 2018). Themes were identified, in the first instance, by researcher (DA), and then by the research team (JC, DK, IW) for more in-depth analysis (Kruger & Casey, 2009). (Please see Thematic Tree - Appendix 2). It was believed that data saturation was reached after eight interviews, however a further three interviews were conducted to ensure that this was the case.

The following process was used to identify codes and themes:

1. Interviews conducted online by DA with an observer (JC, DK or IW).
2. Interviews transcribed by DA.
3. Each transcript verified by a member of the research team (JC, DK or IW).
4. NVIVO (version 12) Qualitative Data Analysis Software package used to organise and code the data by DA.
5. Codes were independently identified by the research team (JC, DK, IW)
6. Codes reviewed and agreed by consensus.
7. Following coding, themes were identified by DA.
8. Themes were independently reviewed by the research team (JC, DK, IW)
9. Themes were agreed by consensus.

3. Results

3.1. Participants

Most schools' Rugby coaches were teachers, working in an extracurricular capacity. All coaches who took part were males. There were no female Rugby coaches in any of the schools involved in the study. Nine of the 11 coaches involved in the study were employed by the school as teachers, teaching across several subject areas including physical education, sciences, arts and humanities, and languages. Of the remaining coaches, one coach was employed as a science technician and the other was an externally appointed Director of Rugby who had the responsibility of co-ordinating the Rugby programme for all players from year 8 to year 14 (11–18-year-olds), in addition to coaching duties with the first XV squad. All coaches had played or continue to play competitive Rugby. The table below shows the number of schools involved in the study, the tier in which they play, and the number of coaches interviewed. The researchers were unable to recruit a school who plays in Tier 4 of the Ulster Schools Cup (Please see Table 1).

3.2. Interviews

All interviews were conducted online between June and July 2020, and each took 60–80 min to complete.

Table 1
Ulster Schools Cup tiers and number of coaches represented in each school.

School	Tier	Number of coaches
1	1	3
2	2	4
3	3	2
4	3	2
(n = 4)		(n = 11)

3.2.1. Factors that influence coaches' decision making

Four main factors influence coaches' decision making regarding the management of injured players: (i) experience and learning (formal, informal, and experiential), (ii) relationships and attitudes (iii) knowledge and understanding of the roles and responsibilities of medical staff and other healthcare professionals (HCP) and health fitness professionals (HFP), and (iv) resources available to them.

3.3. Coaches' experience and learning

Whilst emergency medical provision is available for most competitive games, some schools' Rugby coaches appeared to take a lead in the initial pitch side assessment of injured players and made decisions on whether assistance from ambulance or paramedical personnel was required. Coaches utilise their first aid training for the immediate management of injuries occurring on the pitch. Despite often having a medical service provider on site, some coaches felt that it was their responsibility to "deal with [injured players] and diagnose on the pitch first" (P3), in effect, providing pitch side triage.

In making decisions regarding the management of injured players, coaches draw broadly from informal learning opportunities and their own coaching and playing experiences. "It's … my own experience … through my own eyes as well so you know, it's my interpretation … but I do have a bit of an idea" (P1). Coaches also draw from their own experiences of injury to recognise when "someone pulls a hamstring" or when a player has "sprained their ankle" (P5). In conducting a pitch side assessment of injured players, coaches seek to establish if players are in pain, or identify an "obvious deformity" or to determine if "they need further treatment at the hospital" (P1). In the case of minor injuries, coaches may "ice [the injury] and just see how it settles" (P1). Some coaches may conduct a "crude assessment … can he bear weight; can he do all those little strength tests and things like that?" (P8). However, participant 4 suggested that coaches "who maybe don't have as much experience or who will be questioning themselves [should] just let the professional make the decision … the only thing to do is take the player off'" (P4).

3.4. Relationships and attitudes in schools' Rugby

All coaches appear to maintain good relationships with most players. The interaction between coach and player is pivotal in terms of how that player is perceived when he becomes injured. Coaches rely on updates from players regarding injury status, and "will take the boy's word for it" but will contact a parent "if there is a specific thing [they] really want to know" (P6). Coaches can recognise when a player may be injured during a game by observing their movements and demeanour, for example "if someone is holding their shoulder or if they are limping" (P1). The coach may suspect an injury where they notice a drop-off in performance or where a player is "having a bad game" (P1). Coaches can also identify when players may be experiencing stress or anxiety by observing changes in their behaviour or demeanour, "you get to know the boys … the loud ones [who] would be bouncing around after a match" (P10) and, where possible, will engage with the players "who are a wee bit off, or sitting in a corner, very quiet" (P10) to ascertain what is going on.

Being familiar with mannerisms and personality help coaches to recognise when a player has suffered an injury; "are they willing to take guys on, or are they just looking to get rid of the ball? Their confidence levels, are they looking for work? Just basically

watching how they are moving about the field" (P8). Under-reporting of musculoskeletal injuries is evident in schools' Rugby. Coaches are aware that players "do get injured" but may not let it be known that they are injured, because "they are very keen to play" (P1). Coaches recognise that players may not be fully aware of the consequences of playing whilst injured. Adolescent players may underestimate the nature and severity of their injury; "I'll be fine again tomorrow or in two days' time, the swelling will have gone down" (P3). There is also a perception that some players are not willing to follow the correct injury management procedure and ignore guidance from the coach; they "want to play and … want to be at training … [but won't] take [the coaches'] advice" (P3). When players do report injury, the feedback is usually non-specific, making it more difficult to establish the nature and severity of the injury. Players "usually report pain"; for example, "sir my ankle is sore", or "I can't catch the ball, my hand is sore" (P7). 'Sir I can't play on', that could be as simple as you get … until you actually get some sort of diagnosis" (P4).

However, there is a reliance on the player informing the coach that they are injured; "it's quite hard to know without them highlighting [that they are injured]" (P1). When injured players are ready to return to training and competition, it is not evident that they will have completed a supervised injury rehabilitation and return to play programme; "when the player thinks it's right to return, they return" (P10).

3.5. Professionalism in schools' Rugby

Schoolboy Rugby is currently undergoing a period of change; "it's a different schoolboy game to the game I played … its faster and bigger … a lot of schools have directors of Rugby now, in the top schools. So [the players] are more skilful, they play the game quicker and faster, but the game is developing … I see how the game is adjusting … the game is certainly a lot better than when I was in school" (P6). Parallels with professional Rugby can be in seen in the schoolboy game. The "top schools" "have full time coaches from 9 o'clock to 5 o'clock and pupils have strength and conditioning embedded into their timetable" (P4). Planning the schools' Rugby season has become an almost year-long process. "Teams are starting earlier and earlier … we traditionally are the first Saturday in August, and that will probably get earlier and earlier in the years to come … if we leave our training later in the year, where our boys are training right up to the end of June, they get the month of July off then start again" (P4).

Yet despite an awareness among schools' Rugby coaches that the current schools' Rugby culture places significant demand on players to perform at a high level "expectations are very high [and] demand on players [is] very high" (P4). Schoolboy Rugby players are completing "five training sessions … every week" in order to "get an edge, or a professional edge at schools' level" (P4), such is the desire to win. This transition to a more professional approach and attitude reflects "the way the game's going … you have to try to keep pace" (P3). Coaches want players to "progress along a professional athlete's programme" (P2). This attitude is also echoed in the players; coaches are aware which players are "the most mature and the most professional" (P10).

Yet for many schools, who are "bringing boys in at 7 o'clock in the morning … to do their S&C″, it is far from a level playing field. "You are looking at that saying, 'well, there's a pupil doing five sessions, two of those sessions are from half seven to half eight in the morning'. It's a long day … because they're not able to do it in their timetable" (P4). For the smaller, but no less ambitious schools, playing the "top schools" can be "very, very daunting … you could have three big and fast players in a country team, they've 15 of them!" (P9).

Nonetheless, coaches are aware of the risk of injury in Rugby, and they encourage injured players to "rest", or to seek help if "they need treatment on injuries" (P5). Coaches do endeavour to "make sure training is safe … that the environment they are training in is safe … and then making sure they are playing safe Rugby" (P11). Having experienced injury themselves, coaches can empathise with injured players, but they know how important Rugby is to the boys. They understand that the boys do not want to "miss Rugby" (P1) and are aware that for many boys, playing Rugby is "a motivating factor" (P1) to attend school. Coaches seek to foster a cohesive team mindset amongst their players, particularly where injured players can remain an integral part of the team setup. "It's very important to keep those boys feeling part of the squad from a psychological point of view … but also from the team perspective … that boy will [be able to] reintegrate into the team" (P5).

3.6. Parents

From the coaches' perspective, parents are supportive of schools' Rugby coaches and schools' Rugby in general. They often attend matches and on occasion, parents may be called upon to assist when a player becomes injured. In Rugby circles, there is a strong sense of "community in general" (P3). This is often seen where a schoolboy player is injured and a "parent may be a doctor or a physio and may be able to give … assistance with figuring out what's going on" (P3).

Parents are also a source of information about players' welfare. Coaches will use the opportunity to catch up with "parents … at the match on Saturday, or ring "the parent to chat about the injury to see how they are recovering" (P10). Living in the local community and "knowing a lot of the people in the town" (P7) often provides coaches with impromptu opportunities "to speak to [parents] and find out about the boys" (P7). Parents are now more aware of injury risk in the adolescent game; "back in the day, even my parents would have encouraged me, 'you can't miss Saturday, strap it up and you'll be fine'" (P4). There is a greater obligation for coaches to "give clarity to parents" (P4) regarding the nature of their son's injury and when they might expect them to be able to return to play. Schoolboy Rugby coaches believe that they would benefit from further training to improve their knowledge and awareness of musculoskeletal injury and return to play, "an educational tool or a course, or any way to … upskill" (P10).

3.7. Knowledge and understanding of the roles and responsibilities of healthcare professionals (HCPs) and health fitness professionals (HFPs)

The involvement of HCPs and HFPs within schools' Rugby in Ulster is diverse and is not formally regulated or monitored. One school involved in this study retained the services of a sports therapist, "who would be with the first 15 on a Saturday" (P7). The remaining schools either recommended a specific physiotherapist or sports therapist or advised players to self-refer to a healthcare

practitioner of their choosing. In most instances, coaches referred players to HCPs who were known to them as many schools "don't have a physio … for the Rugby team" (P8). Whilst coaches may not be fully aware of "all the differences in terms of qualifications", healthcare professionals provide necessary "support, and are … more qualified … to make calls on things" (P6).

Most schools' Rugby coaches consider strength and conditioning (S&C) and fitness training to be important components of the game of Rugby, in order "to compete in Rugby", "strength and conditioning … needs to be at the forefront of things" (P4). In one school, a member of staff holds a bachelor's degree in S&C and takes a lead in the planning of the strength and conditioning schedule for the players. In another school, the Director of Rugby oversees the S&C programme. The remaining schools retain the services of an external S&C coach, personal trainer, or fitness instructor. It is it not fully clear to the authors what their role is in each of the schools in terms of planning and administering fitness training. It is also unclear as to what extent schools' Rugby coaches are aware of the role of S&C in management of injured players. Some schools' Rugby coaches may not be fully aware of the "benefits of conditioning [or] the real benefits of rehab" (P4) and would therefore gain from further training regarding the relevance of S&C and injury rehabilitation more generally.

3.8. Resources

School's Rugby provision varies from school to school and is largely dictated by the availability of staff to coach players and finances available to fund a Rugby programme. For the Head of Rugby in one school, several factors impact his ability to deliver a Rugby programme; "getting time on the pitch is the foremost thing for a coach … the academic side of things does take priority, as it should in a school, but trying to fight for … Rugby and sport in schools is something that I think every school really struggles with … I have to be constantly providing stats to senior management team, about participation rates, and really defend why we need an S&C coach, defend why I need a period of admin for Rugby" (P4).

Fitness and healthcare provision varies significantly from school to school and is largely dependent on financial resources available to each school. While wealthier schools can retain the services of "a fulltime S&C person who runs [the] gym" and "a physio that travels with all [the] teams," other schools "don't even have a [first aid provider] on a Saturday morning … it's just the coach" (P2). Schools' Rugby coaches realise the value and necessity of having suitably qualified and experienced healthcare staff onsite, but many schools "don't have … the money to have a physio or a medic" (P8).

3.8.1. An education focused musculoskeletal (MSK) injury toolkit

The coaches who took part in the present study acknowledged that there is a need for greater awareness of musculoskeletal injury in schoolboy Rugby; "within schoolboy Rugby … it does seem to be that there's more injuries and how to … deal with that is … very important" (P10). Schools' Rugby coaches desire to "be better and be more, [to] have a better understanding" in the knowledge that "constantly things are changing, think back ten years ago with the concussion, there was none of that, so we're always trying to improve" (P9).

Whilst coaches were not entirely sure what should be included in an 'MSK toolkit', a few ideas were suggested: identification and severity of injury; "guidelines for soft tissue injuries and skeletal injuries" (P5), management (on and off pitch); "what sort of rehab they should be doing" (P6), "the typical return to play" (P3), "how do we gauge where someone is in their injury?" (P8), and ongoing injury prevention strategies; "what is a potential injury, what is this person most pre-disposed to?" (P8). In terms of the format in which a toolkit could be presented, coaches suggested the following: webinars or short training courses, booklets, information sheets or posters and an App.

4. Discussion

4.1. Schools' Rugby coaches' role in managing injured players

Schools' Rugby coaches play a significant role in the management of injured schoolboy Rugby players. It is relatively commonplace for Rugby coaches to utilise their first aid training for the immediate assessment of injuries occurring on the pitch and making decisions about the management of injured players (referral to healthcare practitioners, liaising with the player and parents or caregivers, overseeing injury rehabilitation and return to play). In performing this role, coaches also draw broadly from their own coaching and playing experiences. This is somewhat problematic; given that coaching and playing experience will vary from coach to coach, so too will the advice and guidance given to injured players. Whilst coaches can recognise when a player is injured during a game by observing their movements and demeanour, or by observing their mannerisms after a training session or a game, there is a reliance on the player informing the coach that they are injured. Players are often relied upon to advise the coach on their recovery, injury rehabilitation and readiness to return-to-play. Players want to play and may be willing to return to play before they are ready, increasing the risk of re-injury (Tabener et al., 2019).

4.2. The role of healthcare professionals

In professional sport, clubs often employ a full-time multidisciplinary sports medicine team, with each member contributing to the overall sports medicine provision (Tee et al., 2018). Amateur adult sports teams may retain the services of one or two healthcare providers, usually on a part-time basis (Hagglund et al., 2016). Whilst it is speculative to presume that most healthcare professionals working with sports teams have a particular interest in that sport, some schools' Rugby coaches believe that sports focused physiotherapists are better placed to "understand competition and … the boys desire to get on the pitch" (P2).

For other coaches, a physiotherapist with a background in Rugby is more favourable; the "sports physio played Rugby, was still playing Rugby, understood Rugby injuries, and yeah, he was good" (PT6). This perception may be influenced by coaches' personal experiences as players. In professional sports settings, injured players receive a speedy assessment, have access to medical imaging and are exposed to sophisticated methods of injury rehabilitation and return to play protocols. However, amateur players are often responsible for managing their own rehabilitation, perhaps having limited contact with healthcare providers and at their own cost financially. Unlike professional athletes, they will not have daily, free access to sports rehabilitation staff who will monitor every aspect of their return to play (Hagglund et al., 2016). Similar experiences may influence schools' Rugby coaches' opinion of who is best placed to look after injured schoolboy Rugby players.

4.3. Return-to-Play

In elite sports, return-to-play (RTP) decisions often involve a multi-disciplinary team that may include coaches, sports scientists, physicians, physiotherapists, and athletic therapists, alongside the athlete (Shrier et al., 2014). Early return to play increases the risk of injury (Tabener et al., 2019), therefore it is important that injured athletes have completed enough training to ensure they are ready to RTP (Blanch & Gabbett, 2016). Whilst it is not feasible for schools to employ a multi-disciplinary medical team, it is important that schools' Rugby coaches understand their role in the RTP of an injured athlete (Dijkstra et al., 2017).

4.4. RTP in schools' Rugby

It is not evident that progressive, phased RTP approaches, supervised by an appropriately trained HCP, are commonly utilized in schoolboy Rugby (Reiman & Lorenz, 2011). A somewhat ad hoc approach to RTP is evident; "if [the player has] been given guidance from outside, whether it's a physio or a doctor, we will try and stick to it" (P3). When the player feels ready to return, coaches will "try and build [the player] back into training … to make sure that there's no pain in whatever the injury may be." (P3). Players were often left to make their own decisions regarding RTP; "when the player thinks it's right to return, they return" (P10). It is of concern that players may not undertake appropriate sports rehabilitation following injury to ensure their readiness for a return to training, competitive play, and performance.

4.5. The role of strength and conditioning in RTP in schools' Rugby

Because of the perception that the top tier schools' players are "so much bigger, so much fitter, so much faster" (P9), ambitious players at schools in the lower tiers strive to work harder to close the gap with the elite schools. To address this perceived gap, coaches feel that a greater "emphasis on the S&C [is the way] forward" (P9). However, greater levels of physicality (strength, power, and speed) leading to higher collision forces, increases players' injury risk (Archbold et al., 2017). When playing against much stronger teams, the physicality of these encounters may explain "where injuries come from in those games" (P9). Whilst elite adolescent Rugby players demonstrate greater levels of strength, power, and speed than amateur and younger players, there is limited research investigating S&C training practices in adolescent Rugby (Weakley et al., 2019).

In some instances, fitness professionals are involved in activities that are outside their scope of practice including the analysis of injuries. S&C coaches working in schools' Rugby may be asked to design specific rehabilitation "programmes for [players] who are injured, or … recovering from a certain injury", often during "the primary phase of recovery … and maybe somewhere down the line after that where [the S&C coach] reintroduces a proper weights programme" (P8). As an injured player progresses from early-stage rehabilitation to end stage rehabilitation and return to play, the focus shifts from resolving physical impairments to restoration of functional and sports specific performance (Kraemer et al., 2009). It is at this latter stage that the S&C coach, working with the physiotherapist or graduate sport and exercise therapist and Rugby coach can focus on strength, endurance, speed and agility, neuromuscular training and so on, enabling the player to return to play safely and effectively (Kraemer et al., 2009).

RTP should not simply be viewed as an 'add-on' to recovery and rehabilitation from sports injury. Planning the athlete's return to sports participation should begin in the early stages of recovery (Ardern et al., 2016). In the absence of sports specific guidance, coaches cannot be sure of when a player is ready to return. "So, it's very hard to gauge … in terms of returning to Rugby … you're 'guess-timating' when players should be coming back to play Rugby" (PT4). Helping schools' Rugby coaches to better understand their role, and that of HCPs and HFPs in the RTP process (Dijkstra et al., 2017; Shrier et al., 2014) will in turn help them to develop their awareness of injury, to be more confident in knowing when a player is ready to return to play and to remove the RTP responsibility from the player.

4.6. Need for further training

It is already known that education of Rugby coaches improves player injury prevention behaviours (Gianotti et al., 2009). A recent study by Barden et al. (2021) further highlighted the importance of coaches' knowledge of injury risk and prevention in terms of a culture of injury prevention among players. The availability of suitably qualified and experienced medical personnel working in schools' sports settings is of concern (Leahy et al., 2020). Pitch side first responders in schools' Rugby settings are likely to be laypersons (coach, teacher, parent, etc.) with basic first aid training (Hanson & Carlin, 2012), however such provision is not sufficient to meet the demands of pitch side sports injury management in modern-day schoolboy Rugby.

The 5th International Consensus Statement on Concussion in Sport (McCrory et al., 2017) presented a clearly defined sport-related concussion protocol, developed for HCPs working with amateur, elite, and professional athletes. The "eleven Rs of sport related concussion management" are as follows; recognise (and evaluate), remove (the player), re-evaluate, rest, rehabilitation, refer (where persistent symptoms exist), recovery, return to sport, reconsider, residual effects and sequelae and risk reduction. Based on the findings of the 5th International Conference on Concussion in Sport (McCrory et al., 2017), the Sport Concussion Assessment Tool (SCAT5) (Echemendia et al., 2017a) and Concussion Recognition Tool (CRT5) (Echemendia et al., 2017b) provides procedural guidance for HCPs and non-medical staff working with athletes aged 13 years and over with suspected concussion. The development of a recognition tool has removed decision making responsibilities from coaches regarding the diagnosis of concussion (McCrory et al., 2013). The protocol provides clarity for coaches and players alike. In a similar manner, an educational toolkit for musculoskeletal injury may be effective in providing guidance for schools' Rugby coaches when dealing with musculoskeletal injury.

5. Conclusion

Schools' Rugby coaches play a significant role in the supervision of injured adolescent Rugby union players. They are involved in pitch side management of injured players; they liaise with coaching colleagues, parents and caregivers, HCPs and HFPs and make decisions regarding a player's readiness for return to play following injury. Whilst most coaches have first aid training, they often rely on their own playing and coaching experiences when making decisions regarding the management of injured players.

Schoolboy Rugby is currently going through a period of change. Players are stronger and fitter, and the game is faster, partly

influenced by a greater focus on strength and conditioning. Training and competition reflect the professional game; extended pre-season training schedules and in-season training five days per week with at least one competitive game per week is the norm. Schools retain the services, or recommend the services, of HCPs and HFPs. However, the role of these individuals, along with their qualifications and experience is not fully understood by coaches, particularly in the areas of injury rehabilitation and return to play; aspects of healthcare provision where physiotherapists, graduate sport and exercise therapists and graduate strength and conditioning coaches can have significant influence. Coaches acknowledge that there is a need for further training and would welcome education initiatives aimed at increasing awareness of musculoskeletal injury in schoolboy Rugby players.

Author contributions

DA, JC, DK and IW participated in the design of the study, contributed to data collection and data analysis. IM and MH acted as external reviewers. All authors contributed to the manuscript writing.

Ethical approval

Ethical approval for this study was granted by the Research Ethics Committee of Ulster University. Participants gave informed consent to take part.

Ethical statement

This research has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

All participants gave informed consent to take part in this study.

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Declaration of competing interest

The authors have no conflicts of interest to declare.

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Appendix 1. Semi-structured interview schedule

Semi-structured interview schedule (staff).

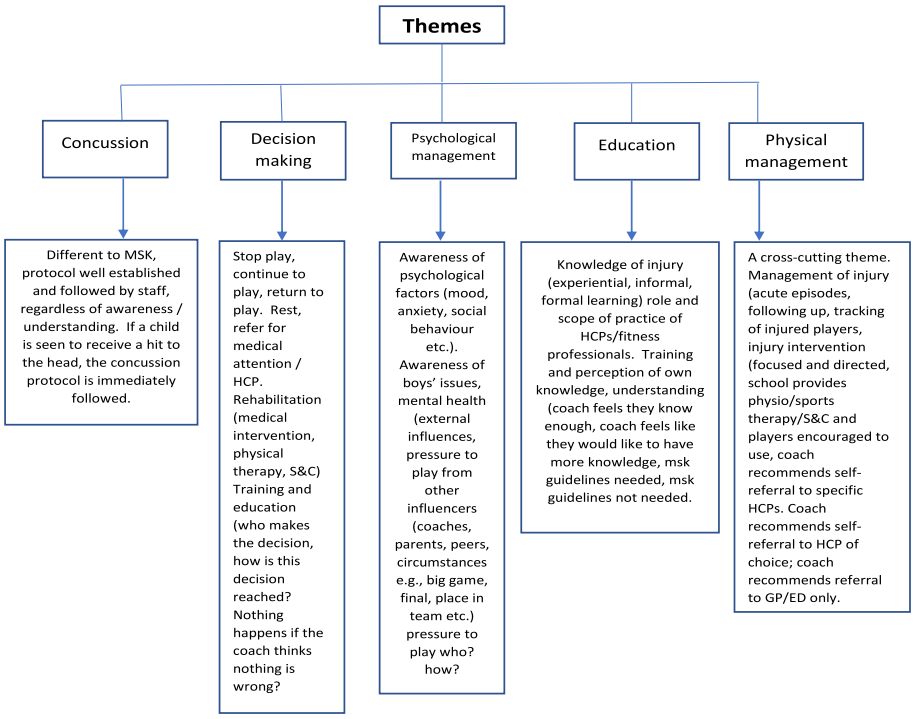
1. Collect consent form
2. Advise participant that the interview is being video recorded
3. Explain that this is a safe place for discussion and that the participant can take a break at any time and/or discontinue the interview

The study aims to gain an understanding of the phenomena of injury and awareness of injury in elite school-boy Rugby in schools that take part in the Ulster Schools Cup. You have been invited to take part in this study because you have a teaching/coaching, training or medical role with the players. I hope to gain an understanding of current practices regarding injury recognition and management, return to play strategies (who makes this decision, players' readiness for return to competition, re-injury rates and so on). You can speak in confidence, but if poor practice is uncovered, it will be reported to the appointed safeguarding officer within the school.

Please reflect on your experiences of working with injured adolescent Rugby players when answering the following questions:

1. (Ice-breaker) – hello _____ thank you for agreeing to take part in this interview today, can you start by describing your responsibilities with your school's Rugby team?
   - Probes: overall role
     - o Coach, trainer, healthcare professional (designation?)
   - responsibilities with injured players
     - o point of contact
     - o decision making – who gets treatment and why? Priorities eg. 1st 15, 2nd's, medallions etc
     - monitoring injured players
     - liaising with other staff
     - RTP (strategy/management) – role of strapping (physiological/psychological crutch? How is this managed?)
2. Now we have a general idea about your role with your school's Rugby team, would you tell us about your experience of injuries involving your players?
   - Probes: types of injury
     - o Frequency (per match?), severity of injuries (ratio per match frequency)
     - o recovery (management and rehab)
     - o re-injury/recurrence of injury
     - awareness of injury in players
     - understanding of injury burden – physiological; what about psychological? (competition, proving themselves, just love playing, high stakes)
3. So what factors might indicate to you that a player has been injured or is in pain?
   - Probes: eye-witness (training or match)
     - o first point of contact/pitch-side
     - o players generally report an injury
     - typically, what does a player report to you?
   - After a training session/match
     - o verbal/non-verbal signs
     - o attitude/demeanour of child
     - performance/commitment to training or during subsequent matches
     - o what you might expect to see (signs and symptoms)
4. Can you tell us about your experience of managing injured players?
   - Probes: referral to medics, GP, other trained professionals on staff,
   - understanding of the scope of practice of
     - o coaches
     - o trainers or S&C's
     - o medical personnel (docs, physiotherapist, athletic rehabilitator/sports therapist)
   - your preparedness for your role in the management of injured players,
     - o sufficiently prepared?
     - o Would like further training regarding injury awareness
   - willingness to take up an offer of further training/additional support
   - MSK educational tool/guidelines – (concussion protocol, very clear, very successful) what about msk injuries? What should be included/what might this look like?
5. Is there anything else you would like to add?

Appendix 2. Thematic tree



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