New Zealand community rugby players' perspectives and experiences of concussion and its management; a qualitative descriptive study.

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Abstract

This qualitative descriptive study explores the concussion experience of community rugby players in New Zealand (NZ). Concussion is an incredibly complex injury. When not adequately managed, a concussion can result in profound short and long-term consequences for the individual. Contact sports, such as rugby union, have recently received increased media attention due to the sport's high concussion incidence – and its correlated potential to develop neurological disfunction. In order to address this issue, New Zealand Rugby (NZR) launched a concussion management pathway (CMP), which forms part of a national initiative to better support concussion in community rugby.

This study forms part of this nationwide initiative. It aims to provide a voice to community rugby players so as to obtain an insight into their concussion experience - as influenced by NZR's CMP. While there is increasingly more research focused on addressing the issue of concussion in rugby union, few have focused on obtaining players' perspectives of the experience, and none to date have exclusively focused on players' perception of the CMP.

Participants of this study consisted of 36 community rugby players in NZ. Data was gathered through individual interviews. Thematic analysis was utilised to analyse the data and resulted in the identification of four dominant themes: symptomatic experience, the role of a dedicated concussion management pathway in the player's experience, the significant influence of the role of the coach and the physiotherapist, and the general NZ rugby culture and the mind-set of the NZ rugby player.

The study found that the concussion experience can be physically and mentally challenging and has no clear beginning or end. The CMP, as a provider of support, was significantly well received and appreciated. At times, the sport's collective cultural values, in which the group is viewed as being bigger than the individual, made it difficult for players to exert positive concussion management behaviour; thus suggesting that improving concussion management requires initiatives to apply a holistic and contextual understanding of the sport.

The significant success of the CMP in relatively short time highlights how important having a dedicated concussion management support system is for players' overall experience and welfare. This study suggests that it is essential for the current support to continue to improve, and grow, so that all community rugby participants are, in the near future, as supported as possible.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except when explicitly defined in the acknowledgements). Nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed_____

Rodrigo Costa

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Ethical Approval

Ethical approval for the overall study. Of which this study is one component, was granted by the University of Otago Ethics Committee: Reference 18/087 (Appendix B)

Chapter 1: Introduction

This qualitative descriptive study explores the concussion experience of community rugby players in New Zealand (NZ). Through implementing thematic analysis on 36 individual interviews (with community rugby players from four different provinces in NZ) this study aims to obtain an insight into players' personal perception of their concussion experience.

Concussions are incredibly complex brain injuries (Kazl & Torres, 2019; Mccrory et al., 2017). When not properly managed, the injury can lead to the individual suffering and discomforting side-effects, and possibly even lead to the development of long-term brain dysfunction (Decq et al., 2016; Howell & Southard, 2021). Improved understanding and awareness of the potential consequences of experiencing concussion in sport has led to increased efforts, from sporting organizations around the world, into improving the levels of support available for managing concussions. An example of such an effort is NZ Rugby's Concussion Management Pathway (NZR's CMP) (Salmon et al., 2020). NZR's CMP is part of a national concussion initiative, aimed at improving rugby's concussion management at the community level.

NZR's CMP has been on trial since 2019. Clearly, the stakeholders most influenced by concussions, - together with any initiatives designed to manage the injury, are the players. Although a number of publications have emanated from the CMP initiative (Salmon et al., 2020a; Salmon et al., 2021; Salmon et al., 2020c; Salmon et al., 2020b), this is the first study to exclusively focus on understanding the concussion experience of players themselves.

This study aimed to give a voice to the players so that future initiatives are designed with a better understanding of players' attitudes, beliefs, and feelings in regards to their concussion experience; so that these initiatives are more player centred, and potentially better positioned to affect positive behavioural change. It will also serve to enhance our understanding of what is currently working well in the CMP, and which areas may need improvement.

Background and Context

Concussion is a major issue in sport (Gardner et al., 2014; Prien et al., 2018). It is a complex injury, with the potential to cause severe short and long-term damage to one's

physical and mental health, such as depression, anxiety, suicidal ideation, and psychotic disorders (Chrisman et al., 2021; Whelan-Goodinson et al., 2009).

In recent decades, concussion and resulting health effects have developed into a major discussion point in the media and throughout the sports industry (Alla et al., 2011; Mccrory et al., 2018). As a result, there is now more awareness around concussion management and treatment for athletes than at any other time in history (Collins et al., 2014; Gupta et al., 2019; Powell et al., 2021). However, despite improvements, concussion management programs in contact sports – such as rugby union - still lack in quantity and in effectiveness (Fraas & Burchiel, 2016).

An estimated 5 million people participate in rugby union leading to claims that it is the most widely played team collision sport globally (Viviers et al., 2018). Through its physical nature, and frequent body to body collision, rugby union naturally generates a high number of injuries (Chéradame et al., 2021).

In NZ, rugby union is often perceived as the country's national sport, a sport that is of historical and cultural significance (Palenski, 2015). In secondary schools across NZ, rugby is played by around 40,010 male and female athletes (13 to 18 years of age) (NZR National Rugby Database, 2019). In NZ, rugby accounts for 53% of all sports related concussions in adults over 16 years of age - and 15% in children under 16 (Theadom et al., 2014). Based on the prevalence of rugby played by young people it would seem to be fundamentally important to have an effective concussion management program to help protect and improve player welfare. RugbySmart, a joint injury prevention and education venture between NZ Rugby and Accident Compensation Corporation (ACC), was launched in 2001, with the aim of reducing the number and severity of injuries in rugby and improving awareness and education amongst all stakeholders (Hume et al., 2017; Quarrie et al., 2007). As a program, it has proven to be effective in reducing over-all injuries (Gianotti et al., 2009; Quarrie et al., 2020). In recent years, RugbySmart has placed particular focus on the issue of concussions in sport. Following the 2016 Berlin concussion consensus, NZ Rugby has aggressively invested in its concussion management program; as demonstrated through the recent initiation of the CMP (Rugby Smart, 2018). The CMP has been specifically designed to improve concussion management at the community level (clubs and schools) and has already demonstrated positive results (Quarrie et al., 2020; Salmon et al., 2021).

This Masters dissertation will form a part of this ongoing national concussion initiative. As such, it aims to provide insights from players to enable and inform concussion management at the community level in NZ rugby union. This qualitative descriptive study will exclusively focus on providing players with a voice, so as to gain an understanding into the concussed players' experience of the injury – as well as their perception of the CMP. Findings -from this study will be used by NZR to further improve concussion management in the future.

Acknowledging that this Master's dissertation is one component of the NZR CMP initiative, the focus is on the analysis and dissemination of player interview data previously collected in the broader program.

Methodology Choice for the Research

This research sits within a pragmatic paradigm, and the methodological approach chosen is qualitative descriptive. Thematic Analysis was used to analyse the data, utilising an inductive approach, and assisted by the data analysis software Nvivo.

Research Question and Purpose

The purpose of this study is to understand the concussion experience of NZ community rugby players (as influenced by the CMP). This study aims to achieve this through answering one key question;

What are NZ community rugby players' perspectives and experience of concussion while progressing through NZR's CMP?

Aims of the Research

- To better understand the concussion experience of NZ community rugby players.
- To better understand how concussed NZ community rugby players perceive the support provided by NZR's concussion management pathway (CMP).
- To better understand what aspects of the CMP were positively or negatively perceived by rugby players who sustained a concussion.
- To provide relevant information which will be used to improve the support provided to community rugby players in NZ.

Structure of the Report

Chapter Two; Literature Review: This chapter explores literature relevant to the topic of concussion as a brain injury, as a problem in sport in general, and more specifically in rugby union. It will also study the biological mechanism, causes, risk factors, and potential solutions related to this issue. The literature review will, in line with the focus of this study, examine current knowledge related to player perspectives of concussion.

Chapter Three; Methodology: This chapter details the research methodology and methods adopted in this study. As such, it presents elements of the research design which include procedure, participants, data collection, and data analysis. It also considers the ethical considerations applicable to this study, as well as criteria identified for rigour and trustworthiness in qualitative research.

Chapter Four; Results: This chapter provides the findings obtained from the thematic analysis I conducted. The chapter discusses the four main themes identified through my analysis. These themes assist in understanding the NZ community rugby player's concussion experience – as well as their perception of NZR's (CMP). The four themes presented in this chapter are;

- Symptomatic experience
- The role of a dedicated concussion management pathway in the players' experience
- The significant influence of the role of the coach and the physiotherapist
- General NZ rugby culture and the mind-set of the NZ rugby player

Chapter Five; Discussion: This chapter discusses the key findings in relation to previous literature. The chapter is structured around the four main themes identified in the results chapter.

Chapter Six; Conclusion: This chapter concludes the dissertation, acknowledging limitations and identifying the implications of the study and recommendations for future research and application.

Chapter 2: Literature Review

This narrative literature review aims to examine literature concerned with concussion as experienced in the sport of rugby union.

Search Methods

Computer searches were conducted of the peer reviewed English Language literature, from 2000 to present. Databases searched included Google Scholar, PubMed, SPORTDiscus, and University Theses collections. The standard Google search engine was also utilised to locate government, popular and media information pertinent to concussion issues specifically related to rugby. Keywords used included: concussion; qualitative; rugby union; traumatic brain injuries (TBI); repetitive head knocks; sub-concussive; head knocks; consequences; long-term; incidence; Chronic Traumatic Encephalopathy (CTE); brain damage; brain disease; New Zealand; players; athletes; brain injury.

Understanding of the Term 'Concussion'

Understanding concussion, and its implications, is a complex and continually evolving matter. Concussion has been part of the medical discussion from as far back as the 4th century BC. It is referenced in the Hippocratic corpus, where the father of medicine – Hippocrates - explains that a 'commotion of the brain' can lead a person into an unconscious state (Seymour, 2013).

Despite the injury being medically acknowledged in times of Ancient Greece, it remains an injury which is hard to accurately define and fully understand. Still today, despite advances in brain research and understanding, 'concussion' lacks a universally accepted definition (Bodin et al., 2012; Kazl & Torres, 2019).

The definition of concussion, in today's understanding, has evolved to distinguish between the physical head injury (and possible state of unconsciousness), and the brain's subsequent chemical response and resulting symptoms (Ref). Concussion is therefore seen as a term which describes, rather than defines, the complex process that follows a head injury. This complex process takes place inside the brain of an individual and manifests itself through multiple and differing symptoms; symptoms which always differ and are dependable on multiple different factors (Davis et al., 2019; Kazl & Torres, 2019; McCrory & Berkovic, 2001).

The Pathophysiology of Concussion

Part of what makes concussion a particularly complicated and dangerous injury is the complex pathophysiology involved. Concussion involves a two-stage process consisting of primary and secondary injuries (Smith & Stewart, 2020). Primary injury is initiated by a physical insult to the head, resulting in compression and shearing of adjacent tissues with or without loss of consciousness (Shi et al., 2016). Secondary injury is the complex process that occurs in the hours and days following primary injury. It can be described as the 'cascade' effect of the primary injury. Brain injury through a head knock, usually results in axonal injury. Depending on a number of contextual factors, axonal injury can lead to a number of neurological complications (Smith & Stewart, 2020). The multiple chemical reactions which precede a brain injury can cost the brain a lot of energy – and consequently lead to what is commonly described as a metabolic crisis (Giza & Hovda, 2014).

The effort/energy required to heal itself means the brain's energy demands are significantly increased. Meanwhile, because of neurological damage, energy supply is significantly less than normal (Shi et al., 2016). In the effort to supply the excessive energy demanded the brain remains in a constant catabolic mode. In this catabolic mode, increased levels of hormones affect glycaemic levels and lead to transient insulin resistance and glucose homeostasis impairment; resulting in hyperglycaemia (Shi et al., 2016). This can result in potential issues such as excitotoxicity, oxidative stress, edema, neuro-inflammation and cell death (Ambrogini et al., 2019; Hiskens et al., 2021).

These issues are all inter-related, and all contribute towards the development of each other. If not stopped, this process can continually self-promote and evolve into a chronic problem; potentially resulting in mental health disorders - such as depression, anxiety, suicidal ideation, and psychotic disorders (Chrisman et al., 2021; Gornall et al., 2021; Hind et al., 2021; Whelan-Goodinson et al., 2009). In the long-term, it can also possibly lead to a number of different brain disorders such as Dementia, Parkinson's, Alzheimer's, and Chronic Traumatic Encephalopathy (CTE) (Decq et al., 2016; Devine, 2021; Howell & Southard, 2021; Winblad et al., 2019; Zetterberg et al., 2019).

It is also worth noting that a -great deal is still unknown regarding the possible links between concussions and brain health deterioration; particularly regarding its long-term effects (Cunningham et al., 2020). Concussions, despite its relevance and possible implications, has only recently emerged into the spotlight (Smith & Stewart, 2020). It is

expected that the continually increasing amount of research – being carried out on this condition should lead to better understanding of concussion, and its effects on brain health (McKeithan et al., 2019).

Sports-related Concussion Understanding and Management

Concussions in sport, since the turn of the century, have continuously been recognized as a serious threat to the health of athletes (Malcolm, 2019; Quintana et al., 2021; Tremblay et al., 2018). This acknowledgement led to the International Ice Hockey Federation (IIHF), Federation Internationale de Football (FIFA), and the International Olympic Committee (IOC), combining to form the first organization, 'International Symposium on Concussion in Sports' (Aubry et al., 2002). The meeting was held in Vienna, in 2001, and it aimed to "provide recommendations addressing this important topic (concussion in sports) for the improvement of safety and health of athletes who suffer concussive injuries in ice hockey, football, and other sports" (Aubry et al., 2002, p. 57). The meeting symbolized an important and necessary first step towards an organized system aimed at continually improving the understanding and management of concussion in sports (Alla et al., 2011).

From its beginnings in 2001, this organization has grown in size and support. In 2016, World Rugby (the international governing body for rugby union) joined in the process of financially supporting and organizing the meeting; thus demonstrating their willingness to acknowledge concussion as a significant issue in their sport. The most recent conference, held in Berlin 2016, provided the most up to date 'definition' of concussion in sports, as underpinned by the latest research (McCrory et al., 2017). It defined (or more accurately, described), sport-related concussion (SRC) as follows (reproduced verbatim):

"a traumatic brain injury induced by biomechanical forces that can lead to prolonged cognitive, emotional and physical effects. Several common features that may be utilised in clinically defining the nature of a concussive head injury include:

- SRC may be caused either by a direct blow to the head, face, neck, or elsewhere on the body with an impulsive force transmitted to the head.
- SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.
- SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural

injury and as such, no abnormality is seen on standard structural neuroimaging studies.

- SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.
- The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (eg, psychological factors or coexisting medical conditions)." (McCrory et al., 2017)

Rugby Union and the Incidence of Concussion

Rugby Union is a popular contact sport. World Rugby's Strategic Plan (2021) estimated that it is played by approximately 9.6 million people worldwide. This amount marked a 3.7 million increase from 2009, showing rugby's increasing popularity. World Rugby has expressed confidence in its future growth, particularly in women's rugby and in emerging nations (World Rugby Strategic Plan 2021-2025, 2022).

- Rugby Union is an - extremely physically demanding sport. It is a high-paced sport which naturally involves a lot of physical contact (Twist & Worsfold, 2014). One of the game's main objectives is to carry the ball across the oppositions 'goal-line'. In order to do so, a player cannot pass it forwards towards this goal-line, but must instead carry it him/herself (or help a team-mate carry it). In order to stop this from happening, players from the other team must defend the ball carrier, by stopping him or her. This is done through tackling them, using predominantly the shoulder and the arms (Twist & Worsfold, 2014). Tackling a player is a physical manoeuvre, which can often end up involving contact to the head for either the tackler, or the player getting tackled (Cross et al., 2019).

Such a sport, in which players are essentially running as hard and as fast as possible towards each other, naturally produces a high incidence of injuries (Cosgrave & Williams, 2019; Gardner et al., 2014; Pollock et al., 2017). Out of its many injuries, the most currently significant one is arguably concussion (Pollock et al., 2017). Consequently, concussions have recently brought the sport under the media spot-light and have significantly threatened the sport's reputation and global popularity (Malcolm, 2019; McMillan et al., 2017).

Advancements in technology, research, and global awareness have shed light into the potential link between the sport and the development of long-term brain damage (Poole et al., 2015). Rugby Union, as a sport, has one of the world's highest concussion rates. A systematic review by Gardner et al., (2014) estimated the rates at 4.73 per 1,000 player match hours (in men's rugby) – 0.55 per 1,000 player match hours (in women's rugby). The review identified differences in levels of play, with the community or sub-elite level reporting significantly more concussions than elite level. Alarmingly, it is widely believed that the real incidence rate is much higher (Salmon, et al., 2020b; West et al., 2021). Under-reporting, combined with a lack of efficient classification and management resources, as well as a general poor understanding of the term concussion, all lead to undermining the sport's true incidence rate (Dewan et al., 2018; Fraas & Burchiel, 2016; Langer et al., 2020; West et al., 2021).

Such data suggests that the chances of rugby players not sustaining a concussion are in fact very low. Although more research is required in this area, a NZ Rugby health study (2022) conducted with former rugby players found that up to 92% of former elite rugby players, and 82% of former community rugby players believed they had sustained at least one concussion during their time playing rugby (Hume et al., 2022). Of specific concern is the incidence of concussions in females. Women's rugby is steadily increasing in popularity and professionalism, including in New Zealand (Busbridge et al., 2022; Sella et al., 2019). However, women have been shown to be significantly more prone to concussion than men (Tsushima et al., 2019) – as well as significantly less resourced and supported (Chase & Fields, 2021; Furse, 2021; Kanemasu & Molnar, 2019).

The Threat of Sub-Concussive Repeated Head Knocks in Rugby Union

Continual advancements in technology and concussion understanding will help obtain more accurate incidence rates (Guskiewicz & Walton, 2020). It will also help generate more understanding around the danger of sustaining repetitive non-concussive head knocks. There is emerging research suggesting that the major problem in contact sport is not necessarily diagnosed concussions but the accumulative effect of repetitive sub-concussive head knocks (Mainwaring et al., 2018; Nowak et al., 2020; Poole et al., 2015; Tsushima et al., 2019). Research is showing that it is possible to develop concussion symptoms (including CTE) without experiencing an actual concussion but through the accumulation of sub-concussive head knocks (Bailes et al., 2013; Poole et al., 2015; Stein et al., 2015). This is naturally

relevant to the sport of rugby union, where an athlete can experience multiple sub-concussive head knocks on a regular basis.

Rugby Union and Possible Long Term Brain Health Implications

Rugby Union became a professional sport in 1995 (Collins, 2009). A result of this was more frequent and harder contact to the head. Players became bigger and stronger (Hill et al., 2018) – and involved in more training sessions and longer rugby seasons (Rayner, 2017). Rugby union is only just beginning to witness the consequences of this. The first generation of professional rugby players have hit their 40s, and visible damage can be seen (Aylwin, 2021b).

In 2020, eight former players who were diagnosed with early onset of dementia and post-concussion syndrome filed charges against Word Rugby. It is the first allegation of its type in the history of the sport. Leading the group was Steve Thomson. At 41 years of age, he is diagnosed with dementia, and cannot remember the games played when being part of England's world cup winning squad of 2003 (RW Staff, 2020). Since then, the eight have been joined by another 150 fellow players from the same generation; with many more waiting to make a decision on whether to join the group (Aylwin, 2021b). It is expected that the number of players will continue to rise, and it has been suggested that the next few years are expected to unveil unnerving results and correlation between rugby union and mental health disorders (Cummiskey, 2021). Despite the proven long-term effects of sustaining head knocks in rugby union, retired players, explain Daly et al., (2021), lack the necessary support required to effectively manage these (Gouttebarge et al., 2016).

Rugby Union and Concussion in New Zealand

In NZ, rugby union has long been commonly perceived to be the country's national sport, a game of national and cultural significance (Pringle, 2001). Through the success of the national team, the All Blacks, rugby union developed into one of the country's most popular sports (Palenski, 2015). Rugby union currently forms part of the country's national identity, and features prominently in the news and media (Palenski, 2015; Pringle, 2001). The sport is played by 177,640 men and women (New Zealand Rugby Database – from Salmon et al., 2020a). At a high school level, approximately 40,000 high school athletes (both male and female, aged between13-18 years old) participate in the sport (New Zealand Rugby National Rugby Databe, 2019).

As a physical contact sport, participation in rugby union naturally results in a high amount of injuries (3.89 per 1000 playing hours) (Prien et al., 2018). In NZ, rugby union accounts for more injury claims than any other sport (ACC, 2020). Concussion is one of the most prevalent injuries in rugby union, with ACC figures placing it as the third most common injury entitlement claim in rugby (Clacy et al., 2015, 2019). In 2019, almost 3000 ACC claims for concussion were made by rugby players (ACC, 2020). Under-reporting and lack of general awareness suggest that the real number is in fact higher and that concussions could well be the sport's most common injury (Salmon et al., 2020b).

Improved understanding and awareness of concussions has led to the development of government led interventions into better managing head injuries in rugby union. Injury management in Rugby union NZ has a relatively short history. However, it is continuously improving at a fast pace. Prior to the turn of the century, New Zealand rugby players were predominantly taught to 'suck it up', show no pain, and endure through the pain (Daly et al., 2021). Such a mentality was a major component of the rugby culture – which promotes a 'warrior mentality' and renounces mental and physical weakness (Salmon et al., 2021).

At the turn of the century, through the development of professional rugby and improved general awareness regarding the need to manage one's health, significant improvements in the care and support available for rugby players were introduced. In 2001, for example, NZR and ACC combined to launch RugbySmart; a program designed with the aim of reducing the number and severity of injuries in rugby and improving awareness and education amongst all stakeholders (Quarrie et al., 2007). RugbySmart helped reduce the over-all number of injuries, while also vastly improving the support service available to players (Gianotti et al., 2009; Quarrie et al., 2020).

However, concussion awareness in rugby union, and consequently its management, remained minimal until 2016 (Daly et al., 2021; Mccrory et al., 2017). In 2016, the 5th International Conference on Concussion in Sport, of which World Rugby was a major supporter and sponsor, provided updated understanding of concussion in sports, whilst also providing concussion management guidelines for sport. World Rugby then utilized this information to provide global concussion management recommendations (<u>http://player-welfare.worldrugby.org/concussion</u>).

Applying and enforcing World Rugby's recommendations in a particular sport, in a particular area, presents multiple challenges (Clacy et al., 2019; Kerr et al., 2018; Salmon et al., 2020a). Such challenges include the general rugby culture (Salmon et al., 2021), lack of general understanding of concussions (Salmon et al., 2020d), lack of resources and club cooperation (Fraas & Burchiel, 2016), and lack of player understanding and involvement in management protocol (Clacy et al., 2015). In order to address such challenges in NZ, NZR as part of a national concussion initiative, developed a concussion management pathway (CMP) (Salmon et al., 2020c). This CMP "considers the various stakeholders involves in the management of concussion as well as ways to support improved concussion management at the community level" (p. 1).

NZR developed a phone application (App) as part of their CMP; the CMP includes the following steps;

- 1) Initial player concussion baseline testing recorded on the App
- 2) Logging of a suspected concussion on the App
- 3) App-generated automated concussion email notifications that are sent to the player, their parents/care-givers, coaches, school/club and provincial union
- 4) The notifications sent to the player and parents/caregivers contain a unique identifier code that will enable the doctor to access that player's baseline concussion score through the Concussion Portal
- 5) Clinical concussion diagnosis made by the medical doctor
- 6) Email notifications sent out to identified stakeholders
- 7) Appropriate Return to Play (RTP) and medical clearance
- 8) Notifications that the player has been medically cleared sent to identified stakeholders

The purpose of the CMP is to "close the loop between suspected concussion recognition and RTP following medical clearance through the use of technology to provide information to the relevant stakeholders at the appropriate time points to ensure player welfare" (Salmon et al., 2020c, p. 1).

In the few years in which the CMP has been trialled, it has produced significantly positive results in terms of improving general concussion awareness as well as player welfare; There is currently more awareness, legislation, and support available than ever before (Salmon et al., 2021). However, concussion incidence and symptomatic issues remain

high and continue to present a major problem for the future health of rugby players (Hume et al., 2017).

The Future of Concussion Management in New Zealand; Players' Perspectives and Player Centred Management Strategies

Concussion experiences are extremely complex (Kazl & Torres, 2019). Part of this complexity is due to the fact that concussions encompass physical, psychological, and social symptoms (Kontos et al., 2019). All of these symptoms are particular to the individual athlete. Therefore, understanding the psychological and emotional experience of concussion injuries requires individualised and multidisciplinary interventions (Seguin & Culver, 2021). Arvinen-Barrow et al., (2014) further suggest that understanding an athlete's psychology, in relation to their individual injury, is important to the successful management of the injury.

Something which helps address this requirement in injury management is contextual understanding (Bolling et al., 2018). Concussion management in sport requires a cultural and contextual understanding which is particular to the individual's sport and circumstances (Bolling et al., 2019a; Bolling, et al., 2019b; Clement et al., 2015; Forsdyke et al., 2016). Such management requires an adequate understanding of the overall sports related concussion experience; as told by the players themselves (Bolling et al., 2018; Bolling & Award, 2021). Qualitative research can help provide a voice to players and therefore improve the understanding of their particular injury, as lived through in their particular sport (Seguin & Culver, 2021).

Current Understanding of Rugby Players' Concussion Perspective

Although limited in quantity, current literature which has studied players' perspectives has proven helpful in contributing to the overall contextual understanding of concussions in rugby union.

A study by Liston et al. (2016), for example, interviewed 20 community adult players and found that players in general display a notable disregard towards the seriousness of head injuries. They suggest the rugby community in general operates in a state of denial, which can ignorantly and stubbornly undermine the value and application of effective concussion management protocols. Such a culture of denial towards the effects of concussion has been observed in other literature (Liston et al., 2016; McRae, 2020; Salmon et al., 2021; Seguin & Culver, 2021) – suggesting it is a common theme in rugby union.

Another study, (Daly et al., 2021), discovered similar findings. Interviewing 23 professional rugby players who had been retired for at least 10 years uncovered that in rugby union, concussion and head knocks simply became 'normalized'. This normalisation was fuelled through dismissive language, and through trivializing the implications of head injuries. This normalisation of concussion seems to be an ingrained part of rugby culture – particularly in NZ rugby (Murray et al., 2015; Salmon et al., 2020d). This 'rugby behaviour' presents cultural and contextual barriers which limit the effectiveness of concussion management strategies. Creating behavioural change in rugby union might, according to (Murray et al., 2015), require a holistic approach designed to create a positive cultural change. Effectively creating a cultural change requires an understanding of that culture – as lived and explained by the players themselves (Bolling et al., 2018; Bolling & Award, 2021).

In New Zealand, NZR's CMP has been in operation from 2018. To date, no research has yet been done into exclusively understanding NZ rugby players' perceptions of their concussion experience – or of their concussion experience as lived through NZR's CMP.

Summary

In summary, concussion is an incredibly complex and difficult injury to define and understand (Bodin et al., 2012; Kazl & Torres, 2019). The symptomatic experience which may follow a concussion is dependable on multiple factors (McCrory et al., 2017) - naturally making it a significantly – variable and unpredictable experience (Choe, 2016; Seguin & Culver, 2021). If not properly managed, concussion injuries can lead to chronic complications in the brain – which may eventually manifest itself through different brain diseases such as Alzheimer's, Parkinson's, depression, chronic traumatic encephalopathy (CTE) and dementia (Devine, 2021; Hiskens et al., 2021; Howell & Southard, 2021; Poole et al., 2015).

The implications of sustaining concussion injuries are particularly relevant to contact sports. In contact sports, such as rugby union, it is more likely than not that rugby players will experience a concussion (Owens et al., 2019; Rafferty et al., 2019; Theadom et al., 2014). It has been widely acknowledged that, due predominantly to a lack of awareness and understanding, past generations of rugby players have not received adequate levels of support

(Daly et al., 2021; Gouttebarge et al., 2016). Fortunately, improvements in understanding the necessity to manage concussion injuries have turned into a global effort to provide better support for players (Gianotti et al., 2009; Hume et al., 2022).

World Rugby currently openly supports the development of better concussion management systems (McCrory et al., 2017). -This sporting organization is an active supporter and participant of the Concussion in Sports Group (CISG); an organization dedicated to improving global understanding and management of sports concussion (McCrory et al., 2017). The group's latest meeting, held in Berlin in 2016, revealed the latest research on concussion management in sport, and provided globally respected guidelines for managing concussion. Such guidelines and research have been driving global efforts to manage concussions in contact sport and providing guidance for sporting organizations all over the world. World Rugby and NZR are two examples such organizations (http://playerwelfare.worldrugby.org/concussion).

In New Zealand, rugby union is a very popular sport, played by around 177,640 men and women (NZR National Rugby Database, 2019) - thus making concussion injuries an extremely relevant national issue. In order to address this issue, NZR initiated a CMP program – which forms part of a national initiation focused on improving the provided concussion support at the community level (Salmon et al., 2020b). The program was first trialled in 2019, and still continues at present. To date, the CMP has produced significantly positive results in terms of improving general awareness and player welfare (Salmon et al., 2020d).

Although improvements in general awareness and in the management of concussion have been observed – the need still exists for further improvements, and further spread, of effective concussion management pathways (Daly et al., 2021). Successfully implementing concussion management interventions and ultimately improve player welfare can naturally prove very challenging (Salmon et al., 2021). Research has shown that cultural values and societal norms in rugby union may be impeding players from exerting positive concussion behaviour (Daly et al., 2021)

In order to understand how to better support athletes, such as community rugby players in NZ (this study's focus group), it is important to understand the players' particular culture (Arvinen-Barrow et al., 2014; Seguin & Culver, 2021). Qualitative studies, focused on community rugby players, could help generate better understanding in regard to their

general attitude and cultural values. Furthermore, such studies could provide an insight into their experience and perception of the CMP, so as to guide future development and improvement.

Since the implementation of the CMP, in 2019, no research has exclusively focused on understanding players' perception of it, which consequently set the need for this study.

Chapter 3: Methodology

Introduction

This is a pragmatic qualitative descriptive study, aimed at obtaining an insight into the concussion experience of community rugby players in New Zealand -through their involvement in NZ Rugby's (NZR) concussion management pathway (CMP) initiative.

Choosing an appropriate approach is an essential component of the research process – a selection which must be accordingly defended and justified (Doyle et al., 2020). Qualitative descriptive studies provide the researcher with flexibility and variability – therefore requiring a detailed description of the methods used to enable the reader to judge whether the selected methods were both reasonable and effective (Kim et al., 2017). This chapter therefore aims to provide the reader with a justified explanation of the methods chosen, and the application of these methods, for the undertaking of this study.

Background of the Issue

Concussions have, over the past decades, steadily grown to become a major world issue; particularly in the sporting arena (Halstead et al., 2018; Tremblay et al., 2018; Zetterberg et al., 2019). Contact sports, such as rugby union, American Football, and Ice-Hockey, are currently living through what has been termed a 'concussion crisis' (Malcolm, 2019, 2021). Concussion injuries have - and continue to - cause a lot of damage to people who sustain the injury, as well as to the image of the sport which causes it (Malcolm, 2019, 2021; McMillan et al., 2017).

In order to alleviate some of this damage, leading sporting organizations have actively contributed to improving the support system available to athletes around the world (Alla et al., 2011; McCrory et al., 2017; Patricios et al., 2018). One example of this is in the sport of Rugby Union, in NZ. NZR (governing body of rugby union in NZ), in collaboration with World Rugby (governing body or rugby union in the world), launched a community CMP program. This program, initiated in 2019, was designed to improve the concussion management, and consequently welfare, of community rugby players in NZ.

Community players across NZ have, for the past three years, been supported through their concussion injuries by NZR's CMP. The aim of this study was to obtain an insight into the experience and perspective of community rugby players, to hopefully improve our understanding of player concussion-related behaviour and positively influence the culture of

rugby union at a community level in NZ. Information gained from this study will serve to influence future concussion policy designed to further improve concussion management and player welfare.

Theoretical Framework; Overview

This research sits within a pragmatic paradigm (Savin-Badin & Howell-Major, 2013). As a pragmatic researcher, I understand reality as the practical effects of ideas (it can be either objective or subjective). Knowledge – or the way in which we learn about reality – is based on experience and one's perception of these (Glasgow, 2013). In pragmatic research any way of thinking/doing that leads to solutions can be perceived to be useful (Feilzer, 2009), hence the name. To address the specific aims of this study, a pragmatic, descriptive, qualitative approach was adopted (Sandelowski, 2000). The aim of qualitative descriptive studies is to provide a comprehensive summary of events in every-day terms. In this sense the analysis remains close to the data (Sandelowski, 2000). As a qualitative approach, pragmatic studies focus on 'what works best' and draw upon the most practical methods available to answer a given research question and understand the perspectives of the participants involved (Savin-Badin & Major, 2013). A qualitative descriptive approach, therefore, represents a pragmatic approach to best meet the aims of this study.

Research Paradigm; Pragmatism

The paradigm through which I undertook this study is pragmatism. As a researcher, my paradigm describes my 'worldview'. It's important to acknowledge and identify this, as it represents the school of thought which affects how I view and interpret data (Seguin & Culver, 2021).

As a pragmatic researcher, ontologically speaking, I believe that there is no single objective reality. There are, instead, multiple realities (Creswell, 2017). Reality is actively created as individuals experience the world and are influenced by such experiences (Creswell & Clark, 2017). In this sense, I view the issue of concussion in sport as an extremely individualised issue. Each individual experiences the injury differently, according to beliefs, context, and past experiences. Accordingly, in understanding the overarching issue of concussion in sport it is important to understand the individual's perception of their experience – while acknowledging the broader influences which their particular environment and culture may have on such experiences.

Epistemologically speaking, I believe knowledge is neither universal nor measurable. Knowledge is made of unmeasurable elements such as individual experiences (Creswell & Clark 2011). According to pragmatic epistemologically, there is no universal truth, but a practical understanding of issues. Because there is no universal truth, knowledge cannot be assumed universal; what is true to one individual, in one given context, may be completely different to another (Pansiri, 2006).

As a pragmatic researcher, my biggest focus is on finding a solution to the identified issue. In this case, the issue is concussion in sports. In order to help find solutions to this issue, it is fundamentally important to understand the individual experiences of the rugby players who go through this experience. A pragmatic approach fits particularly well to this study's aim to provide relevant information useful to inform future policies with 'real world' impact. Further, a pragmatic approach enables me, as a researcher, to be flexible in my approach, so as to apply the research methodology which best suit this particular context. In this case, the selected approach was qualitative descriptive.

Employing a descriptive qualitative approach

Due to the identified goals of this study which place emphasis on generating understanding regarding the experiences of players – as well as their personal perceptions of NZR's CMP - this study employed a qualitative descriptive approach. Such an approach was selected on the basis of its ability to provide insight into participants' experiences and perceptions, and to give these participants a voice (Sandelowski, 2010). It has been suggested that qualitative descriptive studies are the least intrusive of qualitative methods - and therefore require the least possible data interference from part of the researcher (Sandelowski, 2000). -Undertaking a descriptive study based on players concussion experiences allowed me to stay close to the data and as true to the players' voices as possible. According to Bradshaw et al., (2017) qualitative descriptive is an appropriate methodology when a straight description of an issue is desired – to then be utilised to gather useful information utilised for developing or re-designing interventions (such as NZR's CMP).

Research Design

This qualitative descriptive study utilised previously collected semi-structured individual interviews that were collected as part of wider program of research managed by NZR. I analysed the data via thematic analysis, utilizing the qualitative analysis computer

software NVivo (QSR International). The thematic analysis process was guided through Braun and Clarke's framework (Braun & Clarke, 2006).

It is important to acknowledge that I feel it was a disadvantage that I never got to personally meet and interact with participants, and my relationship was limited to readings of the transcript. An advantage, however, in respect to the scope of a Master's dissertation, I was able to utilize much more data than what would have been possible had I personally designed and executed the interviews. Qualitative researchers are expected to immerse themselves in the context of the participants, so as to observe them and appropriately gather a sense of their respective environments (Marshall & Rossman, 1995; Pitney & Parker, 2002). In my particular case, I missed out on personally interacting with participants. However, I believe my personal background suggests I have a good sense for the natural environment and context of participants. A section on reflexivity follows later in this chapter, but it is important at this point to acknowledge that until very recently I was a rugby player myself. I have experience of playing at a 1st XV level and at a senior club level (as was the case with all participants). In the year the interviews were conducted I was in fact a community rugby player. At present, I – continue to be involved in New Zealand community rugby through coaching at both 1st XV level and senior club level. This all contributes to my personal understanding of the contextual setting - thus naturally positioning me to better understand and relate to the participants and the data – as required in qualitative descriptive studies (Pitney & Parker, 2002). However, as part of the descriptive design, it also meant that I had to step back at times, acknowledge my own feelings and perceptions around concussion in order to stay close to the data. This process was facilitated frequent discussions with my supervisory team.

Data Collection

This study draws upon semi-structured interviews. A semi-structure interview approach was adopted as it provides enough guidance to keep the interview focused on the identified issue while also providing the participants with room to describe and reflect upon their experiences in their own particular ways (Jamshed, 2014).

The interviews were recorded (with participants' consent) and transcribed. The textual data, which included 36 individual semi-structured interviews, was then analysed by me through the application of thematic analysis – following the steps outlined by Braun and Clarke (2006).

Participants

At the end of the 2019 rugby season, semi-structured interviews were conducted to explore multiple stakeholders' perceptions of the CMP. This project was conducted in three geographically and diverse provincial unions (PU) in NZ to facilitate maximum variation in views. Within each PU, rugby administrators in schools and premier-level community clubs were contacted to identify high school and club teams, from which App managers (people responsible for reporting suspected concussions), school contacts, coaches, players, parents and nurses were invited to participate in the study.

To be eligible for the interviews, the participants must have participated in the NZR CMP. For the players, a targeted approach was adopted to recruit players that (i) sustained a suspected rugby-related concussion and/or (ii) followed the CMP during the current season.

Adhering to ethical guidelines, participants were contacted via email and informed of the goals of the study. If they wished to participate, a date and time was scheduled. Participants were again briefed around the goals of the study and written informed consent was obtained prior to the start of the interviews. Demographic information was captured on a paper-based form following the consent process. The interviews were held at a familiar location (i.e. school or rugby club) and time convenient to the participants. Interviews were conducted by six researchers experienced in qualitative methods. The interview team consisted of five females and one male, all of whom were involved in the implementation of the CMP. To ensure consistency between interviewers, experienced qualitative researchers who were part of the research advisory team for the broader project, conducted a training session with the interviewers prior to the interview. Additionally, interviewers met weekly with the research team to reinforce interview consistency, the use of probing questions and paraphrasing to confirm understanding.

Interview questions explored participants' experiences of the various phases of the CMP, including pre-season baseline testing, logging the concussion on an App, the concussion diagnosis visit to the GP which includes a re-assessment of the baseline, a medical clearance visit, and recovery back to school/work and playing rugby. Additional stakeholder specific questions were included based on the stakeholders' roles within the CMP. In total, 36 individual semi-structured interviews were conducted, which consisted of 35 male participants and 1 female participant. The reason behind the small percentage of

female interviews was that the interviews were scheduled for what was expected to be the end of most players' season. However, the female season ended four weeks earlier, which meant it was difficult to get hold of female players to participate. It must also be considered that the number of female teams were significantly fewer than males (15% female).

All interviewed participants were between 14 and 32 years of age. Table 1 below shows the number of participants in the overall study, with players in this specific study highlighted.

Table 1

Stakeholders' Groups Included During 2019 Data Collection (Individual Semi-Structured Interviews), n=123

	Ν	%	Age		Gender	
Stakeholders			Mean (Std	Range	Male	Female
			dev.)			
Арр	6	5	38.5 (15.4)	24-57	4	2
managers						
Coaches	13	11	44.5 (7.5)	28-55	11	2
Parents	11	9	50 (5.6)	43-58	1	10
Physiotherapi	24	20	28.1 (7.7)	22-52	13	11
sts						
Players	<mark>36</mark>	<mark>29</mark>	<mark>19.8 (4.8)</mark>	<mark>14-32</mark>	<mark>35</mark>	1
Provincial	4	3	40.7 (19.6)	29-70	4	0
Union reps						
School	14	11	45 (11.1)	27-60	11	3
contacts						
GPs	9	8	47.5 (12.9)	27-62	7	2
Nurses	6	5	34.5 (11.4)	30-61	0	6
					87	37 (30%)
Total	12				(70%)	
	3					

Data analysis

The collected data was analysed using thematic analysis by applying Braun and Clark's 6 steps framework table (2006, p. 87; 2021). Each phase was conducted under the supervision and guidance of my two supervisors, Simon Walters and Marelise Badenhorst, who continually provided guidance and constructive feedback.

Prior to initiating data analysis, I undertook training in thematic analysis by attending preparatory workshops at Auckland University of Technology (North Campus). I was tutored by Gareth Terry, senior lecturer in the school of clinical sciences at AUT, a renowned and published thematic analysis expert. The training consisted of three different workshops. Two were single day 'crash courses' explaining the basics of thematic analysis. The third consisted of a two day, six-hour workshop, aimed at supporting students undertaking qualitative research.

The data was coded using the qualitative data analysis software NVivo. This also required me to undertake a period of preparation. Training for the utilisation of NVivo consisted of multiple online meetings with my supervisor, Marelise Badenhorst. Such meetings took place throughout the entire thematic analysis process; allowing me the opportunity to be provided with continual feedback and guidance.

The actions and decisions taken throughout the six different phases of thematic analysis are described in Table 2 below;

Table 2

1.	During this initiatory step, I read the transcript of each individual
Familiarization	interview so as to familiarize myself with the date. Throughout this
	process I took notes of each interview. I also read up on relevant
	information regarding the CMP so as to better understand the context of
	the interviews. This step essentially introduced me to the participants.
	As a former rugby player who has experienced concussion injuries, it
	was not hard to develop empathy for the participants and be able to
	relate to their experiences which, in some cases, were not much different
	to that of my own and former team-mates.
2. Generation of	Coding interesting features of the data in a systematic fashion across the
initial codes	data set, collating data relevant to each code;
	This phase involved the use of the qualitative data analysis software
	NVivo. The data used for this study had already been transcribed into
	Word Documents. For this phase, I loaded the documents into NVivo.
	As mentioned earlier, I received continual training in the use of NVivo
	for generating codes. In order to generate trustworthiness, my supervisor
	and I both coded the same file separately. We then compared codes and
	discussed our understanding of the meaning contained in each code.
	Throughout the coding of the files, I was in constant communication
	with my supervisors and engaged in bi-weekly zoom meetings through
	which I received guidance and feedback in regards to my coding.
3. Searching for	Collating codes into potential themes, gathering all data relevant to each
themes	theme;

6 Phases of Thematic Analysis

	Codes with similar characteristics were merged to form categories, which were finally organised into themes. Through the guidance of my supervisors, in and line with a qualitative descriptive approach, I aimed
	to develop themes that stayed true to the data.
4. Reviewing	Checking if the themes work in relation to the coded extracts and the
themes	entire data-set; generate a thematic map.
	The generated themes were extensively reviewed, in collaboration with
	my supervisors in regular meetings.
5. Defining and	Defining and naming themes – Ongoing analysis to refine the specifics
naming themes	for each theme - generation of clear names for each theme;
_	I initially had 9 themes, which I presented and explained to my
	supervisors. The meeting resulted in merging relevant themes, which led
	to the agreement of five identified themes. Eventually, however, during
	the writing of the report and through further consultation with
	supervisors - these five themes were further reduced to four. An
	appropriate thematic map was designed, which utilized a socio-
	ecological model to describe the themes' interconnectedness.
6. Producing the	Final opportunity for analysis. Selecting appropriate extracts, discussion
report	of analysis, relate back to the research question or literature, produce
	report.
	Once - my supervisors and myself were content with the selected themes
	I initiated my results chapter.
	I wrote an initial preliminary findings draft which was shared with my
	supervisors. My supervisors then provided feedback via Word
	Document – while also discussing the work via weekly Zoom meetings.
	A strong emphasis was placed on the need to stay true to the data and to
	the voice of the participants; to focus on presenting what I found from
	the data, while refraining from including personal opinions or
	suggestions. In total, the reports chapter was sent back and forwards 3
	times prior to it being deemed adequate to the purpose of this study.

Ethical considerations

Approval to conduct the research was obtained from the University of Otago Human Ethics Committee (approval 18/087). All participants provided informed written consent. For players aged 15 years or younger, written consent was also obtained from their parents/caregivers. As part of the consent process, the research team ensured that participants understood what the study is about and before they decided whether they wanted to participate. It was made clear to participants that they were free to withdraw from the research at any time, without disadvantages, penalties or adverse consequences. Specifically, it was made clear to them that their decision to not participate would not impact upon any relationships with the University and/or your Club / School or rugby team. Interview transcripts were stored and digitized on a secure server at NZR. A nondisclosure agreement was signed between myself and NZR, to protect and maintain the anonymity of the information contained in the transcripts. All data was analysed anonymously.

Trustworthiness

In qualitative studies, developing trustworthiness is crucial to the acceptability and worthiness of research (Lincoln & Cuba, 1985). Trustworthiness, according to Lincoln and Guba (1985), who are seminal qualitative research authorities, can be developed through ensuring credibility, transferability, dependability, and confirmability.

Credibility

Credibility refers to the confidence which can be applied to the research findings. Such confidence stems from a researcher's ability to accurately extract and interpret participants' information (Rolfe, 2006; Tobin et al., 2004). Being able to do this requires the researcher to have a well-developed contextual understanding of the participants involved. Lincoln and Guba (1985) suggest techniques such as prolonged engagement, and persistent observation, can be used by the researcher to develop credibility. In my personal case, I never met my participants in person. However, in my opinion, my personal background helped me compensate for this. During the time of the interviews, I was in fact myself a community rugby player in NZ. -Furthermore as - per the participants in this study, I also have suffered from concussion injuries. Although I was never directly involved in NZR's CMP program as a participant – I indirectly felt its' impact and very consciously experienced the positive change in concussion awareness and available support which has developed in the last few years.

The rugby culture encompasses an extremely close-knit community, with particular values which can be hard to understand when observed from the outside. A result of this can be that rugby players are often stereotyped and misunderstood. By participating in rugby union my whole life, particularly as a community rugby player in NZ, I was able to immerse myself in the sport's particular culture and environment; thus developing a contextual knowledge which assisted my ability to interpret and relate to the information provided by this study's participants.

Transferability

Transferability normally refers to the generalizability of the study's results (Tobin et al., 2004). However, the purpose of a qualitative study is to provide deeper insight into an issue, which researchers and readers can draw upon, Although Stake (2006) refers to case study research, he asserts that qualitative studies in contextual research offer the reader with opportunities for what he refers to as 'naturalistic generalisation', where readers can draw upon findings to inform their own practice in similar contextual settings. Through access to a detailed description of this study's context, readers may be able to judge whether this study's findings are transferable to other contexts. The context of this study, of the participants, and of the researcher, has been discussed through-out this dissertation. I trust in the hope that other researchers in this field - find this study relevant and useful for generating further understanding – and providing further solutions – to the global issue which is concussion in rugby union. Despite the uniqueness of rugby union's context, I believe the study's findings are relevant, to different degrees, in not only rugby but in all contact sports. Concussion in sport is currently a major issue for which there is still relatively little understanding. As such, every piece of relevant information is useful in the global effort to better support the affected athletes.

Dependability

Dependability can be achieved by ensuring the research process is logical, traceable, and documented (Tobin et al., 2004). In this study, an audit trail was utilized to demonstrate dependability. An audit trail provides reader the chance to observe and critique a researcher's decision trail (Sandelowski, 2000). Throughout the research, I have attempted to describe the decisions, as well as the reasons behind them.

Confirmability

Guba and Lincoln (1985) suggest that confirmability is generated through successfully ensuring credibility, transferability, and dependability. Through attempting to explain my underlying philosophical assumptions, as well as potential author biases, I have been able to justify the four trustworthiness components outlined by Guba and Lincoln.

Reflexivity

Although reflexivity is not one of the four trustworthiness concepts identified by Lincoln and Guba (1985) – it is nonetheless a crucial component of dependability (Rolfe,

2006) and consequently to trustworthiness as well. As is deemed appropriate and even necessary in qualitative research (Nowell et al., 2017), I have attempted, throughout this paper, to provide the reader with an insight into my positionality and contextual background.

I acknowledge having a strong emotional attachment to this issue; an attachment which often came through and influenced my journey through this project. The close guidance and support of my supervisors helped me stay focused on writing this study in accordance with a pragmatic, qualitative study.

As with the concussion injuries of this study's participants, as with arguably everything in life, undertaking this research represents part of a journey. A personal journey which, for my-self, started when I first played - and fell in love with rugby, and was convinced it was all I ever wanted to do. I feel extremely privileged to be part of the rugby community. A community which often is much more than that – in which team-mates can become brothers and sisters - and coaches and staff can become father and mother figures. It is a tough sport no doubt. It provides countless injuries, frustrations, and disappointments. But the sport's difficulties are also partly responsible for the closeness of the community/family. Rugby union provided me with my best friends, with some of my most influential life mentors, and with some of the biggest character development lessons of my life.

In 2014, shortly after returning from a relatively minor concussion, I suffered a much more serious one. It was by far the worst injury experience of my life. I wasn't able to play rugby, nor strive to accomplish my dreams, nor get to spend time on the field with my team. However, unlike with past injuries which purely limited me physically, this concussion left me struggling to socialize, to drive my car, attend lectures at university, to handle noise or light, to walk up a flight of stairs... At the time, there was not much awareness, understanding, nor support for concussions – I was left, and felt, very much alone, confused, and scared. With time, I learnt about the injury and the way -it can affect the brain. I learnt that what I was feeling was normal, and it wasn't my fault, and I wasn't going crazy. I read and learnt as much as I could find about concussions. And with time, I learnt that there were ways to manage it, and to help recover from it. I'm grateful that I eventually returned to living a normal life and playing rugby again.

I often wish I could go back and, aided by what I know now, manage my concussion injuries more effectively; but I can't do that. What I can do, however, is try to reach out a
hand to the next person in line – so as to try help make their experience a little bit better. Reading the stories of this study's participants was extremely challenging. It brought back some bad memories, and -generated a lot of empathy on my part for these participants. However, I was also extremely grateful for the fact that these participants – this next generation of rugby players - were now so much better supported and protected. – That being said although it is better, it is not yet enough. I now hope that, in some way, this study can aid the effort to provide continually better support for rugby players in NZ, and across the world.

Chapter 4: Results/Findings

Introduction

The aim of this chapter is to present the findings from the thematic analysis in relation to the research question of the study. This research question was:

• What are NZ community rugby players' experiences around concussion while progressing through NZR's CMP?

A thematic analysis of the 36 individual interviews identified four dominant themes. These themes were:

- The symptomatic experience
- The role of a dedicated concussion management pathway in the players' experience
- The significant influence of the role of the coach and the physiotherapist
- General NZ rugby culture and the mind-set of the NZ rugby player

Staying true to a qualitative descriptive approach, this chapter will present a descriptive summary of the themes and corresponding sub-themes in a way that best fits the data (Sandelowski, 2000), and best represents the voice of the participants. Additional substantiating quotes are provided in Appendix A.

Theme 1; The Symptomatic Experience

The 'symptomatic experience' of the concussed rugby player was identified as a dominant theme; it played a central role in influencing the players' overall injury perception. This theme consisted of four different sub-themes.

- The immediate symptomatic experience;
- The non-linear nature of the symptomatic experience;
- Concussion experience is mentally challenging;
- Concussion affects all walks of life;

Players reported experiencing a variety in the types, intensity, and duration of their concussion symptoms; these often combined to make the concussion experience extremely difficult and challenging. Furthermore, due to the sometimes- progressive nature of the

injury, concussion symptoms did not appear to have a predictable start and finish time. Lastly, the concussion experience was not limited to a particular body area or activity, but instead affected all areas of their lives. The combination of these factors made concussion injuries extremely tough to deal with, both physically and mentally.

1.1 The Immediate Symptomatic Experience

On the day of the injury players reported experiencing a number of different neurological issues (predominantly including loss of consciousness, memory loss, dizziness, headaches, and fatigue). One particularly concerning issue was memory loss. Players explained that their injury produced memory gaps. Players were sometimes unable to recall the injury, or certain things which happened before or after the injury.

I was watching me play (on video replay) and I was like, 'what on earth?' Because I kept playing for like two, three, five minutes probably. I don't remember any of that and pretty much the second half... So scary to think I don't remember that (MP5).

Suffering from memory problems as a result of a head knock, regardless of how brief this period lasts, was a traumatic and "scary" experience for players as well as friends and family. One player explained that; "I didn't know what actually happened until I watched the video... So like I was out, I was still moving and trying to get up apparently... and the only thing I woke up to was my mom crying" (MP12).

Another concerning neurological issue which players experienced on the day of the injury involved a sense of "feeling lost", "confused", and "not quite right". Some players, for example, experienced trouble understanding where they were or what they were doing; "I asked everyone like I didn't understand like why we were there. I saw the game and stuff, but I just didn't quite understand what was going on" (MP3). It was also common for players to feel "sick and nauseous", while also experiencing "headaches, dizziness, and/or fatigue". One player, for example, explained that; "I kind of felt just dizzy, and I felt really sick (MP27)".

This sense of being lost, unaware of their surroundings and their situation, made players feel quite anxious;

All I remember was just coming out and just actually I saw stars for the first time, everything was just, I don't know, flashing... And I was just like,

"what the f###? What do I do?"... That's when (the Physio) ran over and was like "Hey are you all right?" I was like, "I want to get off... Because I was honestly, I got to the point where I was like, "What the f###? Am I part of this team? (MP16)

1.2 The Non-Linear Nature of the Symptomatic Experience

A characteristic of concussion symptoms which added to the complexity of the experience was 'delayed-symptoms'. Some players explained that on the day of the head knock they experienced minimal or no symptoms. However, hours – or even days – after the time of injury, they started to suffer from concussion symptoms.

Well I didn't actually realise I had it, until the Monday. I played on Saturday, got a concussion, but I had delayed symptoms, most of them didn't kick in until midday on Sunday. Then, I just thought that I had burnt myself out from doing too much. However, like Monday morning came around, and I went to work and I just wasn't feeling that good at all (MP7).

In some cases, the symptoms experienced would progressively worsen with time. One player, for example, explained that "I probably suffered more a couple of hours after, than I did during the actual game even, if that makes sense" (MP32) – "It just progressively, the headaches got worse" (MP18).

The unpredictability of the symptoms, in regards to duration and intensity, further added to the confusion and anxiety experienced by affected players. In some cases, players thought they were symptom free and 'finally' recovered. However, doing some form of either physical or mental effort would bring back the symptoms, along with the physical and cognitive struggles which the injury experience entails; "By Friday I thought I was pretty fine and then that happened (exerted himself physically) and it kind of reiterated it to myself that I was still actually concussed (MP4)".

Players were not certain when - or even if - they would recover fully. Two weeks after being medically cleared by a doctor, a player explained that; "I still kind of have some side effects, I guess... Probably need a little bit more (time) because I still get real tired and get confused quite a lot" (MP25). Another player similarly expressed his uncertainty by explaining that; "I don't think my concussion is fully recovered now even because sometimes you're lying in bed and I get the worst headaches" (MP5). One player reported having a

friend who has been out from rugby for "two years (MP21)" – something which scared him into taking concussion recovery more seriously than in the past.

1.3 Concussion Experience is Mentally Challenging

For some, experiencing a concussion was a psychologically traumatic experience which left doubt and "fear" in the back of their minds; in particular when they had to face their first game or contact training back. Players explained that "I was a bit scared I'm going to get knocked out again" (MP1). And that "It took time to get used to it again. And for a little while I was a bit scared of knocking my head" (MP10). Players explained that they sometimes felt physically but not mentally ready; "I felt I was ready, but pretty sure I was a bit scared... I was a bit nervous to get tackled" (MP6).

This fear naturally affected their game experience and even performance. "I wasn't playing like aggressive as I used to... because I didn't want to get hurt" (MP3). Another mentioned that he felt slower and more hesitant; "I was like my reflexes were slow, pretty slow. I went in for a tackle, and I kind of froze. And I was, "What the f###? What was there?" (MP16).

1.4 Concussion Affects All Walks of Life

Another feature of concussion symptoms which made it a particularly tough experience was the way in which the injury could affect essentially all parts of a person's life. Unlike a specific bone or muscle injury, which only limits a particular physical component of a person, a brain injury negatively influenced all aspects of participants' lives; such as school and work.

Players reported problems in returning to do school work. Many players, who were playing high-school rugby, found that "going back to school was hard" - and that "it was pretty hard to concentrate in class" (MP10). One player explained the experience in the following manner; "I just couldn't (concentrate), I literally, I would stare at a board and be like, seeing two of the board and then you'd be going off into a... you know like a... sort of like your own little world" (MP5).

Players that did not return to school but to work, also expressed that their lives were affected by concussion symptoms. One player explained that

As soon as I had to start doing any thinking, I sucked. And I got a massive headache, then I was like... I actually had to apologise, because I was stumbling. I couldn't keep concentration. These people were like, you've asked me that three times (MP18).

Another felt that he had to go home because he felt his health was being put in danger; "I wasn't supposed to be at work... had a little wobbles on a ladder and then straight away after that happened I was at home. Cause I thought I was just overdoing it a little bit" (MP20).

Theme 2; Role of a Dedicated Concussion Management Pathway in the Players' Experience

This theme identified the important role that an organised and dedicated concussion management pathway had on players' concussion experience. This theme consisted of 3 different sub-themes.

The influence of available and accessible information and knowledge regarding concussion management, prevention, and recovery as part of the NZR's CMP

- The structural support provided through NZR's CMP was generally perceived a positive contributor to player's concussion experience
- In the current implementation of the NZR's CMP program, a lack of Return To Learn (RTL) protocols in schools presented a significant weak link.

2.1 The Influence of Available and Accessible Information and Knowledge Regarding Concussion Management, Prevention, and Recovery as Part of the NZR's CMP

Available information regarding concussion management had a strong influence on players' overall experience and perception of the concussion experience. Information provided players with clarity and guidance – something which was significantly appreciated in what proved to be a complex and unpredictable injury.

Through the provision of practical and useful information - the NZR's CMP positively influenced players' overall experience. Many players reported being "happy" and "satisfied" with the program. This satisfaction was commonly attributed to being provided with the necessary information and guidance; "I thought it was quite, like everything was

explained to me really well once I did go through the concussion protocol stuff, like the steps and everything were really good" (MP27).

Players particularly appreciated receiving useful information from medical professionals such as their GP and their physiotherapists. Being provided with what the player perceived as simple and useful information tended to strongly affect a player's perception of the GP visit. One player explained; "that's why the visit was quite good because it was quite informative... I left with all the information that I felt I needed" (MP31) Passing information in a way which makes sense commonly led to players perceiving their GP visit as a positive/good one; "It was easy to understand and all that. He explained it real well, so that was all good" (MP15). Aside from GPs, other medical practitioners who significantly influenced players' concussion and CMP experience were the physiotherapists. Like GPs, physiotherapists who proved particularly helpful often provided clear instructions and guidance. One player explained that his physiotherapist was "helpful in terms of just telling me what I should and shouldn't do for the next couple of days... so that was great" (MP32).

In contrast to positive GP and physiotherapist experiences, some players who felt illinformed, or misinformed, tended to hold a more negative perception of their overall experience. Some players reported feeling "confused and unsure" about their recovery process. They felt that they were unclear on what to do, and had not, in their opinion, been provided with enough information and guidance. Players explained that they received no information during some stages of their recovery. Others felt that they were "just left out there". One player rated his overall experience as a two (with one being the worst), because "I do think I didn't really know what I was doing...I didn't get any emails or anything" (MP5 – a player who was unfortunately missed out by the system).

Something which helped make information more memorable, practical, and clear, was the provision of this information in a tangible, physical form (such as a printed hand-out, or an emailed document). When identifying something which was particularly useful in the program, players explained that; "The form (written information handed to player after concussion) was good... because at the time you really don't remember much, because you've just had your head knocked" (MP18). Similarly, when suggesting ways to improve the program and the flow of information, players explained that; "having something in hand, like a piece of sheet, would be helpful. Because specially with being concussed, I don't really remember much from the conversations I had on the day of injury and that first week in general" (MP7). Consistently providing physical tangible information is something which most players either suggested as a way of improving their experience – or as a notable helpful contributor to it.

Amongst all the information received, players reported particularly appreciating the 'recovery guidelines' – which explain the recovery goals and timelines necessary to complete in order to play again. One player explains that the guidelines provided through "a piece of paper" meant "I could visualize what my return to play looked like and I got to see what stages I had to go through and stuff like that" (MP24).

Thus, information tended to provide players with a sense of clarity and assurance; something which proves vital when dealing with such a complex and confusing injury. Furthermore, being provided with clear and tangible information was perceived as having a positive influence in players' overall experience. Players particularly appreciated when their GPs and physiotherapist were well informed and able to pass on that information in a clear way (in a tangible and physical manner).

2.2 The Structural Support Provided Through NZR's CMP was Generally Perceived as a Positive Contributor to Player's Concussion Experience

Players in general were satisfied with their concussion experience (as influenced by NZR's CMP program). As an additional interview question, players were asked to rate their overall experience (as lived through NZR's CMP) from 1 to 5, with 5 being very good. These ratings are summarized in Table 3.

Table 3

Ranking of overall experience	Number of players selecting such ranking (%)
5	(27.7%)
4	(61.1%)
3	(8.3%)
2	(2.6%)
1	0

Summary of Players' Rating of Their Overall Satisfaction With NZR's CMP

Many players explicitly commented on their appreciation for the CMP program;

I thought it was really good... I thought like the whole, yeah the whole process was really good... like meeting at the clinic and that was really good... I thought it was awesome having steps and um, wee goals that you needed to meet before you played... yeah, I thought it was awesome (MP27).

One player expressed his appreciation when he compared the CMP program with the structural support back in his home country (which had no specific supporting structure in place);

I think it was pretty good for the players. Because I had a couple of concussions in Japan when I was playing in high school. Definitely the system, getting back to the game is better than that one (Japan's system). So, yeah it's like more clear and I can like have a confident just to get back in the game. So, I think it's good (MP33).

Most players felt their overall experience was really good. They held a positive perception of the support structure provided by the CMP;

I had a really good experience, yeah. I think it' pretty cool how they're doing it... and how the whole concussion... they store data, I think that's pretty cool. Especially at our level as well, not just top levels (MP31).

Another explained that had it not been for the CMP and its educational impact, he "would have probably lied" (MP4) about experiencing symptoms and needing time off; something he felt was "a good thing". Another explained that he believed "the process felt safe and responsible. I felt like I've been taken care of. Not rushed back or held back" (MP34).

In regard to the individual phases, a player reported the diagnosis visit at the GP's clinic was the "highlight" of the experience because "I can mentally like... mentally satisfied. Like can relax because I was really nervous about my concussion because I had a headache, so... I think after meeting with the doc I was pretty relaxed" (MP33).

Describing the clearance visit, one player felt "it was really good... was really helpful" (MP8). Another felt that "the man did his job perfectly" (MP16), and commented that if he was to sustain another concussion in the future he "would follow all of these steps to the fullest, I believe in the system you guys have put on" (MP16).

2.3 In the Current Implementation of NZR's CMP Program, a Lack of Return to Learn (RTL) Protocols in Schools Presents a Significant Weak Link

One component of the CMP particularly stood out as a current weak link and in need of improvement; the Gradual Return to Learn (GRTL) protocol. NZR's CMP provides GRTL guidelines. However, the framework for implementing and successfully carrying these out seem to be lacking in schools. As a result, schools failed to provide players with support during their return to learn phase. Due to this lack of implementation of the protocol by schools, most players underrated the need to manage their return to learn. Furthermore, most players reported not believing that their school implemented any 'return to learn protocols', or that such a thing even exists. The consequence of this was that many players mismanaged their concussion recovery – and generally experienced 'worse' symptoms.

It was noted that players' attitudes significantly underappreciated the need to rest from school. Players' general mind-set to returning to school was detrimental to proper concussion management; "I just got straight into it. It didn't hold me back" (MP32). This mind-set led to many players returning to school whilst still suffering from concussion symptoms. Such symptoms include experiences such as 'feeling lost'; "I was a little bit lost. During school, my concussion... I couldn't like... see right, focus..." (MP14), trouble focusing; "it was pretty hard to concentrate in class for the first week or so I went back to school... but yeah..." (MP10) or experiencing headaches; "I sometimes was getting headaches... they just happened randomly" (MP11).

Sometimes, players felt their school would have supported them if they expressed the need to rest. However, players commonly felt it unnecessary and so placed pressure on themselves to return; "I got told I could have rest if I needed it, but I didn't think it was that bad" (MP9). Players often rushed their RTL because they were not properly informed on the need to rest their brain. It was noted that the vast majority of schools were not actively implementing the return to learn guidelines as suggested by the NZR's CMP. Schools, in the most part, did not provide players/students any information regarding how to manage their return – nor explain "what they should or shouldn't do".

My analysis identified that schools were currently not being efficiently used to spread concussion awareness and information, nor helping players/students properly manage their recovery. Most players reported "not being aware" (MP1; MP2) of schools having any type

of RTL protocols in place – and of "not receiving any type of information or guidance" regarding how to manage their RTL process.

Illustrating the lack of emphasis and underappreciation of schools' impact on concussion management, players often reported being aware of their school having a supporting framework in place to guide their RTP, but not their RTL. NZR has been providing schools with the necessary information necessary to guide players through both an RTL and an RTP process. At the moment, however, schools =appear to be guiding and supporting the RTP process; but still require a comparative improvement in their application and emphasis of RTL guidance.

I'm not sure about the school side of it, but I know that the sports like, well now that we're with like the concussion sort of side of it, they make us have a break from training and stuff like that... I didn't change anything for the school side of it, but obviously with... the rugby side of it (MP24).

A consequence of not properly implementing RTL protocols was seen in players' reflection of their concussion management regarding RTL; "I think in hindsight I probably should have just taken some time. In hindsight, I should definitely have taken some time off" (MP6). Another player, when asked about where the CMP could be improved, referred to his school's approach to guiding players through RTL protocols. He suggested to "maybe get a school thing as well, just to see what I should and shouldn't be doing? Because I'm not too sure" (MP24).

Theme 3; The Significant Influence of the Role of the Coach and the Physiotherapist

My analysis identified that coaches and physiotherapists provide emotional and logistical support and thus have a strong influence on players' concussion experience.

This theme consisted of two sub-themes:

- The role of the coach as a provider of emotional and logistical support;
- The role of the physiotherapist as a provider of emotional and logistical support;

3.1 The Role of the Coach as a Provider of Emotional and Logistical Support

A coach, through his/her position of influence, is naturally one of the very first lines of emotional and logistical support for the player. Players' remarks showed that coaches were capable of making a player feel either pressured to play on - or supported in his/her need to rest and properly manage his/her injury.

Players explained that coaches sometimes applied pressure on players; pressure which can be hard to handle, particularly if the player is young or feels his position in the team may be threatened;

Yes, definitely (from) coaches... they were kind of like, "you'll be right". Yeah, and it's hard to think otherwise, when you're being told that, especially I think if you're a younger guy, or if you felt pressure to keep your spot in the team (MP30).

Players often expressed high levels of respect and trust on their coaches. One player, for example, explained that he left the guidance of his concussion recovery to his coach. Despite the coach having the best of intentions, lack of professional medical support eventually led to future complications for the player. The player fully obeyed the coaches' instructions because he believed in the coach;

He (the coach) knows what he's talking about... my coach is a prem player and he's been concussed quite badly a couple of times and he says, and he emails me and he goes, I want you to take two weeks off now. Don't do anything at all. Just rest. Don't do any physical activity. Just rest yourself, and then the first week back, I want you to come back into training. You're not going to do any contact (MP5).

However, the lack of guidance from a professional expert led to complications because "then he left. He left for India and then he said that you are probably able to play... And I played. But then I got hurt again" (MP5).

Despite there being some coaches who exerted pressure on their players – and some who provided well-intended misinformed advice – in the majority of cases players felt coaches were "very supportive" and "very good". Some attribute this support to improved general concussion awareness;

To be honest, obviously, with the whole awareness of it now. My coach and my management, as soon as I said I was feeling a bit dizzy, and faint sort of thing. They

pulled me straight off. There was no, "Come on mate, you'll be all right, carry on" (MP18).

Players that get concussed often require both emotional and logistical support. Thus, players particularly appreciated coaches who attended to both aspects;

He was just real supportive and... Because yeah, I was quite upset and he was just real supportive and said follow the procedure and get you to a doctor. And he got hold of my mom and said to keep an eye on me and stuff (MP29).

Players also explained that coaches can positively influence an entire team environment. They can make everyone in that 'inner community' more supportive and understanding of the need to follow concussion recovery protocol. One player explained that, in his team, "no one really worries too much about it, you know. It's just, it happens. Everyone understands you can't play. Coach won't let you on, so it's just like you carry on (with the recovery), you know..." (MP16).

Having clear rules set in place by a supportive coach helps a player deal with their injury (both physically and mentally). Players expressed gratitude and appreciation for coaches who displayed such support. One player explained that it is hard as a player to not play and so appreciated the coach making it easier for players to "protect themselves from themselves"; "It's just like human nature to just get back out there and just want to play... but the coaches were really good, and they didn't let anyone play unless they had a certificate (clearance letter)" (MP6).

3.2 The Role of the Physiotherapist as a Provider of Emotional and Logistical Support

The physiotherapist of the team had, like the coach, a strong influence on the overall player experience. This influence was possible through their role which allowed them to provide emotional and logistical support. The physiotherapist was, through players' comments, identified as the person who tended to work the closest with the players throughout the recovery -process. The physiotherapists were almost always the first to assess the players, to check them for symptoms, and to then inform them on whether the player should come off or carry on playing. Once the concussion was diagnosed by the physiotherapist on the day, it was the physiotherapist who often instructed the player to go see a specialized GP – to then begin the player's recovery (process through which the physiotherapist acts as communicating line between doctor and player);

It was (physiotherapist), came on and he just told me to stay put, and that he would get me off slowly and rang me later on that day just to check on me and stuff, just make sure I was doing alright and stuff. He booked me in for a GP later on, few days later... he did step by step of what I needed to do to get back on the field. It was good (MP35).

Players appreciated the guidance, support, and companionship provided by their physiotherapists; explaining that it had a positive contribution to their overall experience;

I thought it was really good, like especially, oh well for me, um having, being able to talk through (team physiotherapist), who was talking to my GP in the clinic to get through, um, yeah to get clearance and stuff like that. Um that was really good. Like having someone who can monitor me through training (MP27).

Players can develop a strong relationship of trust and support with their physiotherapist, particularly if the two have worked together for a long time. This allows the physiotherapist the opportunity to strongly influence the player's injury experience though the provision of both logistical and emotional support;

My last physio she knew, she had been my physio for years, so while I was on the field she'd know something wasn't right. And she knew what I was like, when I'd had a head knock and then yes, if I got angry at her because she was trying to pull me off the field or something like this... (MP20).

The physiotherapist-player relationship proved to be influential in a player's concussion management – as well as their perceived overall experience. Players often reported laying their trust in their physiotherapist, and simply following what they "got instructed to do" in order to recover and play again. In what was shown to be a tough injury to navigate emotionally, as well as logistically, the physiotherapist supported players by being there through essentially every step of the way.

Theme 4; General NZ Rugby Culture and the Mind-Set of the NZ Rugby Player

This theme makes reference to the rugby culture and player mind-set in NZ community rugby – as expressed through the interviewed players. It was found that players were, in general, extremely grateful for the support provided by the CMP, and the difference that it has made for their concussion experience. Also, rugby union consists of a community

which is very 'tight', and of 'collective' cultural values. In such a community, players were willing to sacrifice their own health for the benefit of the team. Lastly, it was found that rugby players were more willing to listen and follow the advice of someone who was a fellow member of their own community (such as ex-rugby players).

This theme consists of three identified sub-themes:

- Player appreciation for the system;
- The influence of the collective culture of rugby union;
- Players' response to an influential person of the same circle/community;

4.1 Player Appreciation for the CMP System

Players expressed particular appreciation for the way recent improvements in awareness and management of concussions have generated a positive change in the way people 'in the rugby circle' understand and manage concussion injuries. Players explained that this positive change has provided them with better overall support and care.

When commenting on the current support structure, one player expressed his appreciation by saying that "I like it because like, you know we're schoolboys, we're the next generation, I guess, so it's good that you guys are looking out for us now" (MP24).

Further acknowledgement of players' positive response to increased awareness was seen through their perceived rating of NZR's current efforts to inform people about concussion. This is summarised in Table 4.

Table 4

Summary of Players' Perceived Ranking of NZR's Efforts to Inform People About Concussion

Ranking of NZs effort to inform people	Number of players selecting such ranking
about concussion	
5	86.7%
4	10%
3	0
2	3.3%
1	0

Players' high levels of satisfaction were shown to be the result of relatively recent perceived improvements. Players explained that they gave it a 5, for example "because it's like, concussions, we weren't really aware of it like a couple of years ago. But especially this year, everyone's like really aware of it" (MP9). Players expressed gratitude at being able to witness a positively changing all-round culture. One player commented that; "I think the players are really supportive. The culture around the player alignment has changed a lot in the past years... everyone is much more understanding and reasonable" (MP30). And another player further explained that "I think a lot it's definitely improved over the past few years... Like my first year in the first XV, there was nothing. So it's changed a lot since then I think that will just continue to improve" (MP6).

In some cases, players reported that their parents also were supportive and happy to see a change; particularly if the parent had experience with rugby;

When my dad used to play rugby he said there wasn't anything like this so he thought it was good that there was people taking recognition of this kind of stuff rather than like turn a blind eye cause like I guess there is a serious outcome so you know if you don't take it seriously you might get it again and get permanent damage... (MP19).

Through their expressed satisfaction, players revealed a gratitude for what is becoming a more supportive and understanding rugby community (when it comes to concussion management). This positive attitude towards such change – as well the appreciation of the seriousness of the injury - was further illustrated through players' expressed desires to continue seeing such positive changes. A typical response as; "There's definitely been more awareness around it, but there can never (be enough) ... probably chuck even more out there, sort of thing, about just the seriousness of concussions...But yeah. I think you guys do a pretty cool job" (MP18).

Some players explained that their past concussion management behaviour was flawed. They expressed an appreciation for what they have learnt, while also demonstrating a desire for their concussions - as well as those of fellow rugby players - to be better cared for in the future. One player, when asked what his advice for other players going through a concussion would be, replied that:

It probably just, to make sure you listen. That's what I would do. I wish I had listened, because I feel, if I had listened I would have probably recovered a bit better. Because

I never saw the importance of it (healing from a concussion), I was just, "Ugh, you're just concussed." Because when... thinking about it now, I used to just think that a concussion was just a one-day thing, oh you're concussed the next day you're fine... But learning from doctors, that last meeting I had with them helped, it just opened my eyes... I told myself the next time I get concussed, I'm going to definitely going to do it properly (MP16).

Another player also expressed regret at his past concussion-related attitude. His regret was related to his personal lack of support towards a concussed team-mate. The player attributes this attitude to a lack of awareness and understanding. He explains that

I feel bad, because we did have one guy on our team that just... he naturally just milks every injury. He got a concussion... But we did give him a lot of s### for milking it, sort of thing he was off for six weeks. But I do feel bad, because I got the concussion after that, and I thought, maybe this does hang around for a bit longer for some people... (MP18).

And lastly, players revealed a positive concussion management mind-set when they expressed their understanding in the need to take concussions seriously, and to take time off. They explained that it was hard to not play, and their initial reaction was possibly negative; but in the end, however, they accepted and appreciated the need to sensibly take time off. Players explained that the time taken off "was useful", and "necessary"; that "I don't want to muck around with the head" (MP6), "I was pretty upset at the time, but I knew it had to be done" (MP10), and "It's good to have a bit more recovery than you think" (MP21).

4.2 The Influence of the Collective Culture of Rugby Union

Analysis revealed that the rugby culture has a strong influence on players' mentality, behaviour, and willingness to sacrifice their own health for the team. Players expressed strong values characteristic of a 'collectivist culture' – in which the whole is bigger than the individual – and in which the individual is willing to sacrifice for the team. Players explained that they did "worry" about their health, and possible "consequences" of being concussed. However, they expressed a strong desire to carry on playing – due to "not wanting to let their team-mates down", or miss out on the sense of belonging and "being with the boys"; Players explained that "we all want to be on the field no matter what. It sucks just watching the boys

play, and then you're not part of it" (MP16). Many players reported that watching and not being involved was emotionally tough to handle;

Hard to deal with, not playing. I found it hard just watching because I was on the-like on the microphone and stuff for a couple of weeks before I was allowed to play. And that was probably the hardest part, just watching (MP19).

Emphasizing players' appreciation of being with the boys, one player expressed his relief at being cleared and explained that; "I felt good because I could train with the boys and stuff, and because I was able to, just train with the boys" (following clearance visit; MP28).

The rugby environment can sometimes feel "pressured". However, in most cases, players reported not feeling external pressure from coaches, management, nor team-mates. For most cases, the pressure to continue playing, or rush a recovery, came mostly from the player himself. Often, this self-pressure stems from a feeling of wanting to help the team;

It was an important game... and we didn't have many players, this was a part where we had heaps of injuries and all that kind of thing... the whole team needs me kind of feeling (MP5).

This self-pressure was particularly strong if the injury happened during an important part of the season; "I could tell they (teammates) were disappointed and that sort of made feel that I wanted to (continue playing) ... because it was big games for us and we wanted our strongest team playing, but they weren't pressuring me necessarily" (MP28).

Sometimes, the suspected concussion happens during a crucial stage of the game – making it hard for the player to accept his symptoms and seek help. One player explained that after his head knock, he continued playing because the other team were close to scoring, and he felt he needed to help his team-mates; "I gave it a bit of a rub (player's head). And then they were on the verge of scoring, so I had to quickly try and get back in there, straight away, and then just deal with it..." (MP16).

Improved concussion awareness and knowledge, amongst important stakeholders, seems to have made it easier for players to acknowledge their injuries, care for their injuries, while feeling supported by their much valued and influential rugby community. However, in contrast, the collective culture in rugby - where the team is bigger than the self and where there exists a strong sense of belonging – made it hard for players to acknowledge and

appropriately care for their injuries. They showed a willingness to sacrifice their own health – and overcome their own fears and worries in order to help the team and be "with the boys".

4.3 Players' Response to an Influential Person of the Same Circle/Community

People belonging to the players' 'inner circle' tended to have a particularly strong influence on them. Players explained that having someone that has played rugby and experienced a concussion, in the rugby contextual setting, can strongly influence their opinion and even potentially change the way they viewed, understood, and managed head injuries. Part of the CMP involved organizing educational talks. Sometimes the talk was given by non-rugby players. - However, most of the time it was given by either a current or former rugby player. In general, players reported finding these talks "very good", "helpful", and "influential".

When asked to reflect on which speaker was more influential (the former/past rugby player or the non-rugby player) the player opted for the former; "he's was pretty mean because he's been through it..." Players were more likely to be influenced by fellow rugby players which they felt they could relate to - "that was pretty scary... he's a rugby player and you could actually be sick one day" (MP12). One player expressed the impact of a relatable influential speaker when he explained that if it had not been for Sam Cane's educational talk at the beginning of the season he "probably would have just lied, to be honest" (MP4).

Sometimes, the influential speaker responsible for changing concussion related attitudes and behaviour was a rugby player who was also a friend and not necessarily part of NZ Rugby's CMP. One player, for example, explained that he "had a few (concussions) in the past and masked them" (MP17). When asked what caused a change in attitude, the player mentioned a friend who was also a rugby player;

"One of my mates is – He's had two years, he plays super rugby and he's had two years off footie for head injuries, so talking to him. Told me a few things that screwed my head on permanently... I don't want to end up... Talked some sense into me a bit..." (MP17).

Another player similarly explained that his behaviour post-concussion was strongly influenced by his coach because he was a former rugby player and had experienced a lot of concussions;

My coach is a prem player and he's been concussed quite badly a couple of times and he says, and he emails me and he goes, I want you to take two weeks off now. Don't do anything at all. Just rest (MP5)

The player believed that his coach "knows what he's talking about" (MP5) - and thus followed his advice – and didn't seek professional medical assistance; something which ended up negatively affecting the player's recovery.

Players also suggested that the current NZ Rugby's CMP program would improve if more educational talks were to be given by current (or former) rugby players that people can relate to. When asked on how the current system could help make things better, one player suggested;

Maybe try and find a story of a superstar, that didn't really follow the procedure, and just show that it happens to the best, so that they don't think we are all bulletproof... And yeah, just say that, to be at that elite level, you got to follow the steps (MP16).

Another player similarly suggested utilizing...

Someone that's been through it... and then just the effects of what could happen and how serious it is now compared to what it used to be... someone that is experienced in it and can speak some knowledge into them and I guess scare them a little bit... nothing to play around with (MP17).

Summary

The thematic analysis of the transcripts identified four dominant themes – as well as their respective sub-themes. These themes are;

- The symptomatic experience
- The role of a dedicated concussion management pathway in the players' experience
- The significant influence of the role of the coach and the physiotherapist
- General NZ rugby culture and the mind-set of the NZ rugby player

Participants' reports of their injury experience showed that the symptomatic experience of concussions can be extremely challenging. The symptoms experiences were often significantly troubling for participants and included neurological issues such as memory loss, trouble concentrating, dizziness, and feelings of déjà vu (amongst others). What made the symptomatic experience particularly hard for participants was its unpredictability in terms of what symptoms are experienced, the intensity of such symptoms, and the duration of these. In some cases, the symptomatic experience lingered for extended periods of time – leaving participants unsure of whether they have recovered – or if in fact they ever will. Naturally, such a symptomatic experience can prove traumatic and participants did report that returning to contact, and exposing themselves to another head knock, proved mentally challenging. Furthermore, concussions affect the brain's function – thus impacting all walks of life, particularly school and work.

Overall, having a dedicated concussion management pathway was extremely well received and appreciated by participants. Participants reported high levels of satisfactions in regards to the support provided by NZR's CMP across all stages of the program. One of the things which stood out as being particularly helpful to participants was information. Information, when provided in a clear and tangible manner, was perceived as being helpful in the guidance and management of the injury. Participants appreciated knowing what they could and could not do – what was helpful and what was not. Lack of information, contrariwise, led to participants feeling more lost, unsure, and anxious about how to look after their injury. Despite the overall appreciation for the CMP program, participants' reports identified an area of significant weakness; any meaningful implementation of an RTL. At the present moment, schools are not doing enough to promote concussion management during athletes return to school and study. Participants explained that they were unaware of their schools having any form of policies regarding managing their return to study post-concussion. As a result, many participants rushed their return to school, struggled through symptoms, and failed to adequately manage their injury.

The coach and the physiotherapist are naturally one of the very first lines of emotional and logistical support for the players. Analysis of the data showed that players often held close relationships with their coaches and their physiotherapist. Through these relationships, the physiotherapist and the coach proved influential on participants' concussion experience. They were the people participants turned to the most for advice and guidance. Due to this, participants were really appreciative of having a coach and physiotherapist who proved support and information. Furthermore, participants felt that the coach in particular played a big role in influencing team culture and social expectations. As such, the - attitude of the coach towards concussion would often influence the overall team attitude; making it either easier or harder to adequately manage one's injury.

Finally, the general NZ rugby culture, and the mind-set of the NZ rugby player, also significantly affected the overall concussion experience of participants. Culture and social norms can strongly influence behaviour. Participants felt that the CMP program has contributed towards generating a rugby environment in which concussions are better understood and managed. For this, participants were extremely grateful. Also, participants revealed that the rugby community, in general, possesses many values belonging to that of a collective culture. However, in such a culture, the individual is willing to sacrifice the self for the benefit of the team. Such values often made it hard for a player to prioritize his or her own health over the success of the collective. Lastly, influential speakers, to whom participants could relate to, were able to strongly impact the attitude of participants and generate positive behavioural changes.

Chapter 5: Discussion Chapter

Introduction

The aim of this study was to understand New Zealand community rugby players' perspectives and experiences of concussion and its management. It aimed to do this through answering the question;

• What are NZ community rugby players' perspectives and experiences -of concussion while progressing through NZR's CMP?

-Undertaking a thematic analysis on the collected data resulted in the identification of four dominant themes. These themes help understand the experience and perceptions of the concussed rugby player. The four identified themes were;

- Symptomatic experience
- The role of a dedicated concussion management pathway in the players' experience
- The significant influence of the role of the coach and the physiotherapist
- General NZ rugby culture and the mind-set of the NZ rugby player

Based on the findings reflected through these themes (which are presented and explained in the -Findings chapter), this study suggests that the experience of the concussed rugby player is, metaphorically speaking, a journey. A journey which is physically and mentally challenging, unpredictable, has neither clear beginning nor end – and is influenced by multiple personal, interpersonal, organisational, and cultural factors.

The journey is said to have no beginning because the concussion experience can be influenced by individual factors which precede the injury (such as previous concussion experience, individual's health, and the level of support in the culture/environment in which the player finds himself in). The journey potentially has no end because of the pathological nature of concussions (Choe, 2016; Smith & Groff, 2016; Smith & Stewart, 2020), and its potential for long term damage; experiencing a concussion increases the chances of another concussion, as well as that of developing brain diseases later in life (Cantu & Bernick, 2020; Gardner et al., 2014; McMillan et al., 2017; Poole et al., 2015; Treacy & Heflin, 2021).

This interconnectivity of the multiple and varying factors which shape up the individual's injury experience is represented below in Figure 1.

Figure 1

The Varying and Dependable Concussion Experience



Each identified theme is itself composed of different influential factors. This chapter will discuss the main influencers which were identified within the different themes (illustrated on the table below). Together, all these factors combine to shape the player's overall concussion journey; as illustrated in Table 5.

Table 5

Main	Influencers	Derived	From	Main	Identified	Themes	

Main Identified Themes	Identified main influencers derived from main
Symptomatic Experience	Concussion Symptomatic experience is physically and mentally challenging.
The role of a dedicated concussion management pathway in the players' experience.	Concussed rugby players were, in general, very appreciative of the CMP and the impact it had on their concussion experience.

	Information, and the manner in which it is provided, can play a significantly influential role in the overall player experience.
	In the current CMP program schools are currently not maximizing their potential to positively impact players' concussion experience.
The significant influence of the role of the coach and the physiotherapist	The coach can significantly influence the overall concussion experience as well as the collective's attitudes and behaviours relating to concussion management.
General NZ rugby culture and the mind-set of the NZ rugby player	Rugby Union embodies a 'collective culture' in which the individual is willing to sacrifice the self for the team.

Theme 1: Symptomatic Experience

Concussion Symptomatic Experience is Physically and Mentally Challenging

One of the main findings which - emerged from this study supports previous research (Kirkwood et al., 2015; Seguin & Culver, 2021; Thornton et al., 2008) that found the symptomatic experience of suffering a concussion in rugby can prove both physically and mentally challenging.

Concussions resulted in a number of different cognitive issues for players. The main issues described included memory loss, headaches, dizziness, fatigue, and confusion (feeling lost). Players explained that experiencing such symptoms negatively influenced not only their rugby, but their normal every-day activities; such as school and work. As a result of the symptomatic experience, players reported feelings of anxiety, frustration, and fear. Something which players found particularly hard to deal with was the lack of predictability regarding the intensity and the time-line of such symptoms. Players' reports showed that concussions produced different symptoms, all of which varied in intensity and duration.

These results were not necessarily a revelation. A lack of clear understanding and predictability is a major characteristic of concussion injuries (Aubry et al., 2002; Davis et al., 2019). In fact, even the term 'concussion' still today lacks a clear, universally accepted definition (Anderson et al., 2006; Bodin et al., 2012; Kazl & Torres, 2019; McCrory et al.,

2017). The term is used not to define the injury, but to try and describe the incredibly complex process which concussions entail. In other words, concussions do not happen when someone gets knocked in the head. Concussions are a description of what proceeds after a head knock - the complex neurological process which begins after a player receives the head knock (Anderson et al., 2006; Choe, 2016; Giza & Hovda, 2001; Shi et al., 2016). This neurological process is incredibly varying and dependent on multiple factors (Howell & Southard, 2021; Kazl & Torres, 2019; McCrory et al., 2017). The degree, seriousness, and time-line of the concussion depend on the brain's ability to manage and essentially recover from the generated damage (Howell & Southard, 2021; Nowak et al., 2020; Shi et al., 2016).

Recovering from the damage generated by the head knock requires a lot of energy from the brain. The brain, under normal circumstances, already demands a high energy load (Kozma et al., 2019). Thus, when under further stress from the head injury, the brain can sometimes enter what is referred to as a 'metabolic crisis' – in which the brain's effort to provide the necessary energy can prove not only insufficient, but also 'toxic' and 'oxidative' (Ambrogini et al., 2019; Howell & Southard, 2021; Shi et al., 2016). This metabolic crisis thus leads to what can be described as a type of system failure – which is what we essentially see in the rugby players in this study who experienced physically and mentally challenging symptomatic experiences.

If not properly managed, concussions can generate temporary, and possibly even long-term, brain damage. There is no set time-line for recovering from a concussion. Concussions which are not properly managed can result in progressive brain deterioration – leading to brain diseases such as dementia, Parkinson's, Alzheimer's, multiple sclerosis, and CTE (amongst others); (Choe, 2016; Decq et al., 2016; Devine, 2021; Howell & Southard, 2021; Montenigro et al., 2017; Winblad et al., 2019; Zetterberg et al., 2019).

Theme 2: The Role of a Dedicated Concussion Management Pathway in the Players' Experience

Influencing factors derived from theme;

- Concussed rugby players were, in general, very appreciative of the CMP and the impact it had on their concussion experience.
- Information, and the manner in which it is provided, can play a significantly influential role in the overall player experience.

• In the current CMP program schools are currently not maximizing their potential to positively impact players' concussion experience.

Concussed Rugby Players Were, in General, Very Appreciative of the CMP and the Impact it Had on Their Concussion Experience

Players expressed awareness of the seriousness and the challenges which the concussion experience presented. A result of this was that players experienced high levels of satisfaction and appreciation for NZ Rugby's current efforts to support the concussed rugby player (as done through the CMP).

Most players felt that NZR was doing a great job in spreading awareness and providing a support system to manage their concussion recoveries. The part of the program which the players expressed possibly the most gratitude for was the general cultural change which the CMP has helped to generate. One player, for example, explained that "the culture around the player alignment has changed a lot in the past years... everyone is much more understanding and reasonable" (MP 30). As appreciative as players were of the provided change, the situation was still not considered perfect. Players expressed a desire for continual improvement in the current concussion management support system – explaining that "I think you guys do a pretty cool job... there's definitely been more awareness around it, but there can never be enough" (MP18).

This study thus revealed that players were individually extremely grateful for the cultural change which has occurred in the last few years. They expressed gratitude for the improved support, understanding, and access to care. This finding suggests that players' past 'negative concussion management' behaviour and attitudes were possibly the result of lack of knowledge and of an unsupportive culture.

Such findings are significant, because they present a different side to the 'traditional, tough, masochist' stereotypical rugby player so often presented in the media and in research (Liston et al., 2016; McRae, 2020). It also contradicts previous research which has suggested that the rugby player, in general, limited the success of concussion management interventions due to an ingrained mind-set which actively dismisses and denies the seriousness of head injuries. Liston et al., (2016), for example, found that the adult rugby player commonly displayed a notable disregard towards the severity of concussions. This was mirrored by

(Daly et al., 2021), who concluded that in rugby union, the implications of head injuries were normalized through the use of dismissive language and the trivialization of the injury.

It seemed that such a cavalier approach to head injuries, and all injuries in general, were an ingrained part of rugby culture; and particularly NZ rugby culture (Murray et al., 2015; Salmon et al., 2021). It is commonly suggested in research that this 'ingrained mind-set' acts as a barrier towards successfully improving the management of concussions in rugby union (Daly et al., 2021; Murray et al., 2015; Salmon et al., 2020b; Seguin & Culver, 2021).

The findings related to the young players in this study, however, give cause for optimism and suggest that this display of disregard and trivialization towards concussion may not necessarily reflect all rugby players' attitudes. Findings of this study revealed a side of the rugby player that demonstrated understanding and conscious awareness of the need to take concussions seriously – revealed by strong appreciation for a system which they felt was improving the general level of concussion awareness and support. The reason for the differences found in this study, compared to previous research literature, could possibly be due to the fact that the CMP was only implemented in 2018. Therefore, previous research may not have been influenced by any meaningful concussion management policies or procedures in the way that this study has. Furthermore, this study focused solely on players who were part of the CMP, and were therefore directly influenced by it. It would be interesting to see whether future research into community rugby players' attitude and culture reveal changes which are in accord to those found in this study. Continual improvement in the understanding of the rugby player, and rugby culture specifically, could help improve the overall success of future concussion management interventions.

Information, and the Manner in Which it is Provided, Can Play a Significantly Influential Role in the Overall Player Experience

Players expressed high levels of satisfaction regarding the CMP program, particularly valuing the provision of clear and tangible information. This information – when provided in a clear and tangible manner – positively influenced players' injury experience. Players often associated being well informed and clear of doubt with a positive experience; "I thought it was quite, like everything was explained to me really well once I did go through the concussion protocol stuff, like the steps and everything were really good" (MP 27).

In a thematic analysis, there is commonly a focus on identifying dominant themes (Clarke & Braun, 2017). However, it is important to acknowledge themes that were less

dominant and yet still carry important implications for the overall research question. In this study, the importance of information is an example of such a theme. The role of information proved extremely influential in the overall experience. This was particularly highlighted through players who reported that their experience was negatively impacted through not being adequately informed throughout the CMP. In a few cases, due to inconsistencies in the management of the CMP, some players were not properly informed or guided. They explained that they either received little to no information – or that the information received was verbal and thus forgotten (particularly as the player was suffering concussion symptoms). The consequence of this was that players felt lost, unsure of what to do or not do, and naturally less confident and more anxious regarding their injury experience; "It could've probably been a bit more… got told more about it. We didn't really know what was going on… I don't know what had actually happened to me" (MP 25). Furthermore, when asked on ways in which the CMP could be improved, many players (regardless of their perceived satisfaction) often mentioned information – and referenced the need for more clear and tangible information.

What this finding suggests is that future concussion support systems need to focus on ensuring they are providing simple, relevant and targeted information. Furthermore, this information should be tangible so that the player can have constant access to it. According to the findings of this study, printed information appeared to be a preferred resource for players. The role of information in generating behavioural change is further emphasised in research. (Salmon et al., 2021) found that concussion management knowledge and education was important – across all stakeholders – in generating behavioural change. Informed players, according to research, are more likely (than non-informed players) to report concussions, and to better manage their recovery (Bramley et al., 2012; Salmon et al., 2021; Salmon et al., 2020d).

The reason for this may be explained through Ajzen's (1991) Theory of Planned Behaviour (TPB). According to Ajzen, behaviour follows intention, and intention is predominantly composed of three main concepts; behavioural beliefs (attitude), normative beliefs (subjective norms), and control beliefs (perceived behavioural control).

In accordance with this study's findings, knowledge and information can help influence two of the mentioned concepts; behavioural beliefs and control beliefs. Information helped players recognize the importance of treating concussions seriously (behavioural beliefs) – as well as provide guidance and confidence on how to appropriately care and manage their injury (control beliefs). Information on its own cannot generate behavioural change. However, it does set a strong foundation for it. Lack of adequate information and guidance has been shown to significantly inhibit behavioural change (Bramley et al., 2012; Fraas & Burchiel, 2016; Kerr et al., 2018; Register-Mihalik et al., 2018). Thus, this study found that information and awareness played a strong role in generating behaviour change in rugby union players. It therefore emphasises the need to improve awareness, and continually provide as much clear, tangible, and updated information as possible.

In the Current CMP Program Schools are Currently not Maximizing Their Potential to Positively Impact Players' Concussion Experience

Despite the general appreciation and high levels of player satisfaction regarding the CMP, there was one particular component of the program which stood out as a major area of potential improvement; the Return to Learn (RTL) protocol (as implemented by schools).

RTL refers to the process involved in guiding and managing the concussed rugby player's return to study. As mentioned earlier, concussion injuries affect all parts of life, and this includes school/study. For the concussed rugby player, a failure to adequately manage the return to school proved to be a challenging experience. For some players, it led to symptoms of dizziness, fatigue, trouble concentrating, headaches, and a sense of déjà vu or "of being a bit lost" (MP 14).

Research explains that returning to school settings, for the concussed person, can prove challenging. When suffering from concussion symptoms, people need to manage their mental work load, and be cautious of being exposed to stimulants such as light, noise, and social gatherings (Broglio et al., 2015; Harriss et al., 2020; Newlin & Hooper, 2015; Stein et al., 2015). Thus, if not managed properly, the school setting can negatively influence a person's concussion recovery. It is therefore important to manage a player's return to school – and to cautiously guide him or her through the process (Harriss et al., 2020; Newlin & Hooper, 2015; Purcell et al., 2019). For this reason, NZR's CMP developed a set of guidelines for doing exactly this. The problem, however, is that both schools and players, appear to underestimate the need to properly manage the return to school.

This study found that schools display a supportive attitude towards concussion management in a sport setting. Schools actively guided and helped manage their student's return to rugby. However, these same schools would then fail to provide any structured

guidance or support to the concussed rugby player beyond sport. In fact, most players reported being unaware of whether their schools had any RTL policies at all (being part of the CMP, they should).

I'm not sure about the school side of it, but I know that the sports like, well now that we're with the concussion sort of side of it, they make us have a break from training and stuff like that... I didn't change anything for the school side of it, but obviously with... the rugby side of it (MP 6).

Further adding to the problem, players attitudes also reflected a significant underappreciation for the need to rest from school. Most players found it normal to simply return to school, and push through whatever symptoms they experienced. This behaviour, in turn, negatively contributed to the players' recovery and overall experience. It could possibly be that the underappreciation for the need to manage the concussed rugby player's return to school is due to lack of knowledge and understanding (Fraas & Burchiel, 2016; Kerr et al., 2014).

With all types of physical injuries, such as a broken bone or ligament, the brain remains intact and is thus capable of being in a school setting and managing work load without problems. Concussion injuries are different, because they are physically invisible, and affect the brain (Smith & Groff, 2016; Smith & Stewart, 2020). The injured brain, although not visible to the outside person, can really struggle in a school setting where the number of stimulants can become overwhelming (Purcell et al., 2019). Therefore, future research needs to identify exactly why schools and players prioritise the physical recovery and underappreciate the mental recovery. Finding ways to correct these general misconceptions could lead to better awareness, behaviour, and consequently better experiences for the concussed rugby player.

Overall, this study found that schools are not providing the concussed rugby player with as much awareness, information, guidance, and protection as they could. This is a concern and difficult to comprehend as schools are responsible for the welfare and wellbeing of all in their care. Because schools are so close to the players and have access to them for comparatively long periods of time - they have the potential to be a strong influence on players' attitudes and behaviours. It is thus necessary for NZR to prioritise their working relationship and influence with schools around the country, and better utilize school's potential in influencing the management of concussion.

Theme 3; The Significant Influence of the Role of the Coach and the Physiotherapist

The Coach can Significantly Influence the Overall Concussion Experience as Well as the Collective's Attitudes and Behaviours Relating to Concussion Management

The study found that another major influence on the players' concussion experience was the coach. In rugby union, the coach is the leading figure of the team and therefore a primary influencer on the general team's culture (Cruickshank et al., 2013; Hodge et al., 2014; Mckenzie, 2019; Voight & Carroll, 2006). This culture, which is influenced by the coach, extends to influence the team's concussion management related attitudes, beliefs, and behaviours.

In this study, the difference between a supporting coach, who applied no pressure to the player, and a non-supportive coach, who transmitted pressure to the player, appeared to have a strong psychological and behavioural effect. Players felt more confident in taking time off and adequately recovering when a coach showed sympathy and understanding. Furthermore, players felt that the coach, through their leadership role, strongly influenced the overall culture of the team. This meant that coaches' approach and attitude towards concussion management spread to affect the overall team culture; "no one really worries too much about it... Everyone understands you can't play. Coach won't let you on, so it's just like you carry on... (MP15)". Players who had a coach who demonstrated positive concussion management attitudes and behaviours often found it easier to adequately manage their injury. In contrast, players whose coaches demonstrated a less positive attitude found it much harder; "they were kind of like, "you'll be right"... and it's hard to think otherwise, when you're being told that, especially I think if you're a younger guy, or if you felt pressure to keep your spot in the team" (MP18).

Research accordingly affirms that a coach can strongly influence athlete attitudes and behaviours (Hodge et al., 2014; Kim et al., 2016; Watson et al., 2011). Jowett & Ntoumanis (2004) explain that, in developed coach-athlete relationships, the attitude and behaviours of the two are often mutually and causally inter-connected. In team sports, it has been claimed that the coach is a primary influencer of the team's overall culture (Cruickshank et al., 2013; Hodge et al., 2014; Mckenzie, 2019). Culture is something which coaches can actively influence and shape so as to get desired results (Hodge et al., 2014; Kaya, 2014; Martin et al., 2013) – and it is the development of culture which aligns the mentality, attitude, and behaviours of all team members (Nicholls et al., 2017; Voight & Carroll, 2006).

A coach's beliefs, attitudes, and behaviours regarding concussion management can therefore strongly influence the overall team's beliefs, attitudes, and behaviours. As the study showed, coaches who displayed positive concussion management behaviour helped create an overall team culture in which concussion managements was positively supported and accepted – making it easier for individuals to manage the difficulties experienced through such an injury; "It's just like human nature to just get back out there and just want to play... but the coaches were really good, and they didn't let anyone play unless they had a certificate (clearance letter)" (MP 6).

A strong emphasis clearly needs to be placed on educating coaches and in actively encouraging them to foster a culture which positively supports concussion management. Doing so can help to build a team culture in which players feel more physically and psychologically supported throughout their concussion experience and the many difficulties it provides (particularly the feeling of letting the team down, and on losing a sense of belonging).

Theme 4; General NZ Rugby Culture and the Mind-Set of the NZ Rugby Player

Rugby Union Embodies a 'Collective Culture' in Which the Individual is Willing to Sacrifice the Self for the Team

This study suggests that one of the main reasons for past negative attitude and behaviour is cultural influence. It was observed that rugby union has many characteristics belonging to that of a 'collective culture'. In a 'collective culture', the individual is part of something bigger than him or herself (Hofstede & Bond, 1984). The individual is therefore willing to sacrifice the self for the benefit of the group. Members of such a community also extremely value and appreciate the sense of belonging which comes with being part of the given collective.

In spite of the positive findings related to player attitudes towards the CMP, our study also found that for rugby players, the main reason for playing injured or lying about symptoms was due to collective cultural reasons. One such reason was not wanting to let the team down. It was much harder, for example, for players to miss out on important games when compared to pre-season. The other main reason for continuing to play, or wanting to rush a recovery, was because of how much players struggled to not be with their team mates – to not feel like they were contributing and consequently losing out on a sense of belonging (Clacy et al., 2017; Gornall et al., 2021; Seguin & Culver, 2021).

This identification of the rugby union culture is extremely relevant in helping us understand the mentality of the rugby player and the reason behind sometimes unreasonable behaviour. It also suggests that in rugby union, cultural change has the potential to be significantly more effective than individual change – thus providing a clear target for future concussion management interventions.

The Influence of Someone of the Same Community

Also, in relation to the concept of the collective culture, it was found that players were much more likely to listen to and be influenced by a member of their own community. This study found that rugby players were more likely to listen to someone who has (or still is) playing rugby. This was partly because players felt the rugby player's concussion was very particular, and thus only truly understood by someone of the same 'tribe'. Players reported that CMP organized talks given by influential speakers (such as All Black's captain Sam Cane) proved extremely successful in generating positive change in attitude and behaviour (particularly when the influential speaker was of the same rugby community).

The reason for the identified success of the influential speaker can possibly be explained by the TPB. In accordance with Ajzen's (1991) TPB, the three beliefs that tend to guide human behaviour (behavioural, normative and control), combine to produce intention. Intention, according to the theory of planned behaviour, is the most accurate predictor of behaviour (Ajzen, 1991). TPB explains that providing knowledge regarding best practice in concussion management is, by itself, not enough to produce behavioural change.

A disconnect between identifying and implementing best practice in rugby union has been identified by (Salmon et al., 2021). In accordance with TPB, this is possibly due to the negative influence of normative beliefs (social behaviour). In rugby union, there has predominantly been a culture which was supportive of the individual's sacrifice to play injured, display bravery, and disregard pain (Liston et al., 2016). This quality is often extolled in the NZ media, a typical example being the article by Wynne Gray in the New Zealand Herald, entitled 'All Blacks who played through the pain', where Gray referred to All Blacks captain Richie McCaw's heroism in playing on in a World Cup final with broken bones in his foot (Wynne, 2004). Players may therefore sometimes feel that it isn't socially acceptable (in the context of rugby union) to report a concussion and carry out the necessary precautions. Having an influential speaker, however, who is part of the rugby community, and who has possibly even experienced success, can help generate positive cultural change – through

changing the normative beliefs of players (particularly younger players). A non-rugby player (outsider) would not be able to influence normative beliefs (and consequently intention) as – effectively as a rugby player (insider).

Furthermore, influential speakers have, in accordance with the Popular Opinion Leader (POL) intervention, the potential to positively affect behaviour within their social networks (Valente & Pumpuang, 2007). Kerr et al., (2018) has suggested that concussion initiatives of the past have overly emphasized the individual and policy and not focused enough on community relationships and dynamics. Utilizing opinion leader interventions has shown to successfully generate change in cultural norms (Rogers, 2010).

This suggests that through the implementation of POL interventions, there is a strong potential to generate cultural change. According to TPB, cultural change is one of three main generators of intention (Ajzen, 1991). Research has shown that social and cultural norms have significantly restricted the efficacy of concussion management interventions in rugby union (Liston et al., 2016). Therefore, utilizing POL interventions (through the use of influential speakers) can help generate positive changes in normative beliefs – and in intention and behaviour accordingly. The results found in this study strongly correlate with such research.

Implications

Current State of Play

Media coverage in recent years has highlighted the story of some former rugby players. What essentially constitutes the first wave of professional rugby players has produced some very concerning stories. More than 150 former rugby players have recently filed a class-action lawsuit against governing bodies, including World Rugby, alleging a failure to minimize risk. The lawsuit includes former All Black Karl Hayman, who at age 41 was diagnosed with early onset dementia and probable CTE. Karl Hayman, at one point the best paid rugby player in the sport, explains that, due to repetitive head knocks, he "spent several years thinking I was going crazy... It was the constant headaches and all these going on that I couldn't understand" (NZ Herald, 2021). Further media coverage explained that this led the former player down a road of alcohol abuse, suicidal thoughts and erratic behaviour (Napier, 2021). The link between repetitive head knocks, and the behaviour and diagnosis of Hayman is, according to research, very plausible (Bailey et al., 2010; Ellis et al., 2015;

Fralick et al., 2019). Hayman, explains recent media coverage, is now joining the lawsuit against World Rugby. He is looking to speak up, as he felt the need to spread awareness, to hopefully help "a guy in New Zealand perhaps who doesn't understand what's happening to him and has no support network to lean on" (Cleaver, 2021).

There are currently multiple stories, recently published in media work, which mirror that of Karl Hayman's, such as former England International, and 2003World Cup winner, Steve Thomson. Like Hayman, Thomson has been diagnosed with Dementia and probably CTE (at age 41). He explains that he cannot remember any of the games from when he won the world cup, and today, sometimes forgets even his wife's name (Bull, 2020). In the article, he explains that he is not looking to "kill the game" – but to "have it regulated", so as to better protect players and their brains, so that future players don't end up like him. Thomson acknowledges that regulation and support had improved, but believes more needs to be done, particularly through major governing bodies, such as World Rugby.

Such stories, along with research, highlight the difficulties, challenges, and fears, which a rugby player can face when experiencing a concussion. It can be a complicated and traumatic journey – with a destination which is sometimes uncertain. Such stories also help - one understand the rugby player's concussion experience (at an extreme level), as well as their willingness to spread awareness and improve the support available for future generations. It also highlights the fact that supporting the concussed rugby player should not be limited to the immediate management of the injury. Supporting the concussed rugby players needs to happen prior to the injury (so as to prevent as much damage as possible) – during (so as to guide players through initial recovery) – and post (so as to prevent further damage and ensure the best possible healing).

Economic and Political Interests; Possible Barriers to Provision of Clear and Honest Information

The need to provide clear, honest, and tangible information is therefore a vital component of effective concussion management. It is therefore interesting, and concerning, that recent - research questions the credibility of international consensus statements (from which concussion policies in rugby union are drawn) – as well as that of the sports major governing body (World Rugby). A recent article, written by Casper et al., (2021), suggested that the Concussion In Sport Group (CISG) – the producers of consensus statements, which are
deemed as the 'bible' of concussion in sports, and accordingly utilized by sporting bodies such as NZR – are biased in their publications.

They explain that CISG promote sports-friendly protocols; favouring the interests of sporting organizations over that of the athletes themselves. The validity of such statements is backed by the fact that the CISG is funded and organized by the major interested sporting bodies (such as World Rugby). Furthermore, CISG experts have current, or previous, connections to the funding sporting organizations; thus questioning the credibility of such meetings.

When viewed through a critical lens, I - argue that recent actions undertaken by World Rugby have -done – little to suggest that Casper - and colleagues are - mistaken. In the middle of the sport's biggest ever concussion crisis, World Rugby published a statement suggesting that head knocks are only one of 12 modifiable risk factors which contribute to early on-set dementia and CTE. The 12 modifiable risk factors, according to World Rugby research were: Lack of physical activity, led education, brain injury, weight control/obesity, hearing loss, smoking, lack of social interaction, alcohol consumption, air pollution, depression, high blood pressure (hypertension), diabetes (World Rugby, https://www.world.rugby/news/671057/world-rugby-and-international-rugby-players-launch-

global-brain-health-education-campaign).

Such a statement was labelled "extraordinarily insensitive", and an "insult to players" by the UK newspaper, The Guardian; (Aylwin, 2021a). World Rugby argues that their statement is backed by research. However, this study's literature review failed to find any evidence which remotely suggested that brain injury is an equal contributor to the other 11 mentioned modifiable factors.

This all suggests that solving the current concussion crisis in rugby union may present a major political and economic barrier. After all, the brand of World Rugby is significantly valuable. In 2019, for example, revenues at World Rugby were reported at \$526 million (World Rugby Annual Reports, 2019). The World cup, hosted in Japan, generated nearly 4.3billion pounds in economic output (report published by EY) and added 2.3 billion pounds to its hosting country.

As future interventions are designed, it is necessary to be aware of possible conflicting interests, and the spread of misinformation, which may arise from the sport's leading organization. It is also necessary, as suggest Bolling et al., (2018) and Bolling et al.,

(2019a) to focus on developing more athlete-centred interventions, which genuinely focuses on prioritizing the athlete's best interests. There is a possibility to do more to prevent and manage concussion injuries

Recent Improvements in Concussion Management Strategies

Not long ago (at the very beginning of the century), concussion management policies in rugby union were essentially non-existent. It was only in 2001, that the first 'International Symposium on Concussion in Sports' - aimed at providing "recommendations addressing this important topic (concussion in sports) for the improvement of safety and health of athletes who suffer concussive injuries in ice hockey, football, and other sports" took place (Aubry et al., 2002). At this point, rugby union was not involved in the organizing of, or financially supporting, this meeting. It was only in 2016, when amidst increased awareness, combined with incrementing pressure from the public and the rugby community that World Rugby started to actively get involved in supporting these influential meetings.

It was common for players to get concussed and carry on playing, or possibly come off if the injury was severe enough, only to return to contact the following week or as soon as possible. There was -little awareness of the need to rest and clear the symptoms. Steve Thomson, 2003 Rugby world cup winner with England, diagnosed with Dementia and probably CTE, explains that "In the old days it was a bit of a laugh. If someone got whacked in the head, it was: 'Oh, look at him, he's had a belt. He'll be up in a minute" (Bull, 2020). This observation is shared by many former professional players who played through the early 2000s. To a certain extent, it was shared by some players interviewed in this study (particularly the more senior players;

"when my dad used to play rugby he said there wasn't anything like this so he thought it was good that there was people taking recognition of this kind of stuff rather than like turn a blind eye cause like I guess there is a serious outcome so you know if you don't take it seriously you might get it again and get permanent damage (MP10)".

The positive change which players reported in this study, and for which they expressed high levels of appreciation, are very recent. Through improved awareness, and the efforts of the CMP in NZ, NZ community rugby players benefitted from a comparatively better concussion management system. This process has, according to the findings of this study, proven extremely beneficial and popular for rugby players. The CMP's efforts of the last 5 years have provided a positive and crucial first step in the right direction.

Potential to Improve Concussion Prevention and Management Strategies

However, despite improvements, research shows that more could be done in rugby union to prevent and manage concussions. At the moment, players explained that the advice received for managing concussion mostly involved 'rest' – along with other advice such as staying away from screens and not drinking alcohol. Other than this, there was not much more information provided. In qualitative research, what is not said can also be revealing (Sutton & Austin, 2015). Players in this study never mentioned any possible prevention strategies (ways to prevent the extent of damage caused through a head knock).

It is possible, as mentioned earlier in this chapter, that concussion injuries are still not clearly treated as 'mental injuries'. It appears that concussions are approached in a similar way to physical injuries, in which rest, and careful management of symptoms, can result in a successful recovery. Players main recovery method often mostly consisted – of rest – as explained by one player; "(physiotherapists) were helpful in terms of just telling me what I should and shouldn't do… which is pretty much do nothing, so that was great (MP32)".

However, concussions are an injury to the brain (which affects the physical body). It is therefore needed to be addressed as such – to implement strategies which aim at treating and healing the brain. Doing so could be the next step towards better concussion management.

Recent research shows that, through improved understanding, there is, possibly, a lot more which could be done (both prior and post the head injury). Such things include: strengthening and caring for the neck (Collins et al., 2014; Gupta et al., 2019); re-training the audio vestibular system (Broglio et al., 2015; Quintana et al., 2021); applying nutritional strategies, such as achieving ketosis, so as to better manage the injury induced the brain's metabolic crisis, excitotoxicity, chronic stress and inflammation (Arora et al., 2022; Bernini et al., 2020; Camberos-Luna & Massieu, 2020); and meditation/breathing for nervous system reparation; (Clement et al., 2015; Cole et al., 2015; Hernández et al., 2016).

At the moment, current prevention and management strategies are mostly limited to rest and symptom management. The strategies mentioned above were not commonly, if at all, mentioned by the players in this study. It would seem fundamentally important that schools and sporting organisations, such as NZR, do not ignore the importance of the implementation

of different proven methods into preventing concussion and not only on rest and recovery. Furthermore, research suggests that concussion is better managed utilizing a multi-faceted approach (Glendon et al., 2021; Margulies et al., 2016). Therefore, future research could possibly inquire into incorporating more practical ways of preventing and recovering from concussion injuries. Doing so could help improve the efficacy of concussion recoveries – while also equipping players and medical professionals with tools to actively 'combat' concussions. This would be particularly helpful for players whose symptoms persist for extended periods of time, and for whom rest was not enough to alleviate such symptoms.

Chapter 6: Conclusion

This chapter summarises the key findings in relation to the study's aims and key question. It will also acknowledge limitations and provide suggestions for future research.

This study aimed to understand the concussion experiences of community rugby players in NZ – as well as their perception of NZR's concussion management pathway (CMP). It aimed to do this through answering one key question; what are NZ community rugby players' experiences around concussion while progressing through NZR's CMP?

In line with the purpose of a qualitative descriptive study, this study helped provide participants with a voice – enabling them to express their feelings and opinions regarding the issue of concussion in rugby. In this study I conducted a thematic analysis of data collected through 36 individual interviews as part of the broader NZR's CMP programme of research.

Summary of Results

The study found that the overall concussion experience was significantly variant and dependable. Results identified that players' concussion experience was influenced by four interconnected main elements. These four main elements, or themes, involve; the symptomatic experience, the role of a dedicated concussion management pathway in the players' experience, the significant influence of the role of the coach and the physiotherapist, and the general NZ rugby culture and the mind-set of the NZ rugby player.

Clearly, the concussion experience can prove extremely challenging for players, both physically and emotionally. The symptoms experienced (which are unpredictable in type, intensity, and duration) can severely limit physical and brain function. For rugby players, the time away from the sport, and from their team-mates, can sometimes prove even more challenging than the actual symptomatic experience. Furthermore, the nature of the injury can leave players with psychological trauma – making the return to contact a difficult and sometimes scary experience.

The difficulties faced when dealing with concussion injuries makes it essential for players to be supported, both logistically as well as emotionally. The support which players received, logistically from the CMP, and emotionally from the individuals who were part of the player's injury journey, dramatically impacted their overall experience. In regard to the CMP, players' perceptions was extremely positive. Results showed that players were grateful for the support and guidance which the CMP was providing. Many players compared the level of support the CMP is providing to that which was available prior to the CMP – which they felt, was essentially nothing. Comparatively speaking, the CMP proved extremely beneficial to players and provided them with logistical support which simply was not there in previous experiences. Furthermore, players believed that the CMP was generating an overall positive cultural change. Through a cultural change, players felt that influential stakeholders, such as the coach, parents, and team-mates, were becoming more supportive and understanding of the need to adequately manage concussions. This cultural change made it easier for players to seek help and better manage their injury.

Going Forward

Although players were positive about the CMP, a possible suggestion for future intervention is to emphasize the role of schools in providing support and guidance during players' concussion recovery. The study found that schools were not as actively engaging in the RTL processes (compared to other aspects of the CMP) and therefore missing out on the potential to protect, guide, and educate players in regards to the management of their concussions. Future research should therefore focus on better understanding the reasons behind the lack of RTL support/emphasis provided by schools as well the general player underappreciation for the need to manage their return to study.

A concern which this study highlights is the fact that players perceived the CMP to be extremely beneficial when compared to what was previously available. Expanded roll-out of the CMP is in development. Currently, the CMP is only being provided for the players who are part of the pilot programme; still leaving too many players without access to direct support. Furthermore, although this study found that the impact of the CMP was extremely positive and appreciated by those involved – it is concerning that even with the support provided via the CMP, the concussion experience of some players proved extremely challenging. One can therefore only imagine how many players are struggling through their concussion experience, without facilitated access to a dedicated support system. This study strongly suggests it is therefore essential to not only continue the positive work initiated by the CMP, but to also find different ways to provide support for all members of the rugby community (particularly those identified as being less resourceful and more vulnerable).

One of the study's main findings was the role which culture in rugby union played in individual behaviour regarding concussion management. Previous studies have suggested that rugby players displayed negative attitudes towards concussion management; implying that players disregarded and minimized the severity of the injury. Consequently, literature suggested that such a negative attitude led to negative concussion management behaviour – which consequently made concussion management initiatives harder to implement. However, this study found that players' attitudes towards concussions were, in general, extremely positive. Players expressed concern over their own injuries, as well as that of team-mates. Players also expressed high levels of gratitude towards people or systems which helped to support and protect them from the implications of the injury.

What this study did find, however, was that players negative concussion management behaviour was sometimes due to cultural reasons. More specifically, to the collective cultural values which are held in the sport – in which individuals were willing to sacrifice their own health for the benefit of the team – and in which they feared missing out on the sense of belonging which the culture of the sport provides. The general attitude difference found in this study, compared to previous literature, could be because this study was done on players who formed part of the CMP and therefore accordingly educated and influenced through previous interventions. It would be interesting to carry out further qualitative studies with players who are not part of a concussion management programme and compare attitudes and behaviours. Furthermore, there is a clear opportunity to develop a culture in rugby that encourages players to support each other's health. The notion of 'brotherhood' as one of supporting each other as opposed to playing on through pain for your 'mates', is an area that could potentially be explored to more efficiently generate positive behavioural change in concussion behaviour and management.

Another major finding of this study was the role which information plays in generating behavioural change. It was found that information provided individuals with confidence and guidance. It is therefore important to continually update the latest concussion management related information, and to find ways to effectively pass it on to the interested stakeholders. However, this study also - highlighted political and economic - factors (partly emanating from World Rugby) which may -t possibly be interfering with the flow of information and thus - impacting on player welfare. Such interests further emphasise the need for rugby communities to grow more self-sufficient in their ability to protect and support their

players. And for future research to be participant centred– so as to not over rely on governing bodies (who may possibly hold differing interests).

Despite the dangers associated with rugby, it remains a sport which provides multiple benefits to individuals and communities – particularly in NZ. It would be good for the focus to - lie not on whether rugby union is a bad sport, nor on -how bad concussions are, but instead on ways to support players – to recover players – and to provide solutions. To find a way for research to not compete with each other on whether rugby union is liable or not, but on ways for differing parties to work together in a way which puts the athlete first – so that players' experience during their careers, and post their careers, are as positive as current knowledge and technology allows it to be.

Concussions are not solely a NZ, nor rugby union issue. They affect a multitude of sports which are played all over the world. There is still a lot to be understood about this complex injury, and how to best manage it. Future research which focuses on this issue, and ways to effectively manage and recover from concussions, has the potential to not only help rugby players, but people of all backgrounds, from all parts of the world.

Limitations

A major limitation of this study is the lack of women participants. Out of the 36 participants, only one was a female. Women's rugby is rapidly growing in participation numbers and popularity. Concussion rates and symptomatic experience appear, according to some research, to be worse in women than in men. Furthermore, available resources and support also appear to be less. As the sport grows, it is necessary for future research to focus on understanding women's particular concussion experience so as to be better able to allocate resources and efforts into improving the game's safety.

Another limitation is that all participants were part of the CMP. It is possible that without the support and resources provided by the CMP further challenges would have been encountered – possibly resulting in a much different concussion experience. It is suggested that future research looks more deeply into the concussion experiences of players which are not part of a concussion management pathway.

Concluding Statement

To conclude, it is reassuring to see that steps are finally being taken by organisations to take concussion seriously, not just in professional forms of the game but also at a community level. The appreciation and the gratitude expressed by the players in this study highlight how much how much of a difference the CMP has made in overall player welfare.

It has been a shame to see that in some ways, the more concussion awareness there is, and the more support which is made available, the more the brand of the sport suffers, and the more parents are unwilling to involve their - children in the sport. Although it is my hope to increase awareness and available support, it is not my intention to hurt in any way, the game which has and continues to provide me with so much.

I believe this is the case with most rugby players - even with the ones suffering major consequences – even with the ones currently suing World Rugby for failing to protect them from the damages caused by concussion (such as Welsh and England international representatives Alix Popham and Steve Thomson).

Alix Popham, who represented Wales, and is now at the age of 41 diagnosed with probable case of CTE, explained his position in an interview published in the Guardian "we want to sit down with the governing bodies and work this out, to protect the game, protect the players who are still playing, and the future generations, and make the game as safe as possible" (Bull, 2021). Steve Thomson, who is also in his early 40s and diagnosed with a probable case of CTE, similarly expressed his feelings; "I don't want to kill the game, I want it regulated" (Bull, 2020).

It has been a long time coming, but it is gratifying to see the rugby community begin to take what have essentially been the first steps towards providing its athletes with adequate concussion support. It is essential for this effort to continue – for more player-centred research and interventions to be carried out – so as to continue making the sport as safe and as supportive as possible.

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Appendices

Main	Sub-Themes	Substantiating Quotes
Identified		
Themes		
		"I don't really remember much of the day I just remember waking up in hospital" (MP1)
Symptomatic Experience	The immediate symptomatic	"I had a bit of a headache, and my eyes were kind of I would see stars" (MP8)
	experience	"I got shouldered in the head and knocked out. I couldn't remember who passed me the ball And then also I was a bit dizzy, and not really aware of where I was until I sat down" (MP9)
	The non-linear nature of the symptomatic experience	"It really didn't occur to me that I had a head knock until probably the night after the game" (MP15)
		"Then the problem was that where now my heart rate got too high, I got the headaches back" (MP6)
	Concussion experience is mentally challenging Concussion affects all walks	"A little bit I was scared a bit but I didn't stop the game like my first game back – in the second half when I came on I was like I had the ball I was a bit nervous initially" (MP14)
		"(felt nervous) because the way I had a concussion was like getting tackled and then like (whiplash) So I was ok to do tackling, but I was a bit nervous to get tackled" (MP33)
		"I do the full day's work, and then I'd come home and as soon as I park up on the couch it's just, "S###, it's here" When my mind was on something, it was pretty good, but as soon as I was relaxed, I was pretty bad" (MP17)
		"And then after the game, I was just feeling a little bit lightheaded and whatnot, and then didn't really think much of it. But then it was like the Monday, and I was on my laptop trying to do work and

Appendix A additional substantiating quotes

		whatnot, and that's why I really just like couldn't concentrate and I started getting headaches" (MP31)
The role of a	The influence of available and accessible information and knowledge regarding concussion management, prevention, and recovery as part of the NZR's CMP	 "It was pretty simple, and yeah it was, it was explained to me pretty well what I needed to do and just went through the steps and it was pretty all good" (MP29) Players were questioned on ways their experience could have been improved; "Probably more about what I can and can't do cause I didn't really know much, but they didn't seem like they knew much about what happened" (MP25) "Maybe just a little more advice or something" (MP17) "Because like there was no one there that would actually know what to do the only thing he said to me was to see a doctor"
dedicated concussion management pathway in the players' experience. wai per pos cor pla cor exp	The structural support provided through NZ Rugby's CMP was generally perceived as a positive contributor to	(MP12) "I like how the timetable was set out, but it was like kind of my first time with concussion by having those step by step kind of processes was really good I couldn't really think of anything, any bad things about it. It was like, the whole process was quite good" (MP27) "I was pretty well supported it was pretty good because even thought I got bored in the first week I
	player's concussion experience	obviously needed it five (extremely satisfied), it's been pretty good" (MP4)
	In the current implementation of the NZ rugby's CMP program, a lack of Return To Learn (RTL) protocols in	Players were asked whether they received any relevant information regarding how to manage their RTL; "No. I don't know" (MP1) No. No one really said anything about it" (MP4)
	schools presented	"No they didn't really say anything" (MP8)

	a significant weak link.	"I didn't do anything that I wouldn't usually do at school I'm not sure about the school (policies) side of it" (MP24)
	The role of the coach as a provider of	"My coach was there, he was all good with [coach] was there was well, out other coach he was definitely there making sure I was all right" (MP5)
	emotional and logistical support;	"He (coach) was real supportive and just said that we need to follow the process and see a doctor and stuff" (MP10)
The significant influence of the role of the coach and the physiotherapist	The role of the physiotherapist as a provider of emotional and logistical support;	"(Physiotherapist) was with me the whole time at trainings. So he's be there on Thursday nights and give me advice or ask me how I'm feeling. And then Saturdays at the game, just ask me how my week was and pretty good advice, he's got all the knowledge and pretty good with the process of getting you back to training. So as long as you've got someone there that knows what they're up to, then life looks pretty good" (MP 16)
		"It was probably a five (meaning felt very well supported), because all my my physio I didn't really have to do anything I just had to show up. My physio organized it" (MP24)
	Player	"I felt really well supportedyou guys are doing a really good job. Five" (MP1)
General NZ rugby culture and the mind- set of the NZ rugby player	appreciation for the system;	"I thought it was good, the whole I was actually really, really impressed and my parents also, I was telling them about it, they said they're real impressed with how the process was" (MP31)
	The influence of	"It was just um Hard to watch the boys, play on Saturday and just train while I just stand there and watch" (MP28)
	the collective culture of rugby union;	"I was concerned it's my last year, and the team's not going so well and I've just kin fog thought that I needed to be there as like a leader in the team I was pretty kind of devastated I wasn't able to play I really did want to play" (MP6)

	Players asked now they found the talk form
	influential/role model speaker;
Players' response to an influential person of the same circle/community;	 "Yeah probably. Yeah. Definitely (felt the talk positively influenced behaviour)" (MP4) "Oh yeah, it was mean Definitely helps to see someone" (MP8) "That was good. That was cool It just opened it up" (MP1)

Appendix B: Ethics Approval



18/087

Academic Services Managez, Academic Committees and Services, Mr Gary Witte

Assoc. Prof. G Sole School of Physiotherapy 20 January 2021

Dear Assoc. Prof. Sole,

I am again writing to you concerning your proposal entitled "Evaluating the Management Component of the New Zealand Rugby Community Concussion Awareness, Education, and Management (CAEM) Strategy", Ethics Committee reference number 18/087.

Thank you to Dr Danielle Salmon for her email of 11th January 2021 with request for amendment attached.

We note that Professor John Sullivan has retired and that you will now be the Principal Investigator on the project.

We further note the requests to extend the ethical approval of the research, the extension to the pilot programme and the implementation of recording digital consent for players and parents.

The Committee accepts and approves the amendments and grants approval for a further 3 years from the date of this letter. Thank you for providing the revised documentation, our records have been updated accordingly.

Your proposal continues to be fully approved by the Human Ethics Committee. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing. I hope all goes well for you with your upcoming research.

Yours sincerely,

Day With

Mr Gary Witte Manager, Academic Committees Tel: 479 8256 Email: gary.witte@otago.ac.nz

c.c. Professor L A Hale Dean School of Physiotherapy

Appendix C: Documentation related to focus group

2019 Concussion Management Pathway Interview Script

Players

Introduction:

Thank you for agreeing to participate in this study. Your feedback is valuable to us. You've been selected because you sustained a concussion this rugby season and went through some new steps that New Zealand Rugby is piloting to hopefully better look after players when they have sustained a concussion. This involves the pre-season baseline testing, your physio or team lead logging the concussion on an App, concussion diagnosis visit to the GP where they repeat the baseline test, and a medical clearance visit where they repeat the same process. This interview is about your experience after you sustained a concussion this season, your doctor visits, your recovery back to school/work and back to playing rugby. Your feedback will be used to help make the process better, so please answer all questions openly and honestly. Thank you.

1. How was your overall experience of the steps and things you went through after you sustained your concussion this season?

Probing: For example, the good, the bad, highlights, things that stand out for you or things that you found hard to deal with...

2. Reflecting on your overall experience with your concussion this season on a scale of 1 to 5 how would you rate it, with 1 being very bad and 5 being very good

1= Very Bad	2	3	4	5= Very Good

- Using the infographic here we are going to break the steps that you went through as part of your concussion recovery into 5 parts. For each part tell us (1) what went well, (2) what didn't, and (3) how we could improve:
 - a. At the start of the season when you did a pre-season baseline testing, can you tell me a bit about going through that assessment?
 - i. What did you like about it?
 - ii. What did you not like about it?
 - iii. Did you take it seriously? Do you think your teammates took it seriously?

- iv. What do you think the value of completing a baseline assessment is?
- v. How could we improve your experience?

How would you rate the pre-season baseline testing on a scale of 1 to 5 where 1 is not at all helpful and 5 = very helpful

1= Not at all helpful	2	3	4	5= Very helpful

- b. When you sustained your concussion?
 - i. What happened immediately after your concussion?
 - ii. Were you really concerned for your health?
 - iii. Were there things that you found really helpful after it happened?
 - iv. At the time of injury did anyone give you any information?
 - v. How could we improve your experience?

Probing: Was it logged on the App, were you removed right away, how was your concussion managed when it happened? Did you feel looked after and supported?

When you think back to sustaining your concussion how would you rate what happened after the injury on a scale of 1 to 5

1= Not well supported	2	3	4	5= Very well supported

- c. When you went to see a GP to determine whether or not you have a concussion
 - i. How did you find the GP visit?
 - ii. Did you feel you got all the information you needed from the GP?
 - iii. Did the GP re-test you?
 - iv. How could we improve your experience?

When you think back to your experience of going to the doctor to see if you had sustained a concussion how would you rate this on a scale of 1 to 5

1= Not well supported	2	3	4	5= Very well
				supported

- d. After you saw the doctor for your concussion diagnosis what did you do between then and getting medically cleared?
 - i. Can you tell me what you did to get back to study/school/work after your concussion?
 - ii. Can you tell me what you did to get back to playing rugby after your concussion?
 - iii. Does your school have any policies about return to school or sports after a concussion?
 - iv. Do you remember when you returned to contact training?
 - v. When you were with your doctor for the initial diagnosis visit, did they give you any information on how to get back to study/school/work and sport? If not did someone else give you this information?
 - vi. How did you find the process of GRTP and GRTL?
 - vii. How could we improve your experience?

Thinking back to the steps you took to get back to school/work and playing rugby, how would you rate this on a scale of 1 to 5

1= Not at all helpful	2	3	4	5= Very helpful

- e. Medical clearance visit with the GP
 - i. How did you find the GP visit?
 - ii. Was the GP the same as the Diagnosis visit?
 - iii. Did you feel you got all the information you needed from the GP?
 - iv. Did the GP re-test you?
 - v. How could we improve your experience?

How would you rate this on a scale of 1 to 5

1= Not at all helpful	2	3	4	5= Very helpful

- 4. How did you feel about returning to contact training/playing?
 - a. Did you feel ready or do you think you needed more or less time out?
 - b. Did you feel any pressure to return from players, coaches or parents?
- 5. Can you tell me about returning to school, university or work after your concussion?
 - a. Did you feel ready or do you think you needed more or less time out?
 - b. Did you have any issues returning?
 - c. Did you feel any pressure to return from parents, coaches or teachers?
- 6. If there is one thing we could change to improve your overall experience you had with your concussion what would it be?

Probing: Could we have provided more information to your parents, teachers, team, improved your GP experience....

7. Anything else you would like to share about your experience.

Probing: Maybe ask (if teens) do they think that their parental/caregivers were satisfied with how they were looked after as you progressed through the path and return to school and rugby (bit of lateral info)

8. How satisfied are you with NZR's efforts to inform you and your teammates about concussions?

1= Not at all satisfied	2	3	4	5= Extremely Satisfied