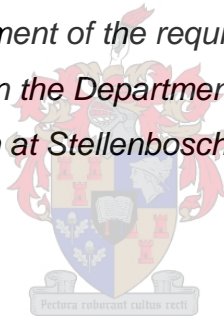


Anterior cruciate ligament rupture, reconstruction, rehabilitation and recovery: The personal experiences of competitive athletes

By
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of Science (Sport Science) in the Department of Sport Science, Faculty of
Education at Stellenbosch University*



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March 2018

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Abstract

Injury is an unavoidable part of sport with inevitable physical as well as psychological consequences. Anterior Cruciate Ligament (ACL) injuries is one of the most prevalent injuries in sport and although considerable research has focussed on the physical recovery, the psychological effects have been neglected. Identifying the thoughts, feelings and behaviours associated with the ACL rupture, reconstruction, rehabilitation and return-to-sport could enhance our understanding of the psychological impact of the ACL recovery process. The aims of the study were to explore and analyse the personal experiences of athletes who sustained a unilateral ACL rupture and underwent ACL reconstruction (ACLR) surgery at six time intervals during the post-injury recovery period up to and including return-to-sport. Seven competitive male athletes took part in the study. Semi-structured interviews were conducted immediately post-injury, preoperative, postoperative (phases 1, 2 & 3), as well as upon return-to-sport. The interviews elicited information about the personal and situational factors that influenced each athlete's response to an ACL injury and undergoing ACLR surgery; their cognitive appraisal of the injury and recovery process; their emotional response to the injury and recovery process, as well as their behavioural response to the injury and recovery process. A total of 42 interviews were transcribed and analysed through the use of thematic analysis (TA). Six superordinate themes emerged; 1) establishing identity (athletic and personal), 2) cognitive appraisal, 3) responses (emotional and behavioural), 4) coping strategies (approach- and avoidance orientated), 5) types of social support (emotional, informational and tangible) and 6) advice/recommendations from injured research participants. The latter was specific to the return-to-sport phase. Each superordinate theme emerged as a result of a range of themes, sub-themes and categories of codes captured immediately post-injury, preoperatively, postoperatively (phases 1, 2 and 3) and upon return-to-sport. Direct quotes from participant transcripts were included to give meaning to each superordinate theme. All participants recovered physically from their injury and returned to sport within 12 months post-injury. This study reported thoughts,

feelings and behaviours associated with athletes' experiences of the rupture, ACLR surgery, rehabilitation and recovery process, as well as prior to and following return-to-sport. To the best of my knowledge, this is the first study of its kind conducted within a South African context and one of only a few studies to note the role of a biokineticist as a source of social support. This study provides guidelines and recommendations for medical professionals involved in the ACL rehabilitation process. Those involved in the rehabilitation process should be aware of the cognitions, emotions and behaviours associated with the rupture, reconstruction, rehabilitation and return-to-sport on the timeline to recovery. Focusing on athletes' experiences of the five R's associated with the ACL injury recovery process (i.e., Rupture, Reconstruction, Rehabilitation, Return-to-sport and Recovery) might help medical professionals, coaches, teammates, friends and family to have a better understanding of the injured athletes' needs. Future research should aim to follow participants for up to two years post-surgery as it could take much longer for athletes to recover psychologically.

Opsomming

'n Besering is 'n onvermydelike deel van sport met onvermydelike fisiese en sielkundige nagevolge. Anterior kruisligament beserings is een van die mees algemeenste beserings in sport en alhoewel 'n aansienlike hoeveelheid navorsing op die fisiese herstel fokus, word die sielkundige nagevolge dikwels afgeskeep. Die identifisering van die gedagtes, gevoelens en gedrag wat verband hou met 'n anterior kruisligament skeur, rekonstruksie, rehabilitasie en terugkeer-na-sport kan moontlik ons begrip van die sielkundige impak van die anterior kruisligament herstel proses verbeter. Die doel van die studie was om die persoonlike ervaringe van atlete, wat 'n eensydige anterior kruisligament skeur opgedoen het en anterior kruisligament rekonstruksie ondergaan het, te verken en ontleed gedurende ses tydintervalle tot en met hul terugkeer-na-sport. Sewe mededingende manlike atlete het aan die studie deelgeneem. Semi-gestruktureerde onderhoude is gevoer onmiddellik ná die besering, voor die operasie, na die operasie (fases 1, 2 en 3) en met hul terugkeer-na-sport. Die onderhoude het die persoonlike faktore en omstandighede geassosieer met elke atleet se reaksie op 'n anterior kruisligament besering en rekonstruksie ontlok, asook hul kognitiewe beoordeling van die besering en herstel proses; hul emosionele reaksie na die besering en herstel proses en hul gedrag na die besering en herstel proses. 'n Totaal van 42 onderhoude is geanaliseer en ontleed deur gebruik te maak van tematiese analise. Ses superordinate is geïdentifiseer; 1) vestiging van identiteit, 2) kognitiewe beoordeling, 3) reaksies (emosionele- en gedragsverwante reaksies), 4) hanteringstrategieë, 5) tipes sosiale ondersteuning en 6) raad en aanbevelings van die deelnemers aan die studie. Tema ses is uniek aan die terugkeer-na-sport fase. Superordinate het verskyn as 'n hoofklas waarin 'n verskeidenheid temas, sub-temas en kodes ingesluit is uniek aan elk van die ses fases (onmiddellik ná die besering, voor die operasie, drie fases na die operasie en met hul terugkeer-na-sport). Direkte aanhalings uit deelnemer transkripsies is ingesluit om betekenis aan die superordinate te gee. Alle deelnemers het fisies herstel en binne 12 maande ná hul besering teruggekeer na sport. Hierdie studie rapporteer die gedagtes,

gevoelens en gedrag geassosieer met 'n anterior kruisligament skeur, rekonstruksie, rehabilitasie en herstel asook die terugkeer-na-sport. Na die beste van my wete, is dit die eerste studie van sy soort binne 'n Suid-Afrikaanse konteks en een van slegs 'n paar studies wat die rol van 'n biokinetikus as 'n bron van sosiale ondersteuning uitlig. Hierdie studie bevat waardevolle raad en aanbevelings vir mediese personeel betrokke by die anterior kruisligament rehabilitasieproses. Diegene betrokke by die rehabilitasieproses moet bewus wees van die kognisies, emosies en gedrag wat verband hou met 'n anterior kruisligament skeur, rekonstruksie, rehabilitasie en terugkeer-na-sport op die tydlyn tot volle herstel. Deur te fokus op die vyf belangrikste aspekte van die anterior kruisligament besering herstelproses (d.w.s., skeur, rekonstruksie, rehabilitasie, terugkeer-na-sport en herstel) kan medici, afrigters, spanmaats, vriende en familieleden moontlik help om die behoeftes van die beseerde atleet beter te verstaan. Toekomstige navorsing moet poog om deelnemers vir tot en met twee jaar ná anterior kruisligament rekonstruksie te volg, omdat sielkundige herstel heelwat langer kan vat.

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Abbreviations

ACL	:	Anterior Cruciate Ligament
ACLR	:	Anterior Cruciate Ligament Reconstruction
ACL-RSI	:	Anterior Cruciate Ligament-Return to Sport after Injury
ADL	:	Activities of Daily Living
BPTB	:	Bone-Patellar Tendon-Bone
IKDC	:	International Knee Documentation Committee Subjective Knee Form
IRT	:	In Real Time
KOOS	:	Knee injury and Osteoarthritis Outcome Score
LCL	:	Lateral Collateral Ligament
MCL	:	Medial Collateral Ligament
MRI	:	Magnetic Resonance Imaging
PCL	:	Posterior Collateral Ligament
Q-angle	:	Quadriceps-angle
QOL	:	Quality of Life
R	:	Retrospective
RICE	:	Rest, Ice, Compression, Elevation
ROM	:	Range of Motion
SD	:	Standard Deviation
SARU	:	South African Rugby Union
Sport/Rec	:	Sport and Recreation
TA	:	Thematic Analysis

Chapter One

Problem statement and aims

Introduction

The importance of exercise in promoting health is not a new idea and evidence of organised participation in physical activity dates as early as 2500 BC (Vina *et al.*, 2012). As agreed by the Council of Europe (2001), sport can be defined as “all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels” (p. 4). Exercise is associated with many health benefits, such as a reduction in early mortality, coronary heart disease, hypertension, colon cancer and obesity (Bahr & Krosshaug, 2005). Psychological and social benefits have also been reported amongst children and adolescents and include confidence in one’s own worth, improved social interactions and a decrease in symptoms associated with depression (Eime *et al.*, 2013). Vina *et al.* (2012) concluded that exercise, due to all its pharmacological benefits, is comparable to a medicinal drug. According to Cadilhac *et al.* (2011), a reduction in physical inactivity may have economic benefits for health organisations, governments, businesses and individuals. Participation in sport can, therefore, benefit individuals physically, psychologically, socially and economically, but not all sport outcomes are positive.

Despite preventative efforts, injuries are an unavoidable obstacle in sport and may have a detrimental effect on an athlete’s performance, career, economic status, physical state and psychological well-being (Almeida *et al.*, 2014). According to Berger *et al.* (2007), a sports injury can be defined as “trauma to the body or its parts that result in at least temporary, but sometimes permanent physical disability and inhibition of motor function” (p. 186). A sports injury is seen as the physical damage caused by an event during participation in sport (Almeida *et al.*, 2014). A study by Hootman *et al.* (2007) involving 380 000 college athletes found that 68% of this population experienced an injury at some point during their sporting careers and more than 50% of these injuries involved the lower extremities; predominantly

affecting the knees and ankles. Most people react negatively to sport injuries, but professional athletes might have an even stronger negative response. Professional athletes invest themselves physically, emotionally, socially and financially in their sport in order to be successful and, therefore, one can expect them to react negatively to injury. Individual differences do exist. According to Lee (2011), professional athletes have a higher risk of getting injured. An increase in sports injuries might be related to professionalism, high levels of competitiveness and longer practice hours (Yang *et al.*, 2012). The high prevalence of injuries among competitive athletes was emphasised by Brown (2005) who stated that “serious athletes come in two varieties: those who have been injured and those who have not been injured yet” (p. 215). According to Mall *et al.* (2014), Anterior Cruciate Ligament (ACL) injuries is one of the most thoroughly studied orthopaedic conditions.

An ACL rupture is a devastating injury feared by many athletes as it may end an athlete’s sporting career should the athlete fail to return-to-sport and to their pre-injury physical state. Surgical reconstruction is still regarded as the gold standard for treating an ACL rupture, especially if the athlete wishes to return-to-sport (Kiapour & Murray, 2014). Following ACL reconstruction (ACLR) surgery athletes have to undergo months of rehabilitation with the most important outcome being able to return to their previous level of sport participation and performance. The rehabilitation process relies on physical recovery, but Langford *et al.* (2009) observed that only 51% of patients return-to-sport despite seemingly successful rehabilitation after ACLR surgery. Although injuries are predominantly physical in nature, the psychological effects cannot be ignored and to fully understand how athletes recover from a sports injury, researchers also started to study the psychological factors related to sports injury, recovery and rehabilitation.

The available psychological sport-related injury literature seems to follow two directions. Firstly, from a pre-injury perspective, stress was identified as the key component that may predispose an athlete to injury. Anderson and Williams (1988) proposed the Stress and Injury Model and later revised it (Anderson & Williams,

1998). The revised model proposes that psychological factors relates to stress and eventually results in a stress response, subsequently predisposing an athlete to injury.

Secondly, research focused on the psychological factors involved prior to and following injury. In a review of the available models by Santi and Pietrantonio (2013), three primary psychological models were identified including stage models, cognitive appraisal models and the biopsychosocial model. Applying the popular grief-response stage model of Kübler-Ross (1969) to the post-injury and rehabilitation phases suggests that athletes experience a progression of emotions following injury. This model refers to five stages of grief including denial, anger, bargaining, depression and acceptance. It was originally developed as a grief response model for terminally ill patients, but has since been applied to athletes who sustained sports injuries. Heil (1993) proposed the Affective Cycle of Injury which includes a cycle rather than a set sequence of emotions. This cycle focuses on three separate emotional responses to injury: denial, distress and determined coping. The most comprehensive cognitive appraisal model seems to be the Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process developed by Wiese-Bjornstal *et al.* (1998). This model suggests that pre- and post-injury factors will determine how an athlete cognitively evaluates an injury. This evaluation will affect the emotional and behavioural responses to injury and eventually the rehabilitation outcomes. The biopsychosocial model includes biological, medical, psychological and social factors and provides a framework to examine a wide range of factors with psychological factors being the focal point (Brewer *et al.*, 2002).

The main goal of sport injury rehabilitation and recovery (i.e., returning to sport and re-establishing pre-injury performance levels) should be accomplished through integrated rehabilitation that focuses on the physical, psychological and social aspects. Although considerable research has been devoted to studying the athlete as a physical being, less attention has been paid to treating the injured athlete as a whole person. One clearly cannot assume that all athletes will react to injuries in

the same way and these individual differences need to be taken into account during the injury, rehabilitation and recovery process. Regardless of how they react, athletes will experience physical and psychological changes following injury. A greater understanding of the significance of the injury to the athlete could provide valuable information to medical professionals to improve the rehabilitation and recovery process. Udry *et al.* (1997), as well as Granito (2001) noted that medical professionals could benefit from learning more about the injury experience from the injured athletes themselves. Capturing the actual richness and complexity of personal experiences through each stage of the rehabilitation and recovery process could potentially provide medical professionals with a greater understanding of the patient's experiences, thereby facilitating holistic recovery.

Aim of the study

This study aims to explore and analyse the personal experiences of athletes who ruptured their ACL and underwent ACLR surgery at various time intervals of the post-injury recovery period and upon return-to-sport.

Specific aims

The study specifically aims to provide a rich narrative and thick description of:

- The personal and situational factors that influences an athlete's response to an ACL rupture and undergoing reconstruction surgery
- Their cognitive appraisal of the injury and recovery process
- Their emotional response to the injury and recovery process, as well as
- Their behavioural response to the injury and recovery process.

Secondly, this study aims to capture possible changes regarding the aforementioned factors during the following phases:

- Immediate post-injury (the day of the injury)
- Preoperative (first day post-injury up to surgery)
- Postoperative (phase 1) - Acute recovery from surgery (surgery and first week post-surgery)
- Postoperative (phase 2) - Repair (weeks 2 to 6 post-surgery)

- Postoperative (phase 3) - Remodelling (week 7 to 4 months post-surgery)
- Return-to-sport (time dependent on meeting the criteria for return-to-sport).

The final data was collected at the time of or as close as possible to return-to-sport. It should be noted that return-to-sport was determined by each participant's individual progress and not tied to a specific point in time. It was foreseen that a final interview will be conducted two years post-injury, but this data will not be included in the current thesis.

Motivation and potential benefits

Many studies have focused on ACL injuries, and noted the complex nature of these injuries (Tan *et al.*, 2015). Langford *et al.* (2009) stated that very little research actually focuses on psychological recovery post-ACLR surgery. The growing interest in psychological recovery has heightened the need for further research. Exploring injured athletes' personal experiences of rupturing their ACL, undergoing ACLR surgery, the rehabilitation and recovery process, as well as returning to sport could further enhance our understanding of the complexities of this injury and the recovery process. Understanding an athlete's appraisal of the injury situation by capturing and analysing their cognitive, emotional and behavioural responses could potentially help medical professionals to tend to both the physical and psychological needs of the client during the rehabilitation, recovery and return-to-sport process.

Chapter one mentioned the benefits associated with sport and exercise, as well as the risk of sustaining injuries (in particular anterior cruciate ligament injuries) in competitive sport. The most widely used psychological models used in sports injury research was introduced, and the importance of tending to both the physical and psychological needs of an injured athlete was emphasised. The aims and specific aims were outlined followed by the rationale for the study and the potential benefits thereof. This chapter provides the reader with the necessary background information and sets the tone for the literature review in chapter two.

Chapter Two

Literature review

This chapter provides a comprehensive review of the available literature on various psychological factors associated with sustaining sports injuries and highlights the need for further research into sports injury psychology, specifically of competitive athletes who sustained anterior cruciate ligament (ACL) ruptures. It provides a theoretical foundation and guides the reader through the anatomy of the knee, the possible mechanisms of ACL injuries, incidence rates, risk factors, treatment and rehabilitation phases associated with this type of injury. It also elaborates on the most prominent psychological models developed to enhance our understanding of the role of psychological factors before, during and following injury.

Anterior Cruciate Ligament injury

A brief overview of the anatomy of the knee, types of ACL injuries, incidence rates, risk factors, treatment strategies and rehabilitation phases are essential to understand ACL injuries, ACLR surgery and the recovery process.

ACL anatomy

The knee is a large and complex hinge joint with two articulations between the femur and tibia and one joining the femur to the patella (Martini & Bartholomew, 2003). The femur is the strongest and longest bone in the human body and its distal end articulates with the tibia and patella to form the knee joint. A smaller bone, the fibula, runs alongside the tibia (Prentice, 2007). The patella (kneecap) is located in the tendon of the quadriceps femoris muscle and sits anterior to the knee joint. Two semilunar fibrocartilage menisci (a medial and lateral meniscus) are found in the joint space. Menisci help stabilise the knee and cushion any stresses placed on the joint surface and bone ends. Fluid filled sacks, bursae, function as a cushion to reduce friction and help with knee movement. A joint capsule protects the knee joint and contains a synovial membrane that produces synovial fluid. The synovial fluid lubricates the joint surface and reduces friction within the knee joint (Prentice, 2007). The two main muscle groups are the

quadriceps (vastus medialis, vastus intermedius, vastus lateralis and rectus femoris) and hamstrings (semimembranosus, semitendinosus and biceps femoris). These muscle groups play an important role in moving and stabilising the knee joint. Tendons join the knee bones to the muscles and assist with movement (Prentice, 2007). Ligaments are tough bands of connective tissue that connect one bone to another bone and help stabilise the knee. The four major knee ligaments that are prone to injury are the ACL, Posterior Cruciate Ligament (PCL), Medial Collateral Ligament (MCL) and the Lateral Collateral Ligament (LCL). The ACL originates at the medial surface of the round prominence at the end of the femur called the lateral femoral condyle and inserts at the frontal and medial aspect of the tibial plateau (Petersen & Zantop, 2007). The ACL is the main stabiliser of the knee, providing the knee with anterior, posterior and rotational stability (Bach & Boonos, 2001; Prentice, 2007).

Primary ACL injuries

A primary ACL injury refers to the initial rupture (partial or complete) of the ACL and can result from contact or non-contact injuries with the latter being more common (Bach & Boonos, 2001). According to Hewett *et al.* (2006), approximately 70% of injuries to the ACL are caused by non-contact forces and 30% by contact forces. Xie *et al.* (2015) reported an ACL incidence rate of 60.8% for non-contact injuries and 39.2% for contact injuries. Contact injuries involve a direct blow to the lower extremity. According to Prentice (2007), ACL ruptures can happen as a result of a direct force to the front of the knee that forces the knee into hyperextension with the foot planted. Non-contact injuries are more difficult to define but usually occur when the lower leg is rotated while the foot is planted, often caused by a sudden change in direction or evasive action. Myklebust *et al.* (2003) conceptualised a non-contact injury as the type of injury that happens without physical contact between players. Non-contact ACL injuries are more common among females, especially in pivoting sports that require running and jumping. An ACL rupture is characterised by a "pop" sound, resulting in complete loss of function, immediate swelling and the inability to continue participation (Prentice,

2007). Ruptures can be partial or complete with the latter being more common. According to Bach and Boonos (2001), an ACL rupture causes a high level of pain and is often associated with meniscal tears. Injury of other ligaments can occur along with ACL ruptures. Severe injuries that involve the ACL, MCL as well as the medial meniscus are referred to as the terrible triad (Barber, 1992).

ACL injury incidence rates

An ACL injury is one of the most common knee injuries in sport. It is a devastating injury and affects roughly 250 000 individuals in the United States each year (Griffin *et al.*, 2006). In a meta-analysis by Prodromos *et al.* (2007), it was reported that ACL incidence rates vary by gender and the type of sport played. The risk of sustaining an ACL rupture tends to be higher among females (Prentice, 2007). High incidence rates are reported among athletes between the ages of 15 and 25 (Van Grinsven *et al.*, 2010). ACL injuries frequently happen in sports that require jumping, running and pivoting such as soccer, skiing and basketball (Xie *et al.*, 2015). According to Sclafani and Davis (2016), 41% to 51% of rugby injuries involve the lower extremities with ACL and MCL injured patients experiencing the greatest period of absence from participation in sport.

ACL injury risk factors

ACL injury risk factors can be split into extrinsic and intrinsic factors (Griffin *et al.*, 2006; Smith *et al.*, 2012). The following section includes a short description of some of these factors. It is important to note that the risk of sustaining an ACL rupture is not limited to these factors and could be the result of a combination of factors.

Extrinsic factors refer to those from outside the human body such as level of competition, playing surface, shoes, sporting equipment, protective equipment, skill level, climate, nutritional factors and type of training (Griffin *et al.*, 2006; Smith *et al.*, 2012). For example, playing a specific type of sport that involve pivoting and cutting might predispose an athlete to ACL injuries. These include sports like football, rugby and soccer. Weather conditions may even play a role in ACL injury

incidence rates. Athletes competing in hot weather conditions are more likely to sustain an ACL injury compared to those playing in cooler weather. According to Orchard and Powell (2003), there seems to be no difference in ACL injury incidence rates between different stadium types (i.e., domes, open turf and grass). Another risk factor was the type of shoe worn by players. A study conducted on American football players found that cleat design affects the risk of ACL injury (Lambson *et al.*, 1996). Shoes with longer cleats and harder playing surfaces may increase the shoe-surface friction coefficient and possibly contribute to ACL injuries (Griffin *et al.*, 2006). A study on Norwegian female handball players found a 2.35 times higher incidence of ACL injuries when playing on a synthetic floor compared to a wooden floor (Olsen *et al.*, 2003). Playing on rye grass seems to cause less non-contact ACL injuries compared to Bermuda grass fields (Orchard *et al.*, 2005).

Intrinsic factors refer to factors from within the body and include age, gender, body weight, previous injury, ligament laxity, muscle strength, muscle imbalance, anatomy, landing biomechanics, flexibility and muscle recruitment patterns (Griffin *et al.*, 2006; Smith *et al.*, 2012). The ACL incidence rate is highest among individuals between the ages of 18 to 25 (Van Grinsven *et al.*, 2010). Although men and women are at risk for sustaining knee injuries during participation in sport, women have a higher risk when it comes to rupturing their ACL. Prodromos *et al.* (2007) reported that female basketball and soccer players suffered roughly three times as many ACL injuries than their male counterparts. Possible risk factors that predispose females to ACL injuries include the fluctuation in hormone levels during their menstrual cycle, a greater quadriceps-angle (Q-angle), increased joint laxity, weaker quadriceps and hamstring muscles, differences in neuromuscular activation patterns, increased posterior tibial slope, narrower notch, smaller ACL cross-sectional area and different landing mechanics compared to males (Tan *et al.*, 2015).

According to Prentice (2007), neuromuscular factors are the most important reasons for a higher incidence risk amongst females. Interestingly, Sanders *et al.* (2016) reported that males had a higher incidence of ACL injuries compared to

females when studying the general population. The highest incidence rate was observed in males aged 19 to 25 who might have been involved in contact sports, possibly contributing to the higher rates seen in males. The second highest incidence rate was reported in females aged 14 to 18 years, suggesting a decrease in female sports participation after high school (i.e., 19–25 years). Vacek *et al.* (2016) identified risk factors that possibly predict primary non-contact ACL injuries among men and women. For men these include increased anterior-posterior knee laxity, posterior knee stiffness, navicular drop and decreased standing Q-angle. For women these include increased anterior-posterior knee laxity, a high body-mass-index (BMI), and parental history of ACL injury. Flynn *et al.* (2005) reported that ACL injured patients are twice as likely to have an ACL injured relative. Cognitive function is a possible intrinsic risk factor that requires further investigation. Swanik *et al.* (2007) examined the relationship between neurocognitive function and non-contact ACL injuries and reported slower reaction time, slower processing speed and lower verbal and visual memory scores for these athletes. This suggests that decreased neurocognitive function might predispose athletes to sustaining non-contact ACL injuries.

Treatment

A suspected ACL injury that occurred during participation in sport will usually be treated in the emergency room by a general practitioner or sports medical professional. The RICE (Rest, Ice, Compression and Elevation) principle should be applied as soon as possible and non-steroidal anti-inflammatory drugs are usually prescribed to alleviate symptoms (Prentice, 2007). The patient typically cannot walk and is instructed to use crutches and to contact an orthopaedic specialist. Non-weight bearing is encouraged to avoid any additional damage to the knee joint and its structures. The orthopaedic specialist will do a clinical evaluation (e.g., Lachman's test, Anterior Drawer test, Pivot Shift test) to determine a positive ACL rupture. The Lachman's test is regarded as the most sensitive and reliable test (Bach & Boonos, 2001). Magnetic Resonance Imaging (MRI) can also be used for assessment, especially when it is suspected that other structures such as the

menisci and other ligaments are also injured. According to Bach and Boonos (2001), three treatment strategies exist; non-surgical treatments, arthroscopic surgery and ACLR surgery. Surgical reconstruction is still deemed the gold standard for treating an ACL rupture and is recommended by 98% of surgeons for patients that wish to return to their pre-injury level of sport participation (Failla *et al.*, 2015). Subsequently, the ACL is the most reconstructed ligament in the body (Haragus *et al.*, 2015).

A decision for or against surgery is based on several factors including age, amount of instability, activity status and available surgical techniques (Prentice, 2007). Whether specialists decide to operate immediately or delay surgery seems to have no impact on the recovery outcomes following rehabilitation (Rodriguez-Merchan, 2015). According to Sanders *et al.* (2016), a third of ACL injured patients choose to delay ACLR surgery for one to 10 years post-injury. It is unclear why so many patients decide to delay surgery, but possible reasons include recurrent injury, chronic instability and the limitation of activities. General indications for surgery include being a young active individual participating in sports that involve pivoting, cutting and jumping for more than five hours per week, a maximum arthrometer measurement difference greater than 5mm or experiencing three or more episodes of instability within a one year period (Bach & Boonos, 2001). Marx *et al.* (2003) reported that patients who desire to return-to-sport tend to influence the orthopaedic surgeon's decision to operate or not. ACLR involves replacing the ACL with a tendon from another part of the patient's body to restore knee stability and facilitate recovery. A proper reconstruction will ideally mimic the ACL's original anatomy allowing the knee to regain its previous level of functioning (Ahmad, 2016).

According to Meuffels *et al.* (2012), the worldwide ACL reconstruction rate is more than 200 000 per year, whereas Mall *et al.* (2014) estimates that between 100 000 and 150 000 ACL injured athletes undergo reconstruction surgery in the United States annually. According to Tan *et al.* (2015), the rate of ACLR has increased 1.5 fold over the past 12 years. ACLR surgery can be done by using either bone-

patellar tendon–bone (BPTB) autograft, hamstring autograft, quadriceps autograft or allograft (graft from a donor) tissue (Bach & Boonos, 2001; Abrams *et al.*, 2014; Ahmad, 2016). Autograft is safe with fast healing at the graft implant site, but involves a secondary surgical site that also needs to heal. Allograft involves fast recovery with a short hospital stay (Vaishya *et al.*, 2015). ACLR surgery is not without risk and although researchers report a 5-year graft survival of 95%, revision surgery is sometimes necessary (Maletis *et al.*, 2015).

After surgery the athlete will ideally follow an extensive rehabilitation programme targeting functional impairments. Early rehabilitation focuses on improving knee range of motion, patellar mobilization, strength, proprioception and neuromuscular control. Movement and early weight bearing is encouraged (Malempati *et al.*, 2015). Individuals may be able to return-to-sport as early as four to six months post-injury (DeCarlo *et al.*, 1992), but according to Prentice (2007) it can take up to two years to regain pre-injury quadriceps muscle function. Returning to competition is seen as the most important outcome for athletes following ACLR surgery, but researchers do not agree on the timeframe needed to do so (Abrams *et al.*, 2014). According to Failla *et al.* (2015), reaching this outcome relies on physical recovery such as avoiding re-injury and recurrent giving way, no joint effusion, quadriceps strength symmetry and achieving good physical functioning. Different rehabilitation protocols exist, each with their own specific return-to-sport criteria. The rehabilitation protocol will determine the speed with which an athlete will return to their pre-injury level of sport participation (Van Grinsven *et al.*, 2010). Achieving a good functional outcome and avoiding future injuries should be equally important during the rehabilitation and recovery process.

Following ACLR surgery athletes are at high risk for developing early onset osteoarthritis (Myklebust *et al.*, 2003). Lohmander *et al.*'s (2004) study on ACL injured female soccer players found that 51% of these athletes demonstrated radiographic osteoarthritis 12 years following injury. A systematic review by Risberg *et al.* (2016) reported that 50% of patients had developed radiographic tibiofemoral osteoarthritis 10 years post-ACLR surgery. Therefore, even though

ACLR surgery might provide an athlete with the opportunity to return-to-sport it is not without consequences and might require further management to slow down the progression of early onset osteoarthritis.

Phases of ACL rehabilitation

Different rehabilitation phases have been proposed by researchers. For optimal recovery, the rehabilitation process incorporates therapeutic modalities and exercises (Prentice, 2007). The preoperative rehabilitation phase entails the psychological preparation of the athlete for surgery and educating the patient on the rehabilitation and recovery process (Prentice, 2007; Wilk *et al.*, 2012; Malempati *et al.*, 2015; Ahmad, 2016). During the preoperative rehabilitation phase and where physically possible, Malempati *et al.* (2015) suggests gradual strengthening of the quadriceps and hamstring muscles, increasing knee range of motion (ROM), decreasing swelling and effusion, establishing a normal gait pattern and patient education. According to Wilk *et al.* (2012), the benefits of preoperative rehabilitation include reduced knee pain, minimised swelling, increased knee stability, increased ROM and possibly improved postoperative recovery.

Postoperative rehabilitation is divided into early and late rehabilitation phases (Bach & Boonos, 2001; Doyle *et al.*, 2013; Ahmad, 2016). Early postoperative rehabilitation includes immediate postoperative and sub-acute strengthening (Myer *et al.*, 2015) and should focus on regaining greater ROM, restoring full weight bearing, reducing swelling and effusion, strengthening the hamstring and quadriceps muscles and may involve the use of a knee brace, cryotherapy and electrical muscle stimulation. The later stages of rehabilitation involve less rigid guidelines and include appropriate exercises with functional progressions and return-to-sport (Myer *et al.*, 2015). Postoperative rehabilitation phases differ depending on the timeline and protocols used, but tend to start the first day after surgery. The type of protocol used depends on the type of surgery and graft, knee structures involved and patient preference (Wilk *et al.*, 2012).

According to Prentice (2007), the first postoperative phase (first week following surgery) involves minimising swelling and pain, improving knee ROM, regaining neuromuscular control and developing good quadriceps control. During phase two (weeks two to six), the rehabilitation exercises continue to focus on increased knee ROM and neuromuscular control. Exercises aim to improve quadriceps and hamstring strength, restore normal gait patterns and maintain cardiorespiratory endurance. Light functional activities may be incorporated into this repair phase. Phase three, also known as the remodelling phase (week seven to four months) focus on functional progressions and high level activity.

The BokSmart injury prevention and treatment programme implemented by the South African Rugby Union (SARU) summarise the phases of rehabilitation after injury as: 1) injury event; 2) inflammatory phase (1-5 days); 3) regeneration phase (days 5-10 to weeks 10-12) and 4) remodelling phase (day 21 to 6-12 months) (Gray, 2009). During the first phase the injury impact is reduced, the player is removed from the field and immobilized. The RICE principal is applied and immobilization is continued during phase two. Phase three involves mobilization, exercise and stretching. Stretching and strengthening is continued throughout the last phase (remodelling). Professionals involved in this process were identified as medics (phase 1), medical doctors (phases 1 and 2), physiotherapists (phases 1 to 4), coach (phases 1 and 4), biokineticists (phases 3 and 4) and trainers/strength and conditioning experts (phase 4).

Van der Poel and Nel (2011) identified five different phases: 1) injury phase; 2) treatment decision-making and planning phase; 3) early rehabilitation phase; 4) late rehabilitation phase; and 5) return to competition. Wilk *et al.* (2012) reports four to five postoperative rehabilitation phases. Phase one (immediately post-surgery) involves the first week following surgery. During this phase emphasis is placed on regaining full weight bearing, improved ROM, decreased pain, swelling and inflammation. Cryotherapy and electrical muscle stimulation are possible modalities that might be used during this phase. A knee brace is used to support the athlete's knee and exercises are used to strengthen and mobilise the knee. Phase two

(weeks two to six) aims to improve proprioception, knee musculature strength and achieve full knee extension. Cryotherapy is continued but the knee brace is removed at roughly four weeks post-surgery. Phase three (advanced recovery phase) includes weeks 10 to 16. During this phase regaining strength and better neuromuscular control are the most important goals. Regular running should be implemented around week 13. Phase four (return to activity) ranges from week 16 to 22 and involve further strengthening, improving stability, proprioception and sport specific exercises. According to Kyritsis and Witvrouw (2014), the most important factors that determine an athlete's successful return-to-sport include muscle strength, neuromuscular control, dealing with the fear associated with re-injury and the athlete's self-perceived level of knee function. During the later phases of rehabilitation, medical professionals should be aware of the difference in athletes' perceptions about their readiness versus their actual readiness to return-to-sport (Myer *et al.*, 2015). Regular postoperative follow-up is very important and athletes should undergo sport specific testing at six months and 12 months post-surgery.

The above literature refers to the importance of preoperative and postoperative rehabilitation for ACLR, however, there seems to be no consensus on a timeline and protocol. For the purpose of this study, the above literature was studied and adapted to six phases to provide a structure for the conducting of interviews. The six phases are 1) immediate post-injury; 2) preoperative (first day post-injury up to surgery); 3) postoperative (phase 1) - acute recovery from surgery; 4) postoperative (phase 2) - repair; 5) postoperative (phase 3) - remodelling and 6) return-to-sport.

Return-to-sport following ACLR

Different return-to-sport protocols, each with their own criteria, have been developed to determine a successful outcome following ACLR surgery. Thomeé *et al.* (2015) defined return-to-sport by referring to certain characteristics that should be present for safe and successful return-to-sport. This implies no secondary or additional injuries, no increase in the severity of symptoms (e.g., swelling, knee

pain) and an absence of long term consequences (e.g., osteoarthritis). The type of sport, level of participation and athletes' perceptions of their performance need to be considered. Wilk *et al.* (2012) recommend that athletes should follow a rehabilitation programme for at least six months before returning to sports like tennis and football and at least nine months for basketball. It is important to note that a set timeline can only serve as a suggestion and each athlete requires an individually tailored rehabilitation programme. Various tests can be used to determine an athlete's readiness to return-to-sport. Some of these include functional tests, isokinetic testing, knee examinations, subjective evaluations, movement analysis, landing mechanics (Abrams *et al.*, 2014; Ahmad, 2016), and the use of the International Knee Documentation Committee Subjective Knee Form (IKDC) (Anderson *et al.*, 2006) and ACL-Return to Sport after Injury (ACL-RSI) scale (Webster *et al.*, 2008). According to Myer *et al.* (2015), graft stability, patient confidence, timeline following surgery and the subjective opinions of the medical professionals involved in the rehabilitation process serve as an indication for return-to-sport. Sclafani and Davis (2016) concluded that in order for a rugby player to return-to-sport it is necessary to implement a rehabilitation programme that is individually tailored to the injured player's position, level of participation, type and extent of the injury.

An ACL rupture is usually a season-ending injury and is feared by many athletes. With modern medical advances one would assume that the recovery and rehabilitation process would be straightforward and that athletes have the ability to recover to their pre-injury level of performance. Langford *et al.* (2009) found that only 51% of patients return to competition despite seemingly successful reconstruction surgery and rehabilitation. Even though good knee function is reported in 85 to 90% of patients following ACLR surgery, less than half of participants are able to return to their pre-injury level of sport participation (Ardern *et al.*, 2011). Therefore, even if ACLR surgery is able to restore knee stability it still does not guarantee a successful return to pre-injury performance levels. Masten *et al.* (2014) noted that 81% of physically rehabilitated athletes are not

psychologically ready to return-to-sport. Ardern (2015) reported that 64% of individuals return to their pre-injury level of play post ACLR surgery, with only 56% returning to competitive sport. These percentages are quite alarming when you consider that most individuals choose to undergo ACLR surgery to be able to return-to-sport. Possible reasons include physical factors (e.g., knee impairments), modifiable contextual factors (e.g., fear of re-injury, psychological readiness and poor subjective assessment of knee function) and non-modifiable contextual factors (e.g., graft type, age, sex and level of sport participation).

Secondary ACL injury

When the criteria for successful ACLR surgery, rehabilitation and return-to-sport are not met, it creates the possibility of sustaining a secondary injury. A secondary injury refers to the devastating reality that some athletes might re-tear their ACL, indicating an unsuccessful ACLR surgery and the need to undergo revision ACLR surgery. Pullen *et al.* (2016) reported a revision rate of 3.6% in a large cohort (N = 16 336) of ACL reconstructed patients. Certain risk factors following the initial ACLR surgery are associated with a possibility of a secondary rupture. Some of these risk factors include a history of previous ACL injury, returning to sports that involve pivoting and cutting, age, graft type, gender, BMI and race (Salmon *et al.*, 2005; Maletis *et al.*, 2015). Younger patients, females and black patients have a lower risk of having to undergo ACLR revision surgery (Maletis *et al.*, 2015). However, Stanley *et al.* (2016) reported that females are predisposed to sustaining secondary ACL injuries.

ACL injuries are associated with a high risk of developing osteoarthritis, especially after undergoing revision surgery (Failla *et al.*, 2015). The position of the hip and knee joint is another important factor predicting the possibility of a secondary ACL injury (Paterno *et al.*, 2010). Patients with a history of ACL injuries seem to be at a higher risk for sustaining a secondary knee injury (Walden *et al.*, 2006) and patients who injured their ACL within the last 12 months are 11.3 times more likely to sustain a secondary injury (Orchard *et al.*, 2001). Borchers *et al.* (2009) noted that allografts had a higher failure rate when these athletes attempted to return-to-

sport and that patients younger than 21 years of age were 7.76 times more likely to undergo revision surgery. Tobacco use in patients following ACLR surgery is also associated with an increased risk of having to undergo revision ACLR surgery (Cancienne *et al.*, 2015).

The role of psychological factors in sports injuries

Most athletes are psychologically affected by their injuries and these psychological effects can have an influence on the rehabilitation and recovery process (Arvinen-Barrow, 2009). Physical rehabilitation and psychological recovery does not necessarily happen at the same time and only 10% of athletes are physically and psychologically prepared to return-to-sport (Masten *et al.*, 2014). Although injuries are mostly physical, rehabilitation of the physical aspects of the injury alone is insufficient to facilitate full recovery. Injuries are not limited to competition and can occur during activities of daily function and training and, therefore, it is important to study the psychological aspects involved in all possible injury scenarios.

Injuries are an unavoidable obstacle in sport and may impact an athlete's performance, career, physical state and psychological well-being (Almeida *et al.*, 2014). For professional athletes, being injured means time away from their sport, a loss of income and most probably a lengthy rehabilitation and recovery process. The cost of the surgery itself adds up to a substantial amount, increasing the financial burden placed on the athlete. Mather III *et al.* (2013) estimated the cost of ACLR surgery at roughly 7.6 billion dollars per year for the American society. In South Africa the cost of an ACLR surgery, including the surgeon, anaesthetist and hospital fees, amount to approximately R140 000 per person in the private sector (private communication with an orthopaedic clinic in South Africa, 2017).

Apart from these consequences, the majority of the available literature tends to focus on the physical nature of injury, but these aren't the only issues athletes have to deal with. To understand an athlete's recovery from a potentially career-ending injury such as an ACL rupture, researchers started to investigate the psychological factors involved in the rehabilitation process. Chute (1997) claimed that the role of

psychology in injured athletes is not fully understood and might be underestimated, with Ortin Montero *et al.* (2010) noting that health professionals still doubt the correlation between psychological factors and the rehabilitation and recovery process. The psychological effects should not be neglected as it could play an important role in the rehabilitation and recovery process. The next section highlights research developments from the late 1960's until 2017 on psychological factors and their influence on the rehabilitation process.

Little (1969) was probably the first to document that athletes experience neurotic symptoms. Since then, research on the psychological impact of an injury and the role of psychological factors during the rehabilitation process has grown tremendously. Eldridge (1983) stated that medical professionals need to understand the psychosocial dynamics of sports injuries to enhance the rehabilitation process. Athletes with an internal locus of control and high levels of physical self-efficacy appear to cope better with their injury, recover faster and are confident in their ability to play well (Goldbach, 1989). Petitpas and Danish (1995) have long argued that medical professionals need to attend to the injured person, not only to their physical injury. Injured athletes experience greater negative affect, depression and anxiety and have a lower self-esteem compared to non-injured athletes (Johnston & Carroll, 1998). Negative emotions (e.g., shock, anger, depression, frustration) have also been reported following ACL injury (Morrey *et al.*, 1999). An athlete's confidence level seems to be highest at the onset of injury, declines during the rehabilitation process and shows an improvement with recovery (Quinn & Fallon, 1999).

Rehabilitation is a complex process and medical professionals, who are in regular contact with athletes, should possess the necessary skills to assist with both the physical and psychological aspects of rehabilitation (Kolt, 2000). According to Quinn and Fallon (2000), the risk of re-injury increases if an athlete fails to recover psychologically. They also observed that team athletes tend to recover faster, probably due to having more resources (e.g., team doctors, physiotherapists, trainers and social support from teammates) available. Social support plays a

significant role in helping athletes recover emotionally from being injured. Sullivan *et al.* (2000) reported that catastrophizing might be a predictor of pain in sport. Nicholls *et al.* (2006) noted that professional rugby players are subjected to a variety of stressors and identified the main sources as injury, mental errors and physical errors. Langford *et al.* (2009) found meaningful psychological differences between athletes who returned and those who did not return to competition one year after ACLR surgery. These psychological differences included athletes' emotions related to return-to-sport, confidence levels and the risks associated with returning to sport. Positive emotions (e.g., excitement, happiness, relief) have been reported following successful rehabilitation and in anticipation of returning to sport (Podlog & Eklund, 2010).

Whereas the detrimental effects of injury is more pronounced, there may be some perceived benefits of injury such as gaining knowledge on anatomy, injury risk factors and proper nutrition. Being injured could create opportunities to strengthen social networks and lead to an increased perception of social support. Another benefit is the increased ability to understand, express and regulate emotions following injury (Wadey *et al.*, 2011). A review of the literature by Podlog *et al.* (2014) found that the quality of rehabilitation is influenced by an athlete's cognitive appraisal, emotional reactions and behavioural responses. Social factors tend to have an influence on injury rehabilitation and include social support and patient-practitioner interactions. Re-injury anxiety, feelings of incompetence, being unfit and not receiving proper social support are just some of the possible concerns athletes have to face when returning to sport. According to Masten *et al.* (2014) successful rehabilitation relies on focusing on the specific injury, physical and psychological health. Christino *et al.* (2016) stated that the effect of psychological factors on ACLR surgery outcomes are underestimated. The mentioned research highlights the importance of addressing both the physical and psychological effects of injury.

Research on the psychology of sports injuries tend to focus on two areas. Firstly, the psychological factors that predispose athletes to injury and secondly, the

psychological factors as a result of sustaining an injury. Therefore, we need to separate the literature that focuses on the pre- and post-injury phases. With regard to the pre-injury phase, it seems that stress is the most important variable. Anderson and Williams (1988) developed the Stress and Injury Model which included the following: personality factors, history of stressors, and coping resources. This model aims to explain the psychological factors associated with injury and was later modified to form the revised stress and injury model (Anderson & Williams, 1998). The revised model proposes that psychological factors form a link with stress that eventually results in a stress response. Individuals with personalities prone to stress (e.g., those with high competition anxiety), a history of stressors (e.g., those with previous injuries, major and daily life stressors) and limited coping resources (e.g., those with poor social support) will appraise a potentially stressful situation as more stressful. After appraising the situation the athlete will respond to the specific situation. This will cause increased physiological reactions (e.g., increased muscle tension) and attentional changes (e.g., concentration problems) that may predispose an individual to injury. The revised model shows a two-way relationship between an individual's cognitive appraisal and the physiological and attentional aspects. Implementing an intervention could influence the stress response by creating a change in the cognitive appraisal, physiological and/or attentional components.

Despite laying the foundation for research into the psychology of sports injuries, the Stress and Injury Model has received mixed support and it has been suggested that this model should be applied from a pre-injury perspective (Wiese-Bjornstal *et al.*, 1998). Although this model does not seem to explain the psychological responses following injury, it remains an important model that may be used to identify the psychological factors that predispose athletes to injury. Various approaches and models have been developed to provide a framework that could potentially explain an athlete's psychological responses both prior to and following injury. According to a review by Santi and Pietrantonio (2013), some of the most

popular approaches include the stage models, cognitive appraisal models and the biopsychosocial model.

Stage models

Stage approaches have been developed to conceptualise the progression through the physical and psychological healing process and include the widely cited grief-response model (Kübler-Ross, 1969). This model was originally designed for terminally ill patients, but has been adapted to the area of sport injury. The Kübler-Ross grief-response model suggests that athletes move through five predictable stages of emotions that follow a set sequence. These emotions include denial, anger, bargaining, depression and acceptance.

Applied to sporting injuries, this model suggests that the first reaction post-injury would involve feelings of denial, characterised by a complete disbelief and underestimation of the severity of the injury. This first stage serves as a type of defence coping mechanism (Chute, 1997). As the prognosis of the injury become more evident these feelings are replaced by feelings of anger towards one self or others. Anger will eventually be replaced by the third stage, the stage of bargaining. This stage is not well known, probably because most bargains are secretly made with a higher power as highlighted by this passage from *On Death and Dying*: "...we have been impressed by the number of patients who promise "a life dedicated to God" or "a life in the service of the church" in exchange for some additional time" (Kübler-Ross, 1969: 95).

Bargaining involves the thought process where an individual thinks that he or she can enter an agreement with some higher power to postpone the inevitable. When an individual reaches the point of realising the full severity of their injury they become depressed. Depression occurs as a result of past loss and/or due to impending loss. For example, in sport, an athlete may be depressed due to losing their place on a team following an ACL rupture and/or because they might never be able to play again. If the individual is able to move past the negative feelings of

depression they can progress to a stage where they are neither angry nor depressed, the stage of acceptance.

Acceptance is characterised by the injured accepting the situation and trying to cope with reality. Despite early research showing great support for the Kübler-Ross model, Brewer (1994) noted that the injured athlete may not go through each of these stages and that these stages do not necessarily follow the same order as for terminally ill patients. Furthermore, Udry *et al.* (1997) found very little support for the denial stage and could not find any proof of bargaining. Morrey *et al.* (1999) argued that injured athletes do not experience the same emotional reactions as terminally ill patients. The grief-response model fails to explain why individuals respond differently to sport injuries (Arvinen-Barrow, 2009). Within a sports injury context, Van der Poel and Nel (2011) reported that isolation is at its highest during early and late rehabilitation, and that anger and depression peaks during early rehabilitation and declines as the rehabilitation stages progresses. Acceptance was at its highest during the early rehabilitation period and only one of the 21 participants in their study reported bargaining. The early and late rehabilitation phases seems to be the most challenging and during these phases participants appreciated support from their coach as well as empathy from medical professionals (e.g., physiotherapist, biokineticist and rehabilitation physicians). It seems as though professional athletes' responses resemble those of the Kübler-Ross model and therefore this model should not be regarded as irrelevant.

Due to the grief model's rigid structure and inability to fully explain the response of injured athletes, it has been adapted to more flexible versions. One sport-specific adaptation from the Kübler-Ross model is the Affective Cycle of Injury by Heil (1993). Drawing from the initial work by Kübler-Ross (1969), the Affective Cycle of Injury proposes that injury follows a less stage like process that includes three emotions: distress, denial and determined coping. Heil (1993) suggests a cycle of different emotions with a possibility of regression and the ability to repeat itself. Distress refers to the effect of the injury on an athlete's emotions such as experiencing feelings of loss, anger, depression, helplessness, humiliation and

threat. Denial refers to unacknowledged stress that possibly will affect the athlete in a positive or negative way. Positive denial is the type of disbelief that protects the athlete from being overwhelmed by the negative emotions following injury. Negative denial hinders athletes from acknowledging the severity of the injury resulting in poor rehabilitation compliance. Determined coping involves more than accepting the injury, it involves dynamic, proactive and goal-driven behaviour (Podlog *et al.*, 2014). Heil's model could be specifically helpful when used in relation to the physical rehabilitation phases, as it is likely that different emotions will emerge during each of the different phases.

Heil (1994) incorporates his Affective Cycle of Injury into seven phases of rehabilitation as described by the orthopaedic specialist, Richard Steadman. These phases are: 1) pre-injury; 2) immediate post-injury; 3) treatment decision and implementation; 3) early postoperative/rehabilitation; 4) late postoperative/rehabilitation; 4) specificity; and 5) return to play. The immediate post-injury phase is characterised by feelings of shock, disorganisation, denial and uncertainty. Athletes experience similar emotions during the treatment decision and implementation phase. The early postoperative/rehabilitation phase can include feelings of helplessness, depression, denial, anxiety, distrust, loneliness and isolation. Progression towards the late postoperative/rehabilitation phase enhances feelings of self-control. A setback during this phase can cause depression, resurfacing of anxiety, decreased motivation, irritability and anger. If all goes well the athlete should become less depressed and vitalised by the time they reach the specificity phase. Determined coping start to appear as the rehabilitation process progresses and Almeida *et al.* (2014) noted that the shift towards determined coping could be dependent on personal and situational variables. Fear of re-injury might surface on the road to return-to-sport. Anxiety and fear will disappear with successful return-to-sport whereas the opposite will result in the reappearance of anxiety, depression and irritability. Due to the Affective Cycle of Injury's specific focus on distress, denial and determined coping, it fails to explain other possible emotional and behavioural reactions to injury.

Cognitive appraisal models

Brewer (1994) re-examined the available stage- and process-based models and proposed that cognitive appraisal models could hold the key to understanding the complexity of the sports injury process. According to his process-based Cognitive Appraisal Theory, an individual's cognitive appraisal is influenced by personal (e.g., anxiety, self-esteem, locus of control) and situational factors (e.g., sport status, injury severity). Cognitive appraisal then determines the emotional response that in turn affects the athlete's behaviour. In other words, an individual's evaluation of the injury will determine their thoughts, feelings and behaviours. This model emphasizes how the athlete perceives an injury. Wiese-Bjornstal *et al.* (1998) revised the proposed stage and cognitive appraisal models and developed an integrated version called the Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process. This model combines existing pre- and post-injury models and uses a cognitive appraisal approach in trying to understand the sports injury process. Cognitive appraisal is conceptualized as the ability to evaluate and recognise a potential source of stress in order to evaluate the size of the threat and determine the type of resources and coping strategies needed to manage the threat (Wiese-Bjornstal *et al.*, 1998).

Injury is seen as a stimulus and according to this model a wide variety of factors will influence how this stimulus is interpreted. The central component is dynamic and focuses on the cognitive, emotional and behavioural responses to the injury. These responses have the potential to influence psychosocial and physical recovery outcomes following injury. The cognitive appraisal of an injury also seems to be influenced by both pre-injury and post-injury variables. The top part of this model focuses on the pre-injury variables (e.g., personality, history of stressors, coping resources) similar to those identified by Anderson and Williams (1998). These variables influence the stress response, which in turn leads to injury. The remainder of the model focuses on the post-injury variables with injury identified as the main source of stress. Post-injury variables influence the cognitive appraisal of the injury itself and influence three interrelated factors (i.e., emotional responses,

behavioural responses and recovery outcomes). Personal and situational factors are postulated to have a direct influence on cognitive appraisal. Personal factors include injury history, injury severity, as well as psychological, demographic and physical differences. Situational factors refer to the type of sport, level of competition, teammate influences, influences of the sports medicine team and the rehabilitation environment. The core of this model reflects the complexity and dynamic nature of injury responses, and allows for change over time. If you follow the core arrows in a clockwise direction, the cognitions will determine the behavioural and emotional reactions to injury which will in turn affect the final rehabilitation outcomes. For example, an athlete competing at a national level might appraise his or her injury as more devastating than that of a recreational athlete. This cognitive appraisal might subsequently elicit a greater emotional response (e.g., fear of the unknown) which in turn will affect their behavioural response (e.g., poor rehabilitation adherence). Counter-clockwise movement is also possible, highlighting the circular and reciprocal nature of the model. This model seems to be the most comprehensive model that attempts to explain the psychological responses to the injury rehabilitation and recovery process.

The biopsychosocial model

Some of the models developed for use in the medical field focus on the physical aspects of recovery. The biopsychosocial model was developed to account for the psychological factors ignored by the medical models present at that time (Brewer *et al.*, 2002). Within the context of sport, the biopsychosocial model describes the role of psychological, biological and social factors in the injury process. According to the biopsychosocial model, the injury itself seems to initiate the rehabilitation process. This integrated model has seven components: injury characteristics, socio-demographic factors, biological factors, psychological factors, social and contextual factors, intermediate biopsychological outcomes, and sport injury rehabilitation outcomes.

This model suggests that injury characteristics (e.g., type, location, cause) and socio-demographic factors (e.g., age, gender, race) affects the biological (e.g.,

nutrition, sleep, respiration), psychological (e.g., personality, cognition) and social/contextual (e.g., stress, social network) factors (Brewer *et al.*, 2002). Psychological factors, together with biological and social/contextual factors are believed to influence intermediate biopsychosocial outcomes (e.g., range of motion, pain, strength). The psychological factors have a bi-directional relationship with biological factors, social/contextual factors and intermediate biopsychosocial outcomes. The final rehabilitation outcomes (e.g., functional performance, quality of life, readiness to return-to-sport) have a bi-directional relationship with the intermediate biopsychosocial outcomes and the psychological factors. This model provides a holistic framework that considers a wide range of factors that can potentially influence the rehabilitation process. According to Kolt (2003), the main advantage of this model lies in its ability to form connections between the many components affecting the injury rehabilitation process.

The above mentioned research highlights certain psychological factors that possibly predispose athletes to injury and include life stress and daily hassles. The literature also attempts to explain an athlete's emotional and psychological responses both pre- and post-injury through the use of stage-, cognitive appraisal-, and biopsychosocial models. Certain psychological factors have been studied and recognised for their role during the rehabilitation and recovery process following an ACL injury. Examples include depression, fear of re-injury, locus of control, pain catastrophizing and social support. These factors will now be discussed.

Depression

According to the World Health Organization (2012), depression is defined as “a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration” (p. 6). Uemukai (1993) referred to the Kübler-Ross stage model (1969) while studying the recovery of 212 injured athletes and found that depression was most prominent two to four weeks post-injury. Crichlow *et al.* (2006) reported a depression incidence rate of 45% among orthopaedic patients. According to Mainwaring *et al.* (2010), a higher level of depression is

present in ACL injured patients compared to patients suffering from a concussion. According to Garcia *et al.* (2015), the relationship between ACLR surgery and depression is not well understood and depression may be present in as many as 42% of ACLR athletes. Patients with a high level of depressive symptoms seem to report postoperative complications and poor knee function. Low levels of self-reported knee function are still present one year post ACLR surgery in patients suffering from major depressive disorder. However, Oztekin *et al.* (2008) found no difference in self-reported knee function between depressed and non-depressed patients. Depression will probably affect how an individual thinks, feel and handle daily challenges and, therefore, its effect on the ACL injury rehabilitation and recovery process should not be underestimated. Garcia *et al.* (2015) highlights the importance of recognising depression as early as the preoperative phase.

Fear of re-injury

Kori *et al.* (1990) defined the term Kinesiophobia as “an excessive, irrational, and debilitating fear of physical movement and activity from a feeling of vulnerability to painful injury or re-injury” (p. 37). According to Heil (1993), fear of re-injury is forever present in the injured athlete. Fear of re-injury is a type of avoidance behaviour observed in individuals experiencing pain. These individuals believe that moving or being physically active may cause re-injury (Vlaeyen *et al.*, 1995). Kvist *et al.* (2005) reported a correlation between fear of re-injury and poor self-reported knee function. Fear of re-injury possibly includes behaviours like hesitation, holding back and giving less than maximum effort. These may delay an athlete’s return to their pre-injury level of competition and, therefore, should be taken into account during the rehabilitation and recovery process. Tripp *et al.* (2007) found that athletes who reported the highest rates of fear of re-injury also had the lowest rate of post-injury sport participation. Ardern *et al.* (2011) recognised fear of re-injury as the main reason for athletes not returning to competitive sport. Athletes who returned to their pre-injury level of sport participation were less afraid of re-injury compared to those who did not. Greater levels of fear towards re-injury have been

reported in athletes who delay ACLR surgery compared to those undergoing ACLR surgery within the first three months post-injury (Ardern *et al.*, 2012).

Locus of control

Te Wierike *et al.* (2013) describes health locus of control as an individual's perception that they are able to control life events. Having a high internal health locus of control means that an individual strongly believes that an outcome is related to their specific behaviour and is believed to play a significant role in the athlete's perception of self-efficacy during the ACL rehabilitation and recovery process (Thomeé *et al.*, 2007). Nyland *et al.* (2006) reported that ACL injured individuals with a high internal locus of control achieved better self-reported knee function scores, were more satisfied with their activities of daily living (ADL) and sports activities. Internal locus of control has been positively associated with self-efficacy, knee function, sport activity levels and return to competition (Christino *et al.*, 2016). Individuals with an external health locus of control believe that outcomes are influenced by luck, chance or fate and that they have little or no control over a specific situation. Goldbach (1989) reported that individuals with an external locus of control, in combination with low self-efficacy, took longer to recover, doubted their abilities and feared the possibility of re-injury. According to Ardern *et al.* (2012), health locus of control, readiness to return-to-sport and patient expectations possibly predicts return-to-sport and, therefore, plays an important role in the rehabilitation and recovery process.

Pain catastrophizing

After ACLR surgery, most athletes experience intense levels of pain. According to Bartholomew *et al.* (1998), athletes who are in pain seems to think deeply about the negative effects of the injury situation, involve themselves in painful thoughts that increase their levels of distress and possibly focus on their ineffective ability to manage feelings of helplessness and pain. Pain intensity has been negatively associated with rehabilitation outcomes following ACLR surgery (Chmielewski *et al.*, 2008). Pain catastrophizing relates to negative thoughts in reaction to a possible threat. Sullivan *et al.* (2001) referred to pain catastrophizing as: "an

exaggerated negative mental set brought to bear during actual or anticipated painful experience” (p. 53). Baranoff *et al.* (2015) reported higher pain catastrophizing, high pain intensity and symptoms of depression during the first two weeks post-surgery. Therefore, the early assessment of pain catastrophizing has the potential to identify those injured athletes likely to experience high levels of pain and depressive symptoms post-ACLR surgery.

Social Support

Shumaker and Brownell (1984) describes social support as "an exchange of resources between two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient" (p.13). After experiencing a serious injury like an ACL rupture most athletes will have to rely on support from friends and family to help with everyday tasks (e.g., driving, shopping, getting in and out of the shower) and to avoid negative feelings and loss of identity. Social support can play a significant role during the rehabilitation and recovery process. According to Hardy and Grace (1993), there are three categories and eight types of social support. These include emotional support (listening support, emotional comfort and emotional challenge), informational support (reality confirmation, task appreciation and task challenge) and tangible support (material assistance and personal assistance). Emotional support and tangible support can be provided by anyone. Medical professionals (e.g., medical doctor, physiotherapist, biokineticist) should be responsible for informational support (e.g., patient education, feedback, advice).

Udry (2002) proposed four types of social support that includes emotional/esteem support, informational support, tangible support and motivational support. A wide array of sources exist that can provide social support, but might not necessarily be available to all athletes. Family members or friends can support the injured by listening to his/her problems, motivating them and lending a helping hand where possible. Physiotherapists and biokineticists who are in regular close contact with the injured athletes should use these opportunities to educate the athletes and in doing so hopefully increase their rehabilitation adherence. Medical professionals

involved in the rehabilitation process should provide emotional, informational and tangible support at different stages throughout the rehabilitation and recovery process. According to Udry (1997), successful social support relies on the right type, timing and amount of social support.

Johnston and Carroll (1998) noted that athletes seem to require more emotional support during the early rehabilitation phases and informational support towards the end. According to Prentice (2007), athletic trainers play an important role in providing social support and should do so by identifying the problem, being a good listener, reading body language, caring, educating the athlete about the injury and recovery process, managing the stress experienced by the athletes and providing the necessary support to help an athlete return to competition. Interestingly, in a study by Mitchell *et al.* (2007), women reported a higher availability of emotional and esteem support compared to men. Heil (2012) noted that sport psychologists are able to provide social support by facilitating treatment adherence and pain management and by equipping the injured with coping skills.

Within the South African context, it should be noted that there still is no registration category for sport psychologists. Subsequently, experts from the fields of psychology and sport science both lay claim to being able to provide psychological support to athletes, and by extension to injured athletes. Whilst the scope of the current study clearly falls outside this ongoing discussion, the work of Arvinen-Barrow *et al.* (2014) emphasises the important role of sport medicine professionals involved in injury rehabilitation in terms of providing psychosocial support. This study investigates various phases during the injury and rehabilitation process and has particular relevance to various sport medicine professionals (ranging from doctors, physiotherapists, biokineticists and psychologists) who encounter the injured athlete along the pathway to full recovery.

Closing comment: The five R's

Drawing from the above literature review, it is clear that an ACL injury is complex and its management requires an approach that involves more than just the

physical. The literature highlights a wide array of psychological factors involved pre- and post-injury, creating the need for a more detailed description of the personal experiences specific to ACL injured athletes. Throughout the literature review five R's emerged that I, the researcher, believe are the most important events on the timeline to pre-injury level of play: **R**upture, **R**econstruction, **R**ehabilitation, **R**ecovery and **R**eturn-to-sport. For the purpose of this study each **R** will now be conceptually defined.

Rupture: Tearing of the ACL (Bach & Boonos, 2001).

Reconstruction: Surgery to reconstruct the ACL to restore the knee's functionality. Surgery is performed by an orthopaedic surgeon who removes the torn ligament and replaces it with a graft (Ardern *et al.*, 2011).

Rehabilitation: A vital process that is used to facilitate the ACL injury recovery process. Individuals progress through different phases, each with their own goals, to regain their pre-injury muscle strength, knee stability, knee function, ROM and avoid possible re-injury. Different protocols and modalities are used to achieve this and include, but are not limited to, rest, ice, compression, elevation, exercises, stretches and electrical stimulation. There is no consensus on the rehabilitation timeline, but it typically lasts six to nine months. However, it could take up to two years to achieve the ultimate goal of returning to sport. Various medical experts may contribute during this phase (Ahmad, 2016; Prentice, 2007).

Recovery: The process of returning to a pre-injury state following an ACL rupture. Recovery starts immediately post-injury and involves all phases of physical as well as psychological rehabilitation. Recovery is not limited to the physical and not measured by return-to-sport, therefore, achieving full recovery (physical and psychological) could take much longer. This is emphasised by Masten *et al.* (2014), who noted that physical rehabilitation and psychological recovery does not necessarily happen at the same time and only 10% of athletes are physically and psychologically prepared to return-to-sport.

Return-to-sport: The point during the recovery process where an athlete is cleared for participation in sport (Thomeé *et al.*, 2015; Van der Poel & Nel, 2011; Wilk *et al.*, 2012).

In South Africa, the act of analysing personal experiences fall within the scope of practice of a psychologist in accordance with the Ethical Rules of Conduct for Practitioners registered under the Health Professions Act (Act 56 of 1974). As a biokineticist, the researcher is aware that providing a psychological service to injured athletes does not form part of a biokineticist's scope of practice and does not intend to provide any form of psychological service or treatment. However, a biokineticist is involved in final phase rehabilitation, allowing for regular close contact with injured individuals and this necessitates the need for a rich understanding of the cognitive, emotional and behavioural responses following **ACL Rupture, Reconstruction, Rehabilitation** and upon **Return-to-sport** on the road to **Recovering** to a pre-injury level of play. This rich understanding could benefit all medical professionals involved in the rehabilitation and recovery process in guiding them to a more integrated approach to rehabilitation, tending to both the physical and psychological needs of the injured.

Chapter Three

Research methodology

Introduction

A research paradigm provides the framework within which research takes place and consists of ontology, epistemology, methodology and methods (Scotland, 2012). Ontology is concerned with the nature of reality and how reality is perceived. Establishing an ontological position is the first step within the research framework followed by considering the epistemology. Epistemology is concerned with creating, acquiring and communicating knowledge. After considering the ontology and epistemology of the research, the researcher decides on a plan of action (i.e., methodology). The methodology section provides the necessary information on how the research was conducted and discusses the methods used to collect and analyse the data (Scotland, 2012). Thematic analysis (TA) was chosen as the preferred method of qualitative analysis. TA is not grounded in theory or epistemology (Braun and Clarke, 2006) and, within the context of this study, was used to report and describe participants' personal experiences and is, therefore, descriptive in nature following a realist method. Two self-administered questionnaires were chosen to collect quantitative data in support of the qualitative data gathered. The KOOS questionnaire measured knee function and the ACL-RSI measured readiness to return-to-sport.

Study design

This study utilised a predominantly qualitative research approach. This allowed for the inclusion of subjective experiences, capturing the way the participants appraised their injuries and the emotions they experienced. The rationale for this approach was to capture individuals' perceptions of their world and the way in which their cognitions (their thoughts), emotions (their feelings) and behaviours (what they do) interact. Arvinen-Barrow (2009) noted that a qualitative approach gives rise to a greater diversity of emotional responses compared to a quantitative approach. Although this study was predominantly qualitative, quantitative data was collected at various stages throughout this study by means of the Knee injury and

Osteoarthritis Outcome Score (KOOS) questionnaire and ACL-Return to Sport after Injury (ACL-RSI) scale. The role of the quantitative data was to support the qualitative data in order to ensure a rich, comprehensive and detailed narrative account. Using more than one source of data could potentially help triangulate findings and develop a better understanding of athletes' personal experiences of the ACL rupture, reconstruction, rehabilitation and recovery process, as well as upon return-to-sport

Participants

Eight competitive male athletes, aged between 18 and 28 years, were recruited for the study. One participant withdrew from the study due to personal reasons and a total of seven participants completed the study and their data was included in this thesis. For the purpose of this study a competitive athlete was defined as an athlete who is part of an organised team or individual sport at professional or club sport level. In recruiting participants, orthopaedic surgeons, physiotherapists and biokineticists within already-established professional networks were contacted, whilst individuals who sustained ACL injuries were contacted personally. Flyers (Appendix A) were distributed to the above mentioned medical professionals as part of the recruitment process. Data collected from each participant include data from the first day of the injury (which was captured retrospectively) up to return-to-sport.

Participants were included in this study if:

1. They were competitive male athletes between the ages of 18 and 28
2. They sustained a unilateral ACL rupture, and
3. They underwent unilateral ACL reconstruction (ACLR) surgery no more than 12 weeks before enlisting in this study.

Potential participants were excluded if they sustained a previous ACL injury. Bandura (1997) noted that individuals who have previously experienced an injury will demonstrate greater self-efficacy than individuals without experience. Other knee pathologies were not excluded.

Procedure

After obtaining ethics committee clearance (SU-HSD-000794), the study was initiated. Four of the injured athletes' contact information was provided by their team physiotherapist, one by the athlete's conditioning coach, one by a team physician, one by a teammate and one of the athlete's information was obtained by the researcher. The researcher contacted each participant to arrange a meeting, either in person or over the telephone. During the initial meeting the aims, objectives and potential benefits of the study were explained. The interview procedures were also discussed and voluntary participation requested. Informed consent (Appendix B) was obtained and each participant was informed about their right to withdraw from the study at any time. The participants were asked to complete a demographic questionnaire (Appendix C) and decided on a date, time and convenient location for the first interview.

Each athlete was interviewed six times. All participants completed the Knee injury and Osteoarthritis Outcome Score (KOOS) questionnaire (Appendix D) prior to the start of each interview. It should be noted that participant recruitment was challenging as it was difficult to gain access to injured athletes within the limited recruitment time period. Participants had to be recruited relatively close to one another in order for the researcher to follow all participants up to the return-to-sport phase. Therefore, none of the participants were recruited immediately following injury and some of the interviews and questionnaires were completed retrospectively as noted in table 3.1 below. For four of the seven participants, the first three interviews were done retrospectively with interviews four to six conducted in real time. Real time refers to cases where the interview was conducted whilst the participant was in a specific phase. For the remaining three participants the first four interviews were done retrospectively with interview five and six done in real time. The first interviews were done within 12 weeks post-ACLR surgery and all seven of the athletes returned to sport within 12 months post-ACL rupture.

Table 3.1: Interviews done retrospectively and in real time

Participant	Interview					
	1	2	3	4	5	6
	The day of injury	Post-injury up to surgery	Surgery and 1 st week post-surgery	Week 2 to 6 post-surgery	Week 7 to 4 months post-surgery	Return-to-sport
1	R	R	R	IRT	IRT	IRT
2	R	R	R	IRT	IRT	IRT
3	R	R	R	R	IRT	IRT
4	R	R	R	R	IRT	IRT
5	R	R	R	IRT	IRT	IRT
6	R	R	R	IRT	IRT	IRT
7	R	R	R	R	IRT	IRT

*R – Retrospective; **IRT – In Real Time

The interviews were conducted in line with Thematic Analysis (TA) as explained by Braun and Clarke (2006). A semi-structured interview schedule (Appendix E) guided the interviews, however, deviation from this schedule was allowed by both parties to make sure that each experience was captured. Each meeting (face-to-face or telephonic) lasted approximately 30 to 45 minutes during which forms were completed and the interview was recorded with a recording device. The total recorded length of the six interviews ranged between 45 and 90 minutes for each participant. Participants were asked to complete the ACL-Return to Sport after Injury (ACL-RSI) scale (Appendix F) prior to the start of the sixth interview.

Thematic analysis

Thematic Analysis (TA) can be used to search across data (e.g., interviews, focus groups, texts) and aims to find, analyse and report repeated patterns of meaning within the data (Braun & Clarke, 2006). TA forms the foundation of qualitative research and one of its major benefits lies in its ability to allow for flexibility. Another benefit of TA is that it is not grounded in theory or epistemology and is, therefore, a better method for researchers inexperienced in the field of qualitative research (Braun & Clarke, 2006). This type of analysis is able to explore an area in a detailed and flexible manner and yield a rich understanding of a participant's

personal experiences, meanings and reality. Therefore, TA was chosen as the qualitative method of analysis for the present study. TA can follow a realist, constructionist or contextualist method. A realist method reports the experiences, meanings and reality of participants, whereas a constructionist method studies events, experiences, meanings and realities as a result of societal discourses. A contextualist method refers to a TA that positions itself between a realist and constructionist approach (Braun & Clarke, 2006). The TA conducted in this study was descriptive in nature and described participants' personal experiences following a realist method. According to Attride-Stirling (2001), it is important to include the TA procedure when writing a research paper in order to allow for a clear representation and understanding of how the analysis was done. The following paragraphs explain the data collection, as well as the TA procedure.

Data Collection

One-on-one semi-structured interviews were conducted to provide insight into each participant's personal experiences. For the purpose of this study, an interview schedule was created to guide the interviews and included broad open questions to allow participants to talk about their thoughts, perceptions and feelings. A pilot interview was scheduled to familiarize the researcher with the interview schedule and to adapt questions where needed. The researcher and study leader met several times both prior to and following the pilot interview to discuss, adapt and finalise the interview schedule. Each of the seven participants took part in six semi-structured interviews that allowed for mutual dialogue between the researcher and participant. The interviews followed the schedule but allowed participants to deviate from the topic. Each participant's responses guided the questions asked by the researcher. The interview schedule focused on the athlete's feelings, emotions and experiences during the following six phases that include the initial rupture, reconstruction, rehabilitation, recovery and return-to-sport:

- Immediate post-injury (the day of the injury)
- Preoperative (first day post-injury up to surgery)

- Postoperative (phase 1) - Acute recovery from surgery (surgery and first week post-surgery)
- Postoperative (phase 2) - Repair (weeks 2 to 6 post-surgery)
- Postoperative (phase 3) - Remodelling (week 7 to 4 months post-surgery)
- Return-to-sport (time dependent on meeting the criteria for return-to-sport).

For the purpose of this study the return-to-sport interview took place during the final training sessions prior to returning to competition or shortly after the first warm-up game. Following the interviews, each recorded interview was transcribed verbatim. According to Riessman (1993), transcribing the interviews forms an integral part of emerging oneself within the data. A margin was left open on the left and right side of the page for comments and notes. The transcripts were read more than once, since reviewing the text might lead to the discovery of new insights. While transcribing, reading and re-reading the transcripts, the researcher wrote down interesting or significant comments in the left-hand margin. Interesting features were then coded across the entire data set. The right-hand margin was used to document more specific themes from the initial notes and codes. This process involved going through all of the transcripts, comments and themes several times.

I engaged with relevant literature prior to the analysis while compiling the literature review and this led to further engagement with literature when similar data emerged from the transcripts. According to Tuckett (2005), further engagement with the literature could add value to the analysis as it allows the researcher to focus on the more understated aspects of the data. Therefore, themes were identified using a “top-down” or deductive approach and driven by theoretical interest in the specific area. A theme was identified when text captured important information in line with the research question and not necessarily chosen in relation to its prevalence in the data set. The initial themes were listed to provide a clear visual representation of the themes. This list was closely studied for possible connections between the identified themes. Some themes formed clusters while others emerged as superordinate themes. Superordinate themes, themes, sub-

themes and categories of codes were listed in tables, creating a master list for each interview phase. In the final stage of the TA, the themes were translated into a narrative account with the use of interesting extract from the transcripts. The narrative account analysed the extracts in relation to the aims of the study and existing literature. The TA applied in this study was used to report and describe participants' personal experiences and is descriptive in nature following a realist method.

To ensure that the qualitative research was accurate and correct, the researcher paid attention to the credibility, transferability, dependability and confirmability of the data. According to Merriam (1998), credibility refers to the similarities between the research and reality (i.e., How believable is the data?). Transferability refers to the way in which results can be transferred to another situation or generalised (Anney, 2014). Dependability requires a detailed description of the research process so that the research could be repeated in a similar way in order to achieve similar results (Shenton, 2004). Confirmability is concerned with the degree to which the research could be verified by others and questions how the results are supported by the data collected (Baxter & Eyles, 1997).

Throughout the process of gathering, transcribing and analysing the data, the researcher frequently involved and communicated with the study leader and co-leader. This allowed for multiple readings of the transcripts as well as multiple evaluations of the superordinate themes, themes, sub-themes and categories of codes. The narrative account was read several times by multiple readers to ensure the credibility of the researcher's work. The researcher provided a detailed step-by-step description of how the TA was conducted. The method was presented in such a way that the researcher believes that external researchers would be able to understand and repeat the method in a similar way. Quantitative data, measuring participants' self-reported knee function (KOOS questionnaire) and readiness to return-to-sport (ACL-RSI), was collected to support the results of the qualitative data. The KOOS questionnaire was completed prior to the start of each interview and the ACL-RSI was completed prior to the start of the sixth interview.

Knee injury and Osteoarthritis Outcome Score (KOOS)

Knee symptomatology including pain and stiffness as well as function during sport and everyday activities are important measures for the comprehensive assessment of knee injuries. The KOOS is a self-administered questionnaire developed by Roos and colleagues in 1995 to assess patient reported measures of knee function over short- and long-term intervals (Roos & Lohmander, 2003). Intended populations include young and middle aged groups or individuals with posttraumatic osteoarthritis or conditions that might lead to posttraumatic osteoarthritis (such as an ACL injury). It has been used in a number of prospective studies to track function and improvement during rehabilitation (e.g., Ageberg *et al.*, 2010; Hill & O'Leary, 2013). According to Salavati *et al.* (2011), the KOOS is a valid and reliable questionnaire (Intraclass Correlation Coefficient (ICC) = pain 0.93, symptoms 0.85, ADL 0.91, Sport/Rec 0.75 and QOL 0.89; Cronbach's alpha = pain 0.91, symptoms 0.75, ADL 0.96, Sport/Rec 0.86 and QOL 0.74; Spearman's rank correlation = 0.40 to 0.79) in measuring the functional status and QOL of ACL reconstructed athletes. It has also been validated for use in competitive athletes.

The KOOS questionnaire mainly focuses on opinions about the signs and symptoms of knee injury and how this affects daily functioning. Therefore, the KOOS should not have an emotional impact on research participants. The KOOS measures 42 items across five subscales of patient outcome: pain frequency and severity during functional activities (9 items), symptoms (7 items), difficulties experienced during activities of daily living (ADL) (17 items), sport and recreation function (Sport/Rec) (5 items), knee-related quality of life (QOL) (4 items) (Collins *et al.*, 2016). A 5-point Likert scale (0-4) is used to rate each item in the different subscales. The scores are then added and transformed to a 0-100 score for each subscale. A score of 0 indicates extreme symptoms and a score of 100 indicates no symptoms (Roos & Lohmander, 2003). The use of a total KOOS score is not recommended. The KOOS questionnaire is able to yield meaningful information following ACLR surgery especially with regard to the quality of life subscale (Collins & Roos, 2012).

Each participant completed the KOOS questionnaire prior to the start of each of the six interviews. Participants had to refer to their experiences and symptoms within the last week when answering the questions. The questionnaire took approximately 10 minutes to complete and used simple language that required tick-box responses. The completed KOOS questionnaire took approximately 15 minutes to score and no training was necessary to administer the scale. An Excel spreadsheet was used to calculate the five subscale scores. The KOOS questionnaire (Appendix D), KOOS user guide and KOOS scoring instructions are available online at www.koos.nu. No licensing or permission was required to use this instrument.

ACL-Return to Sport after Injury (ACL-RSI) scale

Webster *et al.* (2008) reviewed the literature and was unable to find a scale that measures the psychological impact of returning to competition following ACLR surgery. They developed a 12-item ACL injury specific questionnaire (ACL-RSI) to include three types of psychological responses (e.g., emotions, confidence in performance and risk appraisal) associated with return-to-sport. Questions one to five was developed to measure emotions (e.g., nervousness, frustration, tension and fear of re-injury), six to eight to measure the athlete's confidence in knee function, nine and 10 to measure the athlete's overall confidence in their sport and 11 and 12 to measure their cognitive risk appraisal (Webster *et al.*, 2008). Questions were then randomly reordered and visualised on a 10cm analogue scale which was later adapted to an eleven-point Likert scale ranging from 0-100 as used in the present study. For the present study the ACL-RSI was completed prior to the start of the sixth interview (i.e., return-to-sport) to assess the patient reported psychological readiness to return-to-sport. Participants answered each question by selecting one of eleven boxes representing increments of 10 from 0 to 100. The scores were added and the mean score was calculated to create a single score for each participant. The ACL-RSI might be able to predict those athletes that will be able to return-to-sport following ACLR surgery (Kvist *et al.*, 2013). A higher score represents a more positive outlook and psychological readiness towards returning

to sport. Although not all of the participants returned to sport at exactly the same point in time, each participant was asked to complete the ACL-RSI (Appendix F) prior to returning to competition to assess their attitude towards returning to sport. Dr K.E. Webster granted permission to use the ACL-RSI via email as seen in Appendix G. Webster *et al.* (2008) found the ACL-RSI to be a valid and reliable scale (Cronbach's alpha = 0.92) .

Place of study

Three of the participant's semi-structured interviews took place in a private setting, as agreed upon by both the researcher and participant, allowing for a face-to-face dialogue. The remaining five participants completed their interviews telephonically.

Duration of the study

The study lasted approximately three years and was completed in December 2017. This included the development of the research proposal, ethical application, information sheet, consent form, demographic questionnaire and the interview schedule. During this study, the researcher recruited participants, reviewed the relevant literature, conducted the interviews, captured and analysed the data. After analysing the data, the researcher wrote the thesis and presented the results.

Ethical aspects

The research proposal was submitted to and approved by the Stellenbosch University Research Ethics Committee (SU-HSD-000794). Participants were notified that participation was voluntary and that they were allowed to withdraw from the study at any time without having to provide reasons. Furthermore, they were informed that any information that was obtained in connection with this study and that could be identified would remain confidential and will only be disclosed with their permission or as required by law. Participants remained anonymous and completed informed consent forms prior to the commencement of the study.

In South Africa, the act of analysing personal experiences (thoughts, emotions and behaviours) fall within the scope of practice of a psychologist in accordance with

the Ethical Rules of Conduct for Practitioners registered under the Health Professions Act (Act 56 of 1974). As a qualified biokineticist, the researcher was fully aware that providing psychological services to injured athletes fall outside the scope of practice for biokineticists and subsequently did not provide any form of psychological service or treatment.

However, since biokineticists (who can register with the Health Professions Council of South Africa) are involved in final phase rehabilitation of orthopedic conditions, they are regularly in close contact with injured individuals which necessitates the need for a comprehensive understanding and awareness of the cognitive, emotional and behavioural responses following various injuries, reconstructive surgery, rehabilitation and upon return-to-sport on the road to recovering to a pre-injury level of play. The South African Qualifications Authorities minimum training standards for Biokinetics requires that students should be able to “demonstrate knowledge, understanding, skills and attitudes related to the psychosocial aspects of health and human performance”. Subsequently, various exercise psychology topics including the psychology of injuries are typically taught as part of their postgraduate training.

However, the researcher does not consider herself an expert in the field of psychology and consulted with Dr Jason Bantjes from the Department of Psychology in the Faculty of Arts and Social Sciences, Stellenbosch University during the study. Recalling traumatic events could have caused some level of distress and, therefore, all participants were provided with a psychologist’s contact details and urged to contact the psychologist if the need to do so arose. However, none of the participants chose to do so. The results of this study will be communicated to all participants following the successful completion of the researcher’s thesis.

Chapter Four

Results and discussion

A total of eight participants were purposefully recruited for this study. One participant withdrew from the study due to personal reasons. The remaining seven participants were between the age of 18 and 28 years (mean age = 21.7 years; SD = 2.46), sustained a unilateral ACL rupture, underwent ACLR surgery and had no history of previous ACL injuries. All of the participants gave consent to take part in the study and their data was included in the analysis. Each participant's personal experiences of the ACL rupture, reconstruction, rehabilitation and recovery process, subjective knee function as well as readiness to return-to-sport was measured by TA, KOOS questionnaire and ACL-RSI respectively. Results are reported and discussed under each section.

Thematic analysis

Six interviews were recorded and transcribed for each of the seven participants for a total of 42 interviews. Multiple readings of each transcript led to the generation of codes and, in turn, themes across the entire data set. Data was examined and the lists reduced to create a final master list for each of the six rehabilitation phases as outlined in the methodology section. All transcripts were analysed to capture each athlete's personal experiences of the ACL injury, reconstruction, rehabilitation and upon return-to-sport throughout the recovery process. The analysis gave rise to a number of superordinate themes, themes, sub-themes and categories of codes as listed in Tables 4.1 to 4.6.2. Note that each superordinate theme, theme, sub-theme and category of codes was the result of the researcher's subjective interpretation in line with the aims and objectives of the present study. New themes that were not noted during any of the previous phases are highlighted in *italics* from Table 4.2 onwards. The master lists formed the basis of the narrative account which attempts to give meaning to each superordinate theme. The discussion of each superordinate theme is grouped under rupture, reconstruction, rehabilitation and return-to-sport. Recovery starts immediately post-injury and involves all

phases of physical as well as psychological recovery. Therefore, recovery forms a part of the rupture, reconstruction, rehabilitation and return-to-sport process and is not discussed as a separate event.

Rupture – The day of the injury

The first interview, for all participants, was done retrospectively and captured important information about the day of the injury. During the analysis of the first interview transcripts, a total of five superordinate themes emerged, each with their own themes, sub-themes and categories of codes. The superordinate themes emerged as establishing identity, cognitive appraisal of the injury, responses to the injury, coping strategies and types of social support.

Table 4.1: Master table of emergent themes: Immediate post-injury

Superordinate themes	Themes	Sub-themes	Categories of codes
Establishing identity	Athletic identity	Career Development	Participating from a young age
			Receives an athletic scholarship
			Sports fan becomes professional player
			Level of competition
			Professional sportsman
			Ambitious– wants to play for the national team
			Career has not been without its challenges
		Injury History	Previously injured
			Downplays injury history
			No history of previous injuries
		The meaning of sport	Source of joy/ passion

Establishing identity (continued)	Personal identity	Beliefs and attributions	The role of luck and fortune
		Sense of self	A self, separate from sport
			Laid-back personality
			Life-sport balance
Cognitive appraisal	The injury situation	Perceived cause of injury	
		Self-reported symptoms and knee function	Heard a sound
			Instability
			Pain
			Sensitivity
			Stiffness
			Swelling
	Perception of ACL injuries	Not a “typical” ACL injury	
		ACL injuries are season ending	
		ACL injuries are serious	
	Sense of loss	Travel to compete internationally	
	Perceived benefits of injury	Motivation/ Challenge	
		Personal growth	
		Time	Time to focus on studies
			Time for self
Responses to injury	Emotional responses	Facilitative reactions	Excited for what’s to come
			Hopeful for a good outcome
			Positive attitude
	Emotional responses	Debilitative reactions	Confused about injury
			Disappointed/sad/ Depressed/ disheartened
			Denial/ disbelief
			Problems with accepting reality
			Fear of unknown
			Frustration

Responses to injury (continued)	Emotional responses (continued)	Debilitative reactions (continued)	Negative reaction towards injury	
			Stress/ worry caused by uncertainty and academics	
	Behavioural responses	Lifestyle adjustments	Draws from past experiences	
Coping strategies	Avoidance-orientated coping	Avoidance/ withdrawing oneself from a situation		
Types of social support	Tangible	Services provided by medical professionals	Doctors examination	
			Physiotherapist tests knee function	
	Informational	Feedback and advice from medical professionals	Physical assistance from friends/ family/ teammates	
			Initial diagnosis made by doctor	
	Emotional	Motivation/ support	Advice from physiotherapist	
			Support from friends, family and teammates	
Companionship from friends/ family		Support from medical professionals		

Establishing identity

Every person has their own unique identity and who they are and the role they identify themselves with will probably determine how they react in a specific situation. Identity is defined as “a set of meanings applied to the self in a social role or situation defining what it means to be who one is” (Burke, 1991: 837). According

to Oyserman *et al.* (2012), identities are “the traits and characteristics, social relations, roles and social group memberships that define who one is” (p. 69) and include past, present and future experiences. Multiple re-reading of each participant’s transcripts gave rise to themes that were perceived to reveal certain aspects about their identities. These themes were grouped as either athletic identity or personal identity. Most of the sub-themes and categories of codes related to athletic identity emerged during the first interview as participants were asked to talk about themselves.

Athletic identity

Professional athletes invest a great deal of whom they are in their sport. They spend long hours thinking about sport, practicing for competitions and socializing with teammates. Therefore, it is to be expected that they will associate some aspects of who they are with their role in the sports world. Most sub-themes associated with athletic identity were reported during the first interview as athletes reported certain events relating to their career development.

Sport, especially rugby, is very popular within a South African context. Baldauf (2008) compares the popularity of rugby in South Africa to cricket in India and American football in Texas. Therefore, it is not surprising that the present study’s participants reported participating in sport from a young age as reflected in the following extract: *“I played my first rugby match... it was probably, the first time, it was probably [name of a children’s sport development programme] rugby and then I played from grade 1 until now.”* Young athletes become more aware of their role in sport and might start to develop an athletic identity early on (Mitchell *et al.*, 2014). According to Danish *et al.* (1993), sport plays a role in the development of self-esteem and identity among young individuals. Young promising athletes are often offered an athletic scholarship to attend prestigious schools as reported by this rugby player: *“I got a sport bursary to a school in [name of suburb] called [name of primary school] and from there I was fortunate to go to [name of high school].”* Apart from the financial benefits, an athletic scholarship provides young athletes with the opportunity to attend a school with the necessary resources to

help them develop to the best of their abilities, directing them towards the path of becoming a professional sportsman. Providing proper support (e.g., scholarships, support from coaches, support from family and friends) will drive career development and these young athletes will start to develop athletic identities (Wiechman & Williams, 1997).

One participant reported that it was a dream come true being able to play for his favourite team who he supported as a young athlete. In this story, the fan became the professional player: *"I've always supported the [name of team], so being able to play for the team I've supported my whole life is a real dream come true."* All of the athletes that took part in the present study developed into competitive athletes and reported playing at either provincial and/or national level. Four of the participants competed in local as well as international sporting events or tournaments as reported by this participant: *"I have taken it really far, I've competed in world cups and international races and it's going really well."* Three of the athletes only competed locally and reported competing at university and provincial level: *"I am playing for the [university rugby team] and for the [provincial team name]."* All of the participants benefitted financially from participating in sport, but four of them rely on being physically active to make a living. These participants are professional sportsman and referred to playing sport as their job: *"I'm very passionate about my rugby and I'm very fortunate that I can do it as a job, something that I enjoy."* According to Lamont-Mills and Christensen (2006), athletic identity increase with an increase in level of sport participation.

All athletes were able to form a sense of self related to sport, but professional competitive athletes have a stronger association with their athletic role compared to recreational athletes (Lamont-Mills & Christensen, 2006). However, this does not mean that recreational athletes will not react negatively to an event that might threaten their athletic identity. Evidence of ambition emerged as one participant reported that he wanted to play for the national team: *"...everyone who plays rugby in South Africa wants to play for the springboks and then get to the highest level so that's still a big dream of mine"*, but although he had big dreams of being a national

rugby player, achieving this goal was not easy and his career had not been without challenges: *“I’ve had some difficulties before, but um, that’s why I initially moved to [name of another country]. I wasn’t really getting picked for teams.”* Experiencing challenges or sustaining an injury might threaten an athlete’s identity and those who strongly identify with their athletic-self struggle to adjust post-injury (Brewer *et al.*, 2010).

Participants were asked to talk about their injury history. Most reported previous injuries, highlighting the common occurrence of sports injuries amongst competitive athletes. Some athletes downplayed their injury history, ignoring the seriousness and the frequency with which they occurred. This probably suggests that they perceived being injured as an unavoidable part of being a professional sportsman and, therefore, had become desensitized to its occurrence. The following participant reported a few major injuries but constantly referred to them as not being too serious: *“I think I’ve been very...very lucky not have any big injuries in my career thus far. I would say the biggest injury I’ve had is... I broke my arm in my very first rugby game actually and um yes, but other than that I’ve...I’ve had a niggle here and there, but nothing too serious. Um I’ve got a groin problem which uh fortunately got sorted out because at one stage it was getting really bad but yes a strained hamstring or a tweak in the hammy or something like that has been about it for me up until my ACL now but yes, like I said I’ve been very lucky not to have any big injuries for my career... I haven’t really been put to a test I would say uh mentally wise cause I’ve...I’ve always just been out of the game for two weeks or three weeks um I think the longest I’ve been out was a month when I got... I was concussed and then came back and concussed in the game again... so like I say I really haven’t been tested in that way.”*

This might be a type of coping mechanism in reaction to a threatened athletic identity. One of the younger athletes reported that he had never sustained an injury: *“I have not previously had an injury.”* By reading and re-reading the transcripts, it was obvious that these competitive athletes find meaning in sport. Sport emerged as a source of passion and joy as seen in this extract from the

professional cyclist: “...riding has just been...just been part of...part of my life. Both my parents were cyclists so it was I guess natural for me to...to follow after them and I’ve always enjoyed it” and the extract from one of the professional rugby players: “I’m very passionate about my rugby and I’m very fortunate that I can do it as a job, something that I enjoy.” This suggests that sport had a positive and meaningful influence on these participants. Having a strong athletic identity has been associated with certain benefits like improved social interactions, motivation and constructive athletic experiences (Brewer *et al.*, 1993). According to Petrie *et al.* (2014), a strong athletic identity has also been associated with burnout, struggling to cope with injuries and problems dealing with an ending career. Brewer *et al.* (1993) defined athletic identity as the extent to which a person identifies with their athletic role. The present study’s results support this definition as all participants seemed to identify some part of who they are with their athletic role.

Personal identity

Jacobson (2003) refers to personal identity as “categories that are more unique to the individual” (p. 3). According to McCall and Simmons (1966), “personal identities serve as the pegs upon which social identities are hung” (p. 65). For the purpose of this study the personal identity theme include sub-themes and categories of codes related to characteristics of the personal self and include self-beliefs and self-meanings. The first interview involved establishing a good rapport with the research participants. One participant specifically attributed certain outcomes to luck and/or fortune: “I’m very fortunate that I can do it as a job... I’ve been very...very lucky not to have any big injuries in my career... I’ve been very lucky.” When an individual perceives the outcome of certain events to be the consequence of luck or chance, it is said that they have an external locus of control. In other words, they believe that they have little control over life events. This only emerged during the first interview and it does not mean that the specific participant perceived luck or fortune to control all life events but definitely referred to it often when talking about his career development and injury history.

According to Graffeo and Silvestri (2005), individuals with an external locus of control rely on luck to achieve goals and are, therefore, less willing to work towards achieving goals. However, throughout conducting the face-to-face interviews this specific participant was not perceived as unwilling to work towards achieving his goals and his references to luck and fortune probably related to him appreciating what life has given him. Interestingly, this player achieved his life-long dream of playing for the national team during his first season back following the injury. This testifies to his willingness to work hard. Apart from beliefs and attributions, evidence of a sense of self emerged.

Participants who had previously been injured seem to have experienced the threatening effect these injuries have on their identities. They reported a self, separate from sport. According to Brewer *et al.* (2010), some athletes separate themselves from their athletic identity in an attempt to protect their self-esteem during difficult times in their sporting careers. Being a professional athlete, your identity is often associated with who you are as a sportsman but following injury an athlete has the time and opportunity to focus on a self that is separate from sport: *“...it’s a good challenge as well to see where I’m at, you know, not just as [name of participant] the rugby player but [name of participant] off the field as well.”* When your identity is too strongly rooted in who you are as a sportsman, being injured could cause the unravelling of your life-world.

When individuals form a strong athletic association with who they are as a person, it might cause them to direct all of their focus towards sport and neglect other aspects of who they are (Wiechman & Williams, 1997). Some athletes preferred to keep their athletic and personal identities separate whereas others tried to find the perfect life-sport balance: *“I try to be as much balanced as possible so that the one thing don’t influence the other but if I have a problem at home it won’t influence my rugby and it won’t influence my home so I try to balance my life in such a way that everything is just a part of my life.”* When participants spoke about themselves, one participant referred to his personality and perceived himself as laid-back and easy-going: *“I think I’m very relaxed, um not too... not too uptight about certain things.”*

I'm a very laid back guy." According Anderson and Williams (1988), pre-injury factors (e.g., personality) will influence the stress response and may increase or decrease the risk of injury. Having a laid-back personality will probably minimise the stress response experienced as reported by this participant on the day of injury: *"I was still very positive."*

Cognitive appraisal

The cognitive appraisal superordinate theme includes interpretations made by participants about the meaning of the injury situation and ACL rupture. According to Wiese-Bjornstal *et al.* (1998), such cognitive appraisals will have an effect on an athlete's behaviours and emotions.

The injury situation

This theme is specific to the day of the injury. When asked about the injury situation and how the injury had happened, participants reported their self-perceived cause of the injury: *"...someone passed the ball just on my right side and I just stepped out like I normally do to...to try and catch the ball and in that moment I think I might... must have stepped, um, on the side of my foot or a bit skew or in a small little bump or hole in the grass or whatever and followed with my knee and heard a snapping sound."* According to Montgomery (2016), there are two main reasons why rugby players rupture their ACL. Firstly, non-contact ACL injuries occur during offensive running when an athlete performs a sharp cutting motion while carrying the ball. Secondly, contact injuries in rugby result from being tackled. For most of the participants their ACL injury happened during a training session with the perceived mechanism of injury being very similar to that explained by Montgomery (2016).

The cyclist was the only one to report a different mechanism of injury: *"...at the time there was quite a big tailwind and the tailwind sort of set me...set me skew in the air and I over jumped the jump and I landed on my heel which... which caused my knee to hyperextend and obviously to tear my ACL."* Instead of a force to the front of the knee, he landed on his heel which forced his knee into hyperextension

and ruptured his ACL. According to Prentice (2007), an ACL rupture is possible when an individual lands from a jump while his knee is extended. Following an ACL injury, the most common signs and symptoms include hearing a “pop” sound, immediate disability and instability, pain and swelling (Prentice, 2007). Participants’ self-reported symptoms and knee function matched that of Prentice (2007) as highlighted by the following extract: “...*heard a snapping sound, but um no one was anywhere near me so I... it obviously could just come from my leg obviously and um I tried to get up and immediately my leg just felt a bit funny and I walked off the field and went in to the physio room just to ask him to check on me and uh he could immediately see that there was swelling on my knee.*” Another participant reported the following: “*I felt my knee shift like uh I heard a small pop almost like bubble wrap... heard something like that and then I tried to get up and I couldn’t, I lied down.*”

Perception of ACL injuries

According to Clement *et al.* (2015), participants who perceive an injury as serious probably tend to have negative appraisals towards the injury. Proof of negative appraisals emerged as participants were trying to interpret the meaning of an ACL injury. Some of the athletes reported that they did not experience a “typical” ACL injury and, according to one participant’s perception, you are not supposed to be able to walk off the field or do normal movements immediately post-injury: “...*from what I’ve seen, the guys who get an ACL injury don’t just casually stroll off the field like I did so I think that’s why I was also a bit thrown off, because um I still was walking fine like every... every...everything was still, you know, things that weren’t able to be manageable so to say with an ACL uh tear was fine for me.*” This is consistent with Clement *et al.* (2015) who found that the appraisal of the injury is predominately negative.

Prentice (2007) reported immediate disability and a knee that feels like it’s shifting following injury. Following an ACL injury, participants will probably undergo months of rehabilitation and recovery before they can return-to-sport. According to Prentice (2007), rehabilitation lasts four to six months but it can take up to two years to

regain pre-injury quadriceps muscle function. In rugby, a typical season only lasts a few months and, therefore, it is not surprising that these athletes perceived ACL injuries to be season-ending and serious: *“I was thinking it’s maybe MCL or PCL you know, nothing serious like an ACL.”* The cyclist realised that his riding season was over: *“I wouldn’t be riding for the rest of the year.”* The present study’s participants aren’t the only athletes with these perceptions as ACL injuries have previously been referred to as season-ending (Udry *et al.*, 1997), serious (Frobell *et al.*, 2010) and possibly career-ending (Siegel *et al.*, 2012).

Sense of loss

Being injured probably means that one can’t participate in sport, especially following an ACL rupture. Immediately following injury, some of the participants reported not being able to travel. This negative appraisal of loss resulted in a negative emotional reaction as one participant reported being more upset about not being able to travel than he was about his injury: *“I was disappointed, because we were flying out the next day to [name of country] and I’d never been to [name of country], so I was looking forward to travelling with the team and playing there. I think I was more upset about not going to [name of country] than being injured.”*

Perceived benefits of injury

Some of the athletes perceived the injury as a challenge that motivated them to work harder: *“You want to do the rehab to the best of your ability and come back better than you’ve been before so it’s a good motivation.”* Adversity might challenge one in such a way that you learn certain things about yourself and are able to achieve personal growth: *“it’s a good challenge as well to see where I’m at, you know, not just as [name of participant] the rugby player but [name of participant] off the field as well, so it’s good I’m enjoying my time as well so it’s...it’s good.”* Probably the most obvious benefit reported was time, time for themselves and time to study: *“I’ve just taken the positive out of it which mean I’ll be able to study again.”*

Adversity has many negative consequences but some individuals do experience positive outcomes and these include gaining perspective, improved performance, gaining a better understanding, expression and control of one's emotions, increased knowledge of anatomy and risk factors of injury occurrence, an improved social network and perception of social support and a better understanding of proper nutrition (Podlog & Eklund, 2006; Udry *et al.*, 1997; Wadey *et al.*, 2011). In a study by Tracey (2003), participants reported that they were able to learn from adversity, gain knowledge, increase motivation levels and improve their ability to overcome physical and psychological challenges. Udry *et al.* (1997) reported that positive growth is possible following injury and includes personal growth, increased mental toughness and physical progression. Participants in the present study reported some of the above mentioned benefits but also reported benefits not mentioned in the literature.

Responses to injury

Participants were asked to report their feelings, thoughts and behaviours associated with the day of injury. According to Wiese-Bjornstal *et al.* (1998), an individual's cognitive appraisal of the injury situation will subsequently lead to emotional and behavioural responses.

Emotional responses

Depending on the cognitive appraisal, emotional responses will either be facilitative or debilitating. Although this was probably a very difficult point in time, participants did report some facilitative responses. These included being excited: *"I was very, like, excited to find out what's really going on, because it was over a weekend so I had to wait all weekend"*, hopeful for a good outcome: *"...hoping that I would get some good news from the scans as well and that, you know, that nothing serious was wrong and that maybe I thought if it is anything I would miss a couple of weeks of training"* and having a positive outlook: *"I was still very positive."*

According to Clement *et al.* (2015), participants will appraise an injury as negative and in turn experience negative emotions. The present study's responses were

mostly debilitating in nature. Some athletes were confused: *"I was confused. I did not know what to expect."* Most participants reported feeling disappointed, depressed and disheartened as reported by the cyclist: *"...disappointed for the rest of the day and I just kept thinking the whole time well...gonna have to have surgery...I'm gonna have to have this...that. I wasn't too worried about the surgery but more that fact of that I wouldn't be able to ride for a long time and it will be a long...long way back to recovery and that sort of thing... I mean I would call it quite a tragedy in a way um yes you get quite depressed like when you think back to what could have been and how one little moment can define the rest of your year or even your career. It's quite...quite a big thing to process...very bleak about it...I mean...you just...you get into a really dark space and you just think wow what am I missing and its ja...its quite disheartening."* Sadness also emerged: *"...at the moment after it I was pretty much, if I had to say, sad....as I didn't know what to expect."*

According to the grief cycle developed by Kübler-Ross (1969), the first stage of grief is denial. Denial emerged following injury: *"I was...was in denial and I thought no, it's not so bad and it's three months and then I'm back... I didn't think it was an ACL."* This related to some of the participants having problems accepting reality: *"...it was a bit weird and tough to accept when I heard the news."* Fear of the unknown was reported as participants did not know what to expect going forward: *"I was pretty scared, because I didn't really know if I would play rugby again and how big the um operation would be."* Frustration emerged on the day of injury as reported by the following rugby player: *"...misses uh their work or something that they love you know, and you got to sit on the side-lines for nine months you know it's challenging, it's definitely frustrating at times."* Negative feelings emerged: *"I don't think that I have ever been so negative...I was very negative."* Tracey (2003) also reported emotions like depression, denial and frustration following injury. Some of the student participants reported stress related to academics: *"...the academics also made me stress a bit, because I still had a lot of stuff to hand..."*

hand in” and towards the unknown: “...you stress about what’s going on and you don’t know what to expect and you wonder about all those things.”

Behavioural responses

Being able to draw from past experiences may provide athletes with the necessary tools to understand what to do and what to expect going forward. Some participants referred to previous rehabilitation experiences. A positive previous rehabilitation experience seemed to motivate them and helped them to maintain a positive outlook: *“I recovered so quickly back then, I’ve got a feeling that I will recover just as quickly this time around and yes, I should be careful not to push myself too far.”* This is in line with Carson and Polman (2012) who stated that post-injury responses are often influenced by previous injury experiences and having had a positive previous experience probably mediates the emotions experienced in reaction to a new injury. Injury, especially injuries that involve the lower extremities, might be quite disabling as one relies on being able to walk to perform a range of daily activities. Athletes were forced to make lifestyle adjustments: *“I’m not gonna be able to ride for a long time. I’m used to riding six days a week so it’s a big...big lifestyle adjustment for me.”*

Coping strategies

According to Lazarus and Folkman (1984), coping is defined as “constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (p. 141). Different types of coping strategies exist. Avoidance-orientated coping emerged on the day of the injury as one participant reported removing himself from the situation in order to protect his sense of self: *“I went to study for a bit um I think just to get away from the rugby and I think that’s also what I’m doing now, in a way, just to break away. I don’t watch rugby that often anymore, I’m not around the guys that much.”* In a study by Carson and Polman (2008) on professional rugby players, they concluded that avoidance coping may have protective short term, as well as long term emotional effects.

Types of social support

The role of social support in the injury rehabilitation process is not a new concept and is included in models like the Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process (Wiese-Bjornstal, 1998) and the biopsychosocial model (Brewer *et al.*, 2002). Bianco and Eklund (2001) refer to social support as “social interactions aimed at inducing positive outcomes” (p. 85). According to Clement *et al.* (2015), social support from medical professionals, coaches and teammates play an important role in the recovery process. Social support emerged as a superordinate theme with three types of social support listed as themes and these include tangible, informational and emotional support.

According to Hardy and Grace (1993), tangible support refers to material and personal assistance. Tangible support was probably the first source of support immediately following injury as medical professionals rushed to the field to provide medical services. The doctor examined the injured knee and/or the physiotherapist tested knee function. Following injury, tangible support was provided through physical assistance offered by teammates, friends and family. This included physically helping the injured get around or assistance with physical tasks such as walking, cooking, showering etc.: *“I called my parents and they came around and sort of looked after me for the rest of the evening and sort of helped me. Obviously, I needed to shower and go eat and whatever so they helped me through that.”* Another participant reported receiving help from his teammates: *“I drove with one of the teammates and he carried me into the room.”*

Informational support was the second type of social support offered on the day of the injury as medical professionals gave feedback following the knee examination and made an initial diagnosis. According to Cutrona and Russell (1990), informational support involves offering guidance and advice. Advice was given on what to do the rest of the day as to protect the knee as much as possible: *“I think the...the doc was very relaxed. I think because he was so relaxed, I think he made me reali... or he made me feel that it wasn't anything serious that maybe it was just you know like a tear or something simple like my MCL or PCL you know so um but*

with the...with the instant swelling he said we just... I need to ice it and then um go for scans the next day. So yes, I think the way they handled it made me feel very comfortable and relaxed and that I didn't think it was too serious at the time." This extract also serves as an example of receiving emotional support.

Emotional support is offered in listening, comforting and challenging individuals emotionally (Hardy & Grace, 1993). Emotional support was offered by teammates, friends and family as well as medical professionals who motivated and comforted the injured. Some participants reported companionship: *"I've got a lot of...lot of good friends that...that helped me through it and they would keep me company and I don't know just lighten the mood whenever I was feeling down."* Emotional support helps athletes deal with debilitating emotions following injury (Rees & Hardy, 2000).

Medical professionals (i.e., doctor, physiotherapist) played a major role in providing emotional, informational and tangible support during this phase and according to Yang *et al.* (2010), injured athletes seem to prefer receiving support from medical professionals opposed to family, friends and teammates. In line with the present study, Gray (2009) found that doctors typically provide support on the day of injury and during the inflammatory phase (i.e., first five days post-injury). Physiotherapists were reported to provide support from the day of injury up to the remodelling phase (i.e., 6-12 months).

Reconstruction – Pre- and post-surgery

Themes related to the ACLR surgery experience emerged during the week prior to, as well as the first week post-surgery. Therefore, themes from interviews two and three are reported and discussed below. The second interview gathered data from the first day post-injury up to undergoing ACLR surgery while the third interview gathered data of the surgery itself as well as the first week post-surgery. All interviews were done retrospectively as none of the participants had been recruited prior to this phase. A total of five superordinate themes emerged, each with their own themes, subthemes and categories of codes. Although the superordinate

themes remained the same as on the day of injury, new themes emerged. Each superordinate theme will now be discussed, with special focus on the new themes that emerged.

Table 4.2: Master table of emergent themes: Post-injury and preoperative

Superordinate themes	Themes	Sub-themes	Categories of codes	
Establishing identity	Athletic identity	Career Development	<i>Successful career</i>	
			Career has not been without its challenges	
	Personal identity	Beliefs and attributions	<i>The role of faith</i>	
Cognitive appraisal – post-injury and pre-surgery	The diagnosis	<i>Diagnosis confirmed</i>		
		<i>Wrong initial diagnosis</i>		
		<i>Questions diagnosis</i>		
		<i>Seeks second opinion</i>		
		<i>Accepts diagnosis</i>		
		<i>Negative perceptions about doctor</i>	<i>Negative public perception</i>	
	Self-reported symptoms and knee function		Pain	
			Stiffness	
			<i>Uncomfortable feeling</i>	
			<i>Poor knee function</i>	
			<i>No pain</i>	
	Rehabilitation and recovery	Timeline		<i>Out for 6-9 months</i>
				<i>Out for the rest of the year</i>
		Positive appraisals		<i>Motivated to do rehabilitation and succeed</i>
				<i>Self-evaluation- strong belief in own value</i>
		Negative appraisals		<i>“Out again”</i>
				<i>The negative effect of informational support</i>

Cognitive appraisal – post-injury and pre-surgery (continued)	<i>Rehabilitation and recovery (continued)</i>	<i>Negative appraisals (continued)</i>	ACL injuries are season-ending and serious	
			Still not perceived as a “typical” ACL injury	
	Sense of loss		<i>Social</i>	<i>Going out with friends</i>
			<i>Sport</i>	<i>Opportunity to play in upcoming tournaments</i>
			<i>Travel</i>	<i>To compete internationally</i>
	Perceived benefits of injury		Motivation/ challenge	
			Time for self	
	<i>The upcoming surgery</i>		<i>First major surgery</i>	
			<i>Confidence in surgeon’s abilities</i>	
	Responses post-injury and pre-surgery	Emotional responses	Facilitative reactions	<i>Accepts situation</i>
<i>Appreciates social support</i>				
Excited about the future				
<i>Happy</i>				
Hopeful for a good outcome				
Positive attitude				
<i>Relaxed/ at ease following feedback from doctor/ relief</i>				
<i>Neutral reactions</i>			<i>Describes mood as neutral – not positive or negative</i>	
Debilitative reactions			Denial/ disbelief	
			Disappointed/ Sad/ disheartened/ low spirited	
			<i>Fear of Surgery</i>	
			Fear of Unknown	
			<i>Hopeless</i>	
			Negative	
			<i>Nervous about upcoming surgery</i>	
			Problems with accepting reality	
			<i>Shocked following diagnosis</i>	
			Stress/worry caused by uncertainty	

Responses post-injury and pre-surgery (continued)	Behavioural responses	<i>Acting confident in a difficult situation</i>	
		Draws from previous experiences	
		<i>Dwells on the injury</i>	
		<i>Questions adversity</i>	
		Lifestyle adjustments	
		<i>Pushes on through injury</i>	
		Seeks reassurance/ social support	<i>Second opinion</i> <i>Informational support</i>
Coping strategies	Approach-orientated coping	<i>Accept reality and move on</i>	
		<i>Positive self-talk</i>	
		<i>Use of social support</i>	
	Avoidance-orientated coping	Avoiding or withdrawing oneself from a situation	
		<i>Keep busy by doing something that you enjoy</i>	
Types of social support	Informational support	Feedback and advice from medical professionals	Diagnosis confirmed by doctor Doctor explains surgical procedure Reassurance from physiotherapist / doctor
		<i>Advice from family</i>	
		<i>Advice from experienced players who previously injured their ACL</i>	
		<i>Information from internet</i>	

Types of social support (continued)	Tangible support	Services provided by medical professionals	Doctor examines knee
			Physiotherapist straps injured knee
		Physical assistance	From friends/ family/ teammates
	Emotional support	Motivation and support	Support from friends, family and teammates
			Support from medical professionals
		Companionship from friends/ family	

Table 4.3: Master table of emergent themes: Postoperative (phase 1)

Superordinate themes	Themes	Sub-themes	Categories of codes
Establishing identity	Personal identity	Beliefs and attributions	The role of faith
		Sense of self	A self, separate from sport
			Personality type: <i>Independent</i>
Cognitive appraisal	<i>The surgery</i>	<i>Reality sets in</i>	
		<i>“Awake” during surgery – regional anaesthesia</i>	
		<i>Confidence in doctor’s abilities</i>	
		<i>Positive experience with medical personnel</i>	
		<i>Disabling effect of ACLR surgery</i>	
	Self-reported symptoms and knee function	Pain	
		<i>Headache</i>	
		<i>Drowsy/ sleepy</i>	

Cognitive appraisal (continued)	Self-reported symptoms and knee function (continued)	No pain	
		Uncomfortable feeling	
		Poor knee function	Weak muscles
			Limited movement
		Sensitive	
		Swelling	
	Rehabilitation and recovery	Positive appraisals	Motivated to do rehabilitation and succeed
			<i>If at first you don't succeed, try again</i>
			<i>Good relationship with coach</i>
			<i>Feels good to be allowed to move again</i>
		Negative appraisals	<i>Failure to return-to-sport could end career</i>
			<i>The disabling nature of ACL injuries</i>
			<i>Hates crutches</i>
			<i>Rehabilitation is challenging</i>
			<i>Rehabilitation is boring</i>
	Sense of loss	Social	Going out with friends
		Sport	Game time
		<i>Loss of independence</i>	
Perceived benefits of injury	Motivation/challenge		
	Time for self		
Responses – first week post-surgery	Emotional responses	Facilitative reactions	Excited about the future
			Hopeful for a good outcome
			<i>Feels confident post-surgery</i>

Responses – first week post-surgery (continued)	Emotional responses (continued)	Facilitative reactions (continued)	Relaxed/ at ease/ relieved after feedback from doctor
			Happy Positive
			Accepts situation/ <i>outcome</i>
			Appreciates social support
			<i>Motivated to be successful</i>
		Neutral reactions	Positive and negative feelings
		Debilitative reactions	Fear of surgery
			Nervous/ uneasy
			<i>Fear of surgical outcome</i>
			Stressed/ worried about <i>surgical outcome</i>
			<i>Distressed about bladder function post-surgery</i>
	<i>Feels useless</i>		
	Frustration		
Depressed/ low spirited/ sad			
Behavioural responses	Draws from previous experiences		
	Seeks reassurance/ social support		
Coping strategies	Approach-orientated coping	Accept reality and move on	
		Use of social support	

Coping strategies (continued)	Avoidance-orientated coping	Avoiding or withdrawing oneself from a situation	
Types of social support	Emotional support	Companionship from friends and family	
		Motivation and support	Support from friends, family and teammates
			Support from medical professionals
			<i>Support from coach</i>
			<i>Well wishes from player who previously injured his ACL</i>
	Informational support	Feedback and advice from medical professionals	<i>Doctor explains what had happened during surgery</i>
			<i>Doctor gives advice and explains what to expect and do post-surgery</i>
			<i>Physiotherapist gives advice on knee movement and explains exercises.</i>
		Advice from family	
	Tangible support	Services provided by medical professionals	<i>Doctor performs surgery</i>
<i>Nurse attends to patient</i>			
		Physiotherapist treats injured knee	
	Physical assistance	Friends and family	

Establishing identity

References to both athletic and personal identity were made during this period. Both types of identity played a role in defining each participant's sense of self.

Athletic identity

Although the participants spoke less about their athletic identity in the time period prior to surgery, career development still emerged as a sub-theme. One participant referred to his career and having achieved the level of success that he wanted to for the year. Therefore, he seemed less worried about the injury, rehabilitation and recovery process and decided to take it easy, undergo ACLR surgery and try to do better next season: *“I thought that I have already played under 21 [tournament name] last year and this year I felt um that it’s basically the same. I have already achieved that level, you know, so the next level is to be ready for next year’s [tournament name] um so I have to... my idea was to rather be ready for February instead of, you know, to keep on struggling.”*

Prior to undergoing ACLR surgery, another professional sportsman reported that his career had not been without challenges: *“...there have been difficult times in my career... I didn’t play well.”* Not all athletes achieve successful careers without experiencing some type of adversity. In a study by Brewer *et al.* (1999), a reduction in athletic identity was seen in reaction to performance difficulties. It was suggested that reducing athletic identity might be a form of self-defence in order to remain positive following athletic adversity. Following ACLR surgery, none of the participants referred to their athletic identities. One possible explanation could be that they were more focused on the pain and physical disability following surgery and less focused on sports related thoughts.

Personal identity

Participants referred to certain beliefs and attributions both prior to and following surgery. Evidence of faith emerged as some participants mentioned their beliefs and attributed certain outcomes to a higher power. According to Storch *et al.* (2004), athletes tend to report higher levels of faith compared to non-athletes. Athletes seemed to rely on their faith to cope with adversity. This participant probably felt like he had no control over the situation and relied on his faith: *“...so I was well, chilled, put everything in the hands of the Lord and see what happens.”* Following surgery, one participant thanked a higher power in appreciation of a

successful outcome: *"I gave all glory to the Lord that it was such a success."* Storch and Farber (2002) noted that athletes who experience career-ending injuries are able to adapt better following injury if they believe that the outcome is controlled by a higher power. For each of these participants, their ACL injury threatened their career and, therefore, it is not surprising that some of them found comfort in their faith. Athletes possibly rely on faith to cope with injury and to provide them with a sense of security (Hoffman, 1992).

Following ACLR surgery, this rugby player separated his personal identity from his athletic identity: *"...we get so caught up in being rugby players we forget what it's like to be just a normal 23 year old guy, you know, living in [name of city], you know, you just so caught up in being a rugby player and playing for the [name of provincial team], whatever, you don't see what's happening on the other side of us."* Separating yourself from your athletic identity results in a decreased athletic identity and as mentioned before, could be a type of self-defence mechanism to help maintain a positive self-image (Brewer *et al.*, 1999). Another participant reported a sense of self as he perceived himself as an independent individual: *"I'm an only child so I'm very independent and I like doing things for myself."* Tjong *et al.* (2013) reported that personality along with fear and priority have the greatest influence on athletes when deciding whether or not they will return-to-sport following successful ACLR surgery. Personal identity was perceived to be the only type of identity that emerged during the first week post-surgery. This possibly suggest that athletes are more focused on themselves during this time period and less focused on their sport.

Cognitive appraisal pre- and post-surgery

The diagnosis

According to Clement *et al.* (2015), the diagnosis could potentially cause a change in an individual's cognitive appraisal if the confirmed diagnosis is different to what the individual expected or hoped for. The appraisal of the diagnosis is subject to the individual's perception of the diagnosis. In this study, the diagnosis was mostly appraised as negative as the reality of a ruptured ACL was confirmed: *"...he did*

one thing with my knee and he said uh can you feel that and I said yes it feels a bit weird and he did it with my left leg and nothing was happening and he said yes...that shows that your ACL, you know, is torn”, but not all participants experienced the diagnosis in the same way as the following participant initially received the wrong diagnosis: “...they only found the tear in the meniscus, because they couldn’t see the ACL on the... on the sonar and stuff and x-rays... I also had x-rays taken and both showed that it was just... just the meniscus um so yes and I went with that.”

Another sub-theme emerged as one participant questioned the diagnosis: “...when I asked those questions about why I could still walk fine, why could I still walk upstairs and downstairs with no pain or get out of my car easily, you know, things like that... the answers he was giving me wasn't really... it was going in one ear and out the other” and then decided to seek a second opinion: “...they were actually gonna have me in theatre the next day which would have been the Friday, but um I said I...I said no, I first want to get a second opinion.” After receiving the same diagnosis twice, he realised that he had to accept the diagnosis: “...he looked at my knee and obviously said the same thing [name of doctor] said which wasn't nice to hear the second time around.”

One participant received negative information about the doctor but still trusted him and chose to ignore this information: “I think it's a good doctor, um, but before the time many people talked negative about the doctor, but I did not let it bother me and like I just went to him and like the way he treated me was good and like I was, like I was very positive and I did not let it bother me.” Another participant formed his own negative perceptions about the doctor as he perceived him as being absent, too busy and unprofessional: “...he was never there... he is a very busy doctor... I actually found it unprofessional.”

The surgery

During the period prior to surgery, participants had certain perceptions about the upcoming surgery. Surgery can be a frightening experience, especially if it's an

individual's first major surgery as reported by the following athlete: "...very nervous, not scared really, but just nervous, because I had never had such a major injury." All of the participants had confidence in their surgeon's abilities and this seemed to have put the following participant's mind at ease: "...everyone said he's...he's good and he knows what he's doing, he is the best in the business and that sort of thing and it helped to know that he did [name of professional rugby player]'s knee as well so I...I believed that I was in good hands." Reality set in as this participant was taken to theatre to have his ACLR surgery: "...because now it's really...it's time... I've got to go in to the operation room and have my knee worked on."

Most participants received local anaesthesia but some of them received regional anaesthesia and reported being "awake" during surgery: "They just paralyzed me halfway down so I was awake." Being under regional anaesthesia meant that these participants could watch the surgeon whilst he was performing the surgery. One participant perceived the surgeon to be competent and had confidence in his abilities to perform the surgery: "...it puts you at ease when you see how confident he works. You can see he knows what he is doing." Not only were they able to observe the surgeon but this participant reported having a positive experience with the medical personnel: "...very positive. They worked together well." Following surgery, participants found it hard to move and noticed the disabling effect of undergoing ACLR surgery: "I can't do many movements and I need help to go to the toilet and all those things like to wash myself and so on." Another participant reported: "I couldn't just lift my leg up, like I couldn't do it and I couldn't get my leg off the bed."

Self-reported symptoms and knee function

During the post-injury and pre-surgery period, participants reported pain, stiffness and feeling uncomfortable. One participant reported: "...it was uncomfortable, you know, when I crouched down or anything like that" and another remained positive: "...the pain and stiffness will pass." Poor knee function was reported as the following participant noted hopping around and having to use crutches: "I had to

just hop around I guess and by that stage I had crutches so I was just walking around with the crutches.” As reported on the day of injury, some participants did not perceive their injury as a “typical” ACL injury and these participants also reported feeling no pain during the post-injury and pre-surgery time period: *“Feeling no pain was probably the biggest um obstacle for me.”*

The most symptoms were reported following ACLR surgery. Participants reported pain and feeling drowsy or sleepy: *“...it was unbelievably sore and uh then I thought okay it’s... I didn’t feel well um had bit of a headache, um a bit drowsy.”* This specific participant was the only one to mention a headache. The participants who reported no pain, were all on pain medication and once the medication started to wear off one of them reported that *“...it was getting really uncomfortable.”* Participants were given exercises to do in hospital and poor knee function was noted by the following participant: *“...when I started with the exercises there was nothing, like I couldn’t... I couldn’t believe how weak I was like my muscles were nothing.”* After being discharged from the hospital, one of the rugby players reported the following: *“...afterward, was quite difficult um especially to contract my quads and stuff, because I didn’t...understand, my knee was still very sore.”* Later during that week, one participant mentioned that *“...it was still relatively sensitive”* and another noted swelling: *“...if I sat on the floor for a long time it started to swell again.”*

Rehabilitation and recovery

Following injury, participants had different perceptions about the timeline needed to recover. During this period, the diagnosis was confirmed and participants were given an indication of the time needed to recover. Participants had different perceptions about the timeline associated with return-to-sport but most reported a time somewhere between six to nine months: *“about six months”*; *“seven to eight months”*; *“six to nine months”* and *“out for nine months.”* Athletes who perceive a long timeline following injury tend to foster negative cognitive appraisals (Clement *et al.*, 2015). The following participant did not report a specific time, but realised that he would be out for the rest of the year: *“I wasn’t going to be able to play rugby*

again for the rest of the year.” Siegel *et al.* (2012) reported that ACL injured individuals usually do not return-to-sport earlier than six months following ACLR surgery. In a study by Middleton *et al.* (2014), most ACL injured individuals returned to sport within six to 12 months. Clement *et al.* (2015) noted that injury severity and timeline has a direct influence on participants’ cognitive appraisals.

Although the time prior to and post-surgery is probably a very difficult period, participants were able to foster some positive appraisals. As the surgery approached, this participant reported feeling motivated to do rehabilitation and succeed: *“I knew it was going to happen so I was almost excited to... to get it over with and get back on my feet again to start... start working towards getting... getting up to full strength again.”*

Another participant conveys a strong belief in his own value: *“I feel good about myself, I believe that I've got a good few years of rugby in me. I'm still young.”* None of the participants in the present study did any pre-rehabilitation and, therefore, these appraisals related to their appraisals of the upcoming postoperative rehabilitation period. Following surgery, participants seemed motivated to start with the rehabilitation exercises: *“...since the first week I just wanted to strengthen my knee as quickly as possible, start exercising and start rehab as quickly as... you know do exercises, um strengthening exercises, and yes um walk better and start to run.”*

Motivation encouraged participants as one reported the following when speaking about his rehabilitation exercises: *“...try again. If you don't succeed the first time, then you have to go on and try again.”* Early during the first week post-surgery, one participant reported having a good relationship with his coach: *“...the coach phoned me on the Thursday to ask me and said it's just bad luck and asked who he has to put on 10 and asked my input and all of that stuff.”*

According to Podlog and Eklund (2007), maintaining a good coach-player relationship could prevent feelings of isolation and exclusion. At the end of the week, this participant visited the doctor and he was told that he was allowed to

start moving again: *"...went to the doctor again and he said everything is fine and that I can start with rehab after a week or two or whatever um then it was just small movements but even that was something big for me, because I could do something again so yes that was nice."* Regaining some sense of normal physical activity resulted in a more positive appraisal of the situation.

Not all appraisals were positive and a few negative appraisals emerged prior to surgery. This participant mentioned that he had recently come back from an injury: *"I just thought...what now, what will I do next? I mean, I was just out for six...seven weeks and now I'm going to be out again. All I want to do is just play."* One participant decided to read up on ACL injuries and seeking this informational support had a negative effect on him: *"...reading about it and reading how guys were sort of never the same or they lack this or they lacked that when they come back, there was no spark in their game and that sort of thing. Obviously, that had a...a bit of a...a bit of a negative effect on where my head was."*

Participants still had certain perceptions about the nature of ACL injuries and as on the day of injury, they perceived ACL injuries to be season-ending: *"...the only thing that was going through my mind was that I've now torn my ACL and I wasn't going to be able to play rugby again for the rest of the year."* ACL injuries were perceived as serious and, for some, their injury did not fit the profile of a "typical" ACL injury: *"...what I've heard and seen from ACL injuries it was in...in those cases with the...the...the injury looked way more severe than...than how mine happened and how I was feeling at the time and obviously I think, because it's such a major injury and it's a pretty big deal as...as a sportsman."*

These perceptions are consistent with Read *et al.* (2017) who stated that ACL injuries, especially when experienced by competitive athletes, are season-ending and require surgical intervention. Post-surgery, one participant realised that failure to return-to-sport could end his career: *"...there was a time when I thought well if I can't play again then...what will I do?."* Following ACLR surgery participants experienced the disabling nature of these injuries: *"...you lie on the couch with your*

knees up and...and the remote is on the table. As your lying there you think that you don't want to watch this anymore but it's too much of a mission. So small stuff like that um I didn't make food but just warming it up and carrying it to the couch or um small stuff that you won't think about was yes, a mission."

One participant expressed hateful thoughts after appraising the negative effect of being on crutches: *"I hated being on the crutches um, you know, again like I would wanna go out or wanna get up from the couch and, you know, go to the bathroom, but then I have to get my crutches and walk and then, you know, like getting... getting in to the shower was...it took me about twenty minutes to get into the shower and I was in there for three minutes so, you know, just the crutches for me was... yes, I hated being on the crutches."* The limiting and disabling nature of being on crutches definitely evoked feelings of anger for this athlete. Competing at a professional level requires athletes to maintain a certain level of physical fitness and, therefore, it is not surprising that this athlete reported feeling angry and frustrated when physically restricted.

Participants were given small exercises to do in hospital and at home. These rehabilitation exercises were perceived as challenging: *"...to think about how such small things could be so difficult, but at least I understood that this is the process that I need to move through so yes, the first while was a bit tough."* Rehabilitation and recovery was also referred to as a long and boring journey: *"I knew it was going to be long and quite boring."*

Sense of loss

Loss emerged both pre- and post-surgery. Peretz (1970) identified four types of loss; loss of a loved or valued individual, loss of self, loss of external objects or possessions and developmental loss. Immediately following the injury, their impaired physical state probably hindered participants from socialising. Being sidelined following injury meant that athletes did not get to spend as much time with their teammates as before: *"...we obviously have a...a team WhatsApp group and there were pictures being posted on the group or guys, you know, saying were*

going for coffee here whatever, whatever and you know it was... I tried very hard not to... to participate in that or look...even look at the pictures or whatever, because I wanted to be there so badly."

In the first week post-surgery, this participant realised that the disabling nature of the ACL injury would prevent him from socializing with friends: *"...couldn't drive or couldn't go anywhere, you know, and they were telling me about all the places they... or the parties they gonna go to and uh send me pictures and that sort of thing... when they there and when they're out or whatever and they sending me messages, you know, it's so good here and wish you could be here or something like that, you know, obviously I'm like I wanna be there, I wanna be with my friends and that sort of thing."*

Lost sport opportunities also emerged: *"Then everything went through my mind I think I might miss out on a chance to play at a higher level understand I played four [name of tournament] games so I was looking forward to playing [name of tournament] again. I'm missing out on the rest of the [name of tournament] season, I'm missing out on [name of international sporting event], I'm even missing out on the rugby for the year. So yes, all of those thoughts went through my mind."* This participant expressed sadness as he reported missing out on game time: *"It's sad to watch uh like in the week I was still fine, three days ago, and now the guys are playing without me, but yes it's something that you have to get over."*

During the first week post-injury, the cyclist referred to a lost travel opportunity: *"I just saw the overseas trips that I have planned just disappearing out the window and that was just the hardest thing for me to...to process, because other than that you can sort of deal with missing races through... well... within the country, but an overseas trip is always exciting and its always special so that was... that was the worst part for me I think."* Following ACLR surgery, you are forced to rely on others to perform normal daily activities and this resulted in a loss of independence for some: *"It was very difficult, because my mother had to help me with everything and had to help me get dressed um and help me to wash and yes, made me food and*

basically I couldn't do anything...it was an adjustment but with time I got used to my mother...almost treating me like a baby."

Being independent is a part of this participant's identity and, therefore, losing independence related to a loss of self. Peretz (1970) described this type of loss as losing some part of the self.

Perceived benefits of injury

Participants' appraisals leading up to and following injury gave rise to two perceived benefits of injury. These benefits were consistent with those reported on the day of injury. The following participant perceived injury as a source of motivation and a challenge to overcome: *"...stay positive and take this challenge on, you know, work harder to come back bigger, faster and stronger and you know that's exactly what I've been doing."* Motivation as a benefit was also reported during the first week following surgery: *"...it motivated me to do it better and stronger because I want to, you know, recover so um that made me... made me negative but also motivated me to do it better."*

Following injury, an individual is unable to train, participate in any sports related activities and is most probably forced to spend more time at home whilst recovering. Being a professional athlete who invests long hours in achieving success, a sudden inability to exercise resulted in having more time available. How this time is used will depend on the individual, but during this time period participants reported using this time to focus on themselves: *"I thought okay you're out for the year so enjoy your off time."* Another participant reported: *"You don't see what's happening on the other side of us so for me, you know, it's... it's been nice to get away as well."*

Responses captured pre- and post-surgery

Emotional responses

Emotional responses emerged as being facilitative, neutral or debilitating. It was difficult to separate the emotions experienced as they emerged as a mixed set of positive and negative responses pre-surgery. Following diagnosis, acceptance

frequently emerged. After hearing his diagnosis from the team doctor and two surgeons, this participant accepted the outcome: *“I think I accepted the third time better, but yes it was obviously still tough... tough to accept.”* Another participant reported acceptance along with positive emotions: *“I’d gotten over the fact that I wasn’t going to do what I wanted to do for the rest of the year and it was going to be a big and long way back to... back to full strength again and I guess I just accepted it for what is was and tried to think positively the whole time and remain positive and that’s what I did and it seems to be working.”*

Acceptance wasn’t easy for all of the participants: *“I think just accepting it, you know, anyone or...or...or anyone would want to go for a second opinion and um yes I...I just thought it was worth a...a shot.”* The last part of the extract, *“...it was worth a shot”*, emerges as a facilitative reaction as the participant remained hopeful for a good outcome. As mentioned during the first interview, one player had a dream of one day being able to play for the national team so it is not surprising that he reported appreciation for the social support received from an older and more experienced professional rugby player: *“[name of rugby player] gave me a call and said he did his ACL as well and he is still playing now and he’s 33 years old so you know that for me was a big deal and especially a guy like him calling me, you know and wishing me well... it was a big deal.”*

Proper feedback from medical professionals made this participant feel more at ease: *“...he explained to me what was going on and that made me feel much more at ease about the situation.”* The following extract contains a range of facilitative reactions such as being excited, hopeful and positive as well as debilitating responses like being negative, nervous and low-spirited: *“Like, I was very negative um, but also very excited to...that weekend I was very excited to find out what the doctor will say and I hoped that it won’t be serious so I was very, if I had to say, nervous too and afterwards, on Monday, when I found out that I was going for the operation, I was down, but I still tried to talk myself positive... I was very positive before the operation.”*

A wide range of debilitating reactions were reported as participants were forced to deal with the confirmed diagnosis and the upcoming surgery. Following the injury and diagnosis, disbelief and denial emerged: *"...couldn't believe it you know, obviously everything else I was doing was fine and my knee wasn't feeling too bad so I didn't think it was too serious"* and another reported: *"I was still very much in denial, uh, I couldn't believe I'm going to be out for nine months, um, I had the scan and that confirmed everything so there was a lot of denial."* The reality of a ruptured ACL evoked disappointment and sadness: *"...deep down I was really gutted and disappointed."*

One participant reported feeling disheartened: *"I would say like not depressed, but just like disheartened in a way"*, while another experienced shock and negative feelings: *"...when he told me about the ACL...just very shocked and ten to one very negative so, um, yes I was very...very upset when he told me."* Feelings of hopelessness emerged following the negative news: *"I didn't really have hope."*

Reality started to sink in as the following participant received messages of support: *"...it was really tough that...that we getting, you know, all the bad news and whatever and even more so when it was out in the news, you know, everyone sending you messages it's just...yes, it wasn't...I was...I didn't really tell anyone besides my family and close friends, you know, so for it then to be out in the news and everyone sending me messages... I think that's when it really hit me that this is something serious and yes, I think I wasn't...wasn't doing so well in that week leading up to the operation."* After hearing negative comments from his friends, this participant reported fear towards the surgery and the unknown: *"I was really afraid of the surgery, because it would be my first major surgery um, and I did not really know what to expect and like and some of the guys who have had their ACL and so on operated had, if I had to say, they made me more scared, because they said that the pain is very bad afterwards."*

This participant described being nervous about the upcoming surgery: *"...very nervous, not scared really but just nervous, because I had never had such a major*

injury.” Another participant reported feeling nervous, positive and happy at the same time: *“I was nervous obviously um, but I knew if it...but it was just my ACL so it’s not a meniscus or a MCL or PCL as well. I was quite positive that it would be a good operation and it was so yes. I’m happy.”*

Following surgery the cyclist reported the following emotions when asked about the surgery: *“I was actually quite excited. I mean I have never... never been through this before... I’ve never had surgery so I was excited to... to see what was all going to happen. I... I was excited for afterwards where I could start the whole healing process, because up until then you can’t start doing anything before the surgery.”* Prior to receiving feedback from the doctor, a few participants reported being hopeful for a good outcome; *“hopefully it will be a success.”* A successful surgical outcome gave rise to the following facilitative reactions: *“...he was very positive about the operation and how it went and obviously made me feel very positive and confident as well.”* This participant felt relieved after receiving feedback on the surgical outcome: *“...he just explained me what exactly what had happened and what they did and that sort of thing. Just sort of recapping on what he’d told me before the operation as well um yes, I...I felt much more at ease.”*

According to Carson and Polman (2012), relief is the most prominent facilitative emotion following successful surgery. Shapiro *et al.* (2017) noted resilience (i.e., the athlete’s ability to successfully adapt to adversity) as the most common emotional response following ACLR surgery and also noted that athletes who experience mood disturbances immediately following surgery tend to exhibit a higher level of neuroticism. Soon after the surgery this participant reported feeling happy: *“...at the time I was fine, I was laughing about it or whatever, still, and making jokes.”* Facilitative responses emerged at the end of the first week post-surgery and included accepting the situation or outcome: *“A week after the operation I started to accept that I will no longer be able to do what I used to and that I just need to take it easy and accept it”* and appreciation for social support received: *“Some of my friends popped in as well which was very nice, because obviously it was a Friday night and, you know, all they want to be doing is going out*

clubbing and stuff like that they don't really want to be sitting in hospital so it was nice of them to, to come by and just see how I was doing." Lastly, motivation emerged: *"...it motivated me to do it better and stronger."*

One of the participants who reported receiving regional anaesthesia experienced fear during surgery, but perceived this experience as positive: *"Oh it was... it was scary. You think it's only in the movies where it's so bad, but they work very rough with you so it's something new. It was nice (sic) and at one time I got a fright because of what they were doing."* Immediately post-surgery this participant expressed fear, fear of the surgical outcome: *"I was afraid that it wasn't successful."*

Following surgery and prior to receiving feedback from the doctor, stress and worry emerged: *"Um yes, I was a bit worried that, you know, something had gone wrong or something like that."* Distressed feelings emerged early post-surgery as this participant was recovering from regional anaesthesia: *"...because of my lower body that was paralyzed, so um, I felt a bit distressed, because I could not um I could not go to the bathroom properly or anything like that and yes, so I couldn't use my bladder properly, so yes I was quite distressed and, um uh it bothered me a lot."* Later during that day, one participant reported feeling useless: *"...the whole day I was just... yes, useless I couldn't, I could barely speak to people."*

Towards the end of his hospital stay, this participant reported feeling frustrated: *"I was very frustrated um like I had uh only on the...the Friday... on the Sunday morning they removed one of the things and then I could see my knee and uh obviously a lot of bleeding and big cuts and stuff and then I thought wow its quite... quite wild and um then when I started with the exercises there was nothing like I couldn't... I couldn't believe how weak I was, like my muscles were nothing."*

At the end of the first week post-surgery, another participant reported frustration: *"...first weekend out of the hospital um the [name of provincial team] were playing at [name of stadium] and uh yes, that was tough to watch I...I watched the first half, but then just couldn't, well not that I didn't want to, but it was just frustrating,*

you know, sitting at home with this massive brace on my leg not...not being able to move.” This was perceived as a depressing time: *“...that was uh probably the lowest point in the past three months for me yes, I really just couldn’t watch.”* Uemukai (1993) also noted depression as an emotional response during weeks two to four post-injury. A loss of independence seems to have evoked negative feelings: *“It had a negative effect on me, because like I did, I did most things for myself at that moment. I actually depended on myself and, therefore, it affected me negatively.”* This participant also reported feeling stressed by exams: *“...very stressed, because the exams were close, I had to start studying.”* When asked to describe his mood during the first week post-surgery, one participant mentioned the following: *“...grumpy, probably uh... yes, I had a very short fuse but um yes, I was... I think grumpy is the best word.”*

Neutral reactions were reported pre-surgery: *“...positive and negative. Negative, because I couldn’t do anything for myself and positive, because I couldn’t almost play rugby again even if it was nine months”* as well as post-surgery, prior to receiving feedback from the doctor: *“I was, I don’t know, probably neutral. You can’t be positive during that time and um, because I didn’t know what the results were, the doctor haven’t told me yet so I was well, chilled, put everything in the hands of the Lord and see what happens.”*

Behavioural responses

A bigger variety of behavioural responses were reported compared to the day of injury. This is probably due to the longer time period associated with the second and third interview phases. When faced with adversity, one experiences a range of emotions but does not always want your family or friends to share these feelings and this may result in putting on a brave face to spare others. One participant tried to act confident in a difficult situation: *“...when doctor [name of doctor] said it, I had my dad next to me so I had to put on a brave face, but um no yes, it was still tough to hear.”* Drawing from past experiences might have helped this athlete to cope more effectively: *“...the worst was when I hurt my shoulder, so I knew by now how to handle it, so it wasn’t nice, but I got over it quickly.”*

Participants also reported using past experiences to guide them through early post-operative rehabilitation: *"...it was not that hard after my first surgery, so this time I just said to myself it will come with time, so I'll just hang in there and it was really not nice to see where I am and where I had to start again, but at least it quickly sunk in. Quickly got my head right and told myself you just have to work hard again."* Following the devastating news of an ACL rupture, the following participant found it hard to concentrate and reported dwelling on the injury: *"...when he was talking to me about the X-rays and showing me exactly what happened, I wasn't really paying attention, because the only thing that was going through my mind was that I've now torn my ACL and I wasn't going to be able to play rugby again for the rest of the year, so I wasn't really listening to what he was saying."*

Dwelling on the injury led to this specific individual questioning adversity: *"I was just really not trying to do anything, but think about why it was happening to me and you know after I...I would say I had a pretty good year in 2015 and I was, you know, obviously hoping to go one better and chase my dream of playing for the [national team], you know, so I was in my mind, you know the why me? Why now? You know those sort of thoughts were running through my mind."* ACL injuries affect your physical functioning and, therefore, required a lifestyle adjustment: *"...it was a big... big thing to sort of get used to, um it was different not waking up in the morning and going training or going to the gym or anything so it was a big adjustment."* Before finally rupturing his ACL, one participant reported pushing on through injury: *"I played, my knee was obviously very stiff but I played... I played a half."*

Participants reported seeking social support both pre- and post-surgery. This participant sought a second opinion: *"I first want to get a second opinion"*, whereas another participant sought informational support from the internet, but appraised it as negative: *"...reading about it and reading how guys were sort of never the same or they lack this or they lacked that, when they come back there was no spark in their game and that sort of thing, obviously, that had a...a bit of...a...a bit of a negative effect on where my head was."* Following ACLR surgery, one of the rugby

players reported constantly seeking reassurance: *“I like constantly asked the doctor or the nurses whether the operation was a success.”* According to Clement *et al.* (2015), seeking social support remains present throughout the injury rehabilitation process.

Coping strategies

A wide range of coping strategies were reported during this time period, highlighting the challenging nature of the pre- and post-surgery experience. According to Endler and Parker (2000), two types of coping exists, approach-orientated coping and avoidance-orientated coping. Approach-orientated coping involves proactively trying to cope with a stressful situation, whereas avoidance-orientated coping involves avoiding or withdrawing oneself from a specific situation. Carson and Polman (2010) noted that avoidance coping might play an important role following injury and during the lengthy rehabilitation process.

When asked about coping pre-surgery, one participant reported accepting reality and then moving on: *“I cope well. I like, I feel that if something has to happen then it has to happen um you can’t avoid it so it’s okay.”* This coping strategy also emerged post-surgery: *“...sort of just accepted it. I knew it was only going to get better so there was nothing I could really... really do and there’s no point in being upset about it, because if it’s not going to get better um so I guess the more positive I stayed the better it all got.”* Another participant reported: *“...if I’m going to be negative or positive about the six to nine months that I will be out is up to me and, so eventually I accepted it and then I focused on the next job which is to get my knee as strong as possible.”*

Positive self-talk emerged as a coping strategy: *“...everyone has their, has their own things to cope with and, you know, what I was gonna make out of this was my own story and you know no-one else’s story is gonna match up to mine so yes, I just believe stay positive and just try and keep a positive mind-set, because that’s the only way I’ll...I’ll get through this and you know come out better at it.”* Lastly, the use of social support emerged as one participant reported the following:

“...luckily I had good people around me who always supported me understand so people that have also torn ACL’s and close friends and so on. So they always told me listen this is the processes, understand, trust the processes, and so that’s my principals, understand, I trust the processes and like I’ve told myself I need to take it day by day.” The use of social support also emerged post-surgery: *“I was lying uncomfortably so I asked my nurse to help me lay more comfortable, because at that moment my knee was in a bad position.”* Later on he admitted to needing support: *“...I have to accept that I can’t do a lot of movements and that I need help to go to the toilet and all those things like to wash myself and so on.”*

The following participant reported avoidance as he removed himself from the situation: *“I tried very hard not to...to participate in that or look, even look at the pictures or whatever, because I wanted to be there so badly.”* Avoidance was also mentioned post-surgery: *“...I switched myself off and I pulled myself back. Always chatted to people, I tried to pay as little attention as possible to my knee I couldn’t miss it, because when I looked it was swollen and so on, but I tried to not pay attention and relax and not to think too much about my current situation about what I am missing out on, understand, its, but I just changed my thoughts and thought about something else.”* Another example of avoidance emerged as one participant couldn’t continue watching the game and decided to rather avoid watching the second half: *“...sitting at home with this massive brace on my leg not...not being able to move basically and then watching my mates play at... well at [name of stadium] and so it was...it was tough to watch. I watched the first half and then just, you know, decided not to watch but um yes it was...that...that was uh probably the lowest point in the past three months for me. Yes, I really just couldn’t watch.”*

Sometimes the best way to cope is to keep busy by doing something that you enjoy. This created a pleasant distraction from the harsh reality: *“...sat around played PlayStation. Yes, I think that’s when I... when I was the happiest, you could say, because I consider myself to be a pretty good, uh FIFA player, so playing on the PlayStation, scoring goals, winning games made me a little bit better or made*

me feel a little bit better about myself during that week, but yes, that's honestly all I did."

Types of social support

Different types of social support emerged and included emotional-, informational- and tangible support. The following paragraph contains extracts from the transcript of one participant, in the order as they emerged, and includes evidence of all three types of social support: *"...well he made things easier for me, you know, like if we had to get something from the shop or whatever he would drive and...and things like that, but um in my case I... obviously, I'm lucky that my parents don't live too far so I decided to come home um and then just stay... stay with them, you know, because sometimes my flat mate wouldn't be around and then maybe when I need things or need to do something there is no-one there to help me. So yes, I was very lucky um that I could come home and um spend time at home as well and then my...my...my family was there to help me and make things easier for me... they were very supportive and it's nice to have family around when you in...in a situation like this...I went to doctor [name of doctor] and then he told me that my...my ACL is...is torn off and that I would need to go for surgery...he said to me okay sit on the bed and he did one thing with my knee and he said uh can you feel that and I said yes, it feels a bit weird and he did it with my left leg and nothing was happening and he said yes, that...that sho...or that shows that your ACL, you know, is torn...I had a chat with my dad and he said, you know, these things happen to anyone, happens to the best of us, you know, and all we can do now is stay positive and take this challenge on, you know, work harder to come back bigger, faster and stronger...I had people stopping over at the house, you know, to say sorry and they are thinking of me and that sort of thing...all I was doing was just reading about ACL injuries and, you know, trying to find out how guys cope with it after or, you know, what sort of things help the recovery period and that...that sort of thing...[name of professional rugby player] gave me a call and said he did his ACL as well and he is still playing now and he's 33 years old so you*

know that for me was a big deal and especially a guy like him calling me, you know and wishing me well... it was a big deal."

This extract provides proof of tangible, emotional and informational support prior to undergoing ACLR surgery. Support was provided by his doctor, previously injured players, family and friends. Interestingly, the internet emerged as a source of informational support as he reported reading up on ACL injuries to learn more about the injury, surgery and recovery process. Prior to surgery, this participant reported receiving tangible support from his physiotherapist: *"...our physio um strapped me."* Another participant noted his doctor as a source of emotional support: *"...like a person, he treated me like a person. He asked me how my knee was. Look I felt much more relaxed."*

During surgery, tangible support was provided by the surgeon whilst he operated on the injured knee. Following surgery, the nurses became a source of social support as they looked after the patient's needs: *"I was out of anaesthesia, they gave me painkillers to cope with the pain."* The physiotherapist played an important role during this phase: *"...physio there who just um came in and, and gave me a few exercises to do just while I'm at home... just, you know, telling me how I should, you know, if I'm watching TV, how I should sit with my leg up or, you know, if I'm lying in bed, you know, this sort of thing and yes which exercises I should...should try and do before I go to bed."*

Most participants relied on physical assistance from friends and family following surgery: *"She made me dinner and all things like that um her dad drove me around."* The doctor remained present and played an important role by providing the injured with proper feedback following surgery: *"...he just explained me what exactly had happened and what they did and that sort of thing. Just sort of recapping on what he'd told me before the operation."*

Not only did the doctor explain what had happened during surgery but he also gave advice and explained what to expect and do post-surgery: *"...he explained to me everything, you know, and what to do from now on, and um, what I should do when*

I wanna, you know, sit up or if I wanna, you know, if I'm lying uncomfortable or whatever, you know, I shouldn't try and move my leg too much, I should just be still and that sort of thing, but he was very positive about the operation and how it went and obviously made me feel very positive and confident as well." Following surgery, companionship emerged: *"...two of my friends came by and they basically spend the whole afternoon with me so it was... I was in a much better state."*

According to Cutrona and Russel (1990), emotional support involves seeking comfort and security from others during difficult times. Receiving this comfort allows individuals to feel cared for. This participant mentioned the unwavering support he received from friends: *"...that's what friends are there for, you know, we're there in the good times, there in the bad times."* The medical professionals (doctors and physiotherapists) were perceived as supportive: *"He was very kind and, how can I say, helpful."* One participant reported receiving emotional support from his coach and teammates: *"...the coach phoned me on the Thursday to ask me and said it's just bad luck and asked who he has to put on 10 and asked my input and all of that stuff, um, teammates... yes a few of them phoned me, got a lot of messages, um, messages from people who I didn't think would."*

The same participant also received support in terms of well wishes from players who had previously sustained injuries: *"I got a lot of messages from guys in other teams, you know, just wishing me well and especially guys that had the... a ACL injury before, you know, just saying, you know, take your time, you know, don't rush back whatever just enjoy, enjoy your time away from the game as well, you know."* Robbins and Rosenfield (2001) noted that supportive messages help individuals develop a different perspective when faced with adversity. Not only did these messages offer emotional support, but they helped the individual realise that support was available.

The physiotherapist emerged as a source of social support as he gave advice: *"He was very supportive and he told me that it was a big operation, but we um, I just like need to do all the things that he tells me to do and it will be a success."* Family

remained an important source of informational and emotional support throughout this period: “...with the support I received from my family and everyone it had a positive influence on me and they told me that these things happen but it makes you stronger.”

Rehabilitation

Rehabilitation involves the physical and psychological recovery following surgery up to return-to-sport. The following section reports and discusses themes that emerged during the early, mid and late rehabilitation period. Themes related to the rehabilitation process were captured during interviews four to six. Interview six captured the final-phase rehabilitation as well as return-to-sport. The latter is reported and discussed separately under return-to-sport.

Table 4.4: Master table of emergent themes: Postoperative (phase 2)

Superordinate themes	Themes	Sub-themes	Categories of codes
Establishing identity	Athletic identity	Meaning of sport	Sport is a source of passion
		Professional sportsman	
	Personal identity	Sense of self	A self, separate from sport
			Independent personality
			<i>Impatient Personality</i>
Cognitive appraisal	Rehabilitation and recovery	Self-reported symptoms and knee function	Pain
			No pain
			Poor knee function
			Swelling
	Positive appraisals		Motivated to do rehabilitation and succeed
			<i>Realises the importance of proper rehabilitation</i>
			<i>Individualised rehabilitation</i>

Cognitive appraisal (continued)	Rehabilitation and recovery (continued)	Positive appraisals (continued)	Self-perceived progress
			<i>(Still) part of the team (again)</i>
			<i>Regains independence</i>
			<i>No more crutches</i>
			Self-evaluation – strong belief in own value
			<i>Self-perceived “safe space”</i>
			<i>Confidence in health medical professional’s abilities</i>
			<i>Good relationship with medical professionals</i>
			<i>Realises that rehabilitation involves more than physical</i>
	Negative appraisals	Failure to return-to-sport could end career	
		Rehabilitation/ recovery is boring	
		<i>“I was impatient”</i>	
		<i>Not always as it seems</i>	
<i>Rehabilitation and recovery is a long journey</i>			
Perceived benefits of injury	Motivation		
	Time	Spend time with friends	
	<i>Realise who your true friends are</i>		
Responses – weeks 2 to 6	Emotional responses	Facilitative reactions	Accepts situation/ outcome
			Positive attitude
			Excited
			Appreciates social support
			Happy
			Feels at ease following feedback from medical professionals
			Hopeful about future
			Confident

Responses – weeks 2 to 6 (continued)	Emotional responses (continued)	Debilitative reactions	Feels useless/ hopeless
			Frustration
			Sad/ low spirited
			Stress related to exams
			<i>Fear of re-injury/ new injury</i>
			<i>Fear of first contact</i>
			Fear of the unknown
			<i>Fear of not being able to regain pre-injury level</i>
	Negative outlook		
Behavioural responses	<i>Avoids potential dangerous situations</i>		
Coping strategies	Approach-orientated coping	Accepts reality and move on	
		Positive self-talk	
		<i>Goal setting</i>	
		<i>Releasing pent-up emotions</i>	
		Use of social support	
	Avoidance-orientated coping	Avoiding or withdrawing oneself from a situation	
		Keep busy by doing something that you enjoy	
	Types of social support	Emotional support	Companionship from friends and family
Motivation and support			From coach
			From friends, family and teammates
Motivation and support (continued)	From medical professionals		

Types of social support (continued)	Informational support	Feedback from medical professionals	Doctor gives feedback and advice on progress	
			Physiotherapist gives feedback and advice on progress	
		Advice from friends		
		Information from the internet		
	Tangible support	Services provided by medical professionals		Doctor examines knee
				Physiotherapist treats injured knee
				<i>Biokineticist provides physical rehabilitation exercises</i>
		Physical assistance	Friends and family	
	<i>Player becomes a source of social support to others</i>			

Table 4.5: Master table of emergent themes: Postoperative (phase 3)

Superordinate themes	Themes	Sub-themes	Categories of codes
Establishing identity	Athletic identity	Ambitious	
	Personal identity	Sense of self	A self, separate from sport
			Personality: <i>Positive</i>
		Personality: <i>Paranoid</i>	
Cognitive appraisal	Rehabilitation and recovery	Self-reported symptoms and knee function	Pain
			Stiffness
			Swelling
			No pain

Cognitive appraisal (continued)	Rehabilitation and recovery (continued)	Self-reported symptoms and knee function (continued)	<i>Good knee function</i>
		Positive appraisals	Confidence in health medical professional's abilities
			Good relationship with medical professionals
			Rehabilitation is adjusted according to patients needs
			Motivated to do rehabilitation and succeed
			Self-perceived progress
			Self-evaluation – strong belief in own value
			<i>Positive rehabilitation/ recovery experience</i>
			<i>Back to old self</i>
		Neutral appraisals	<i>Good days and bad days</i>
		Negative appraisals	<i>Minimal interaction with coach</i>
			<i>Compares and measures himself to injured team mate</i>
			<i>Every person is different and rehabilitation needs to be individualised</i>
			Recovery involves more than just the physical
			Rehabilitation/ recovery is challenging
			<i>Monotony of rehabilitation</i>
			<i>Still lacking fitness</i>
			<i>Tough to sit on the side-lines</i>
		<i>Setback experienced</i>	

Cognitive appraisal (continued)	Perceived benefits of injury	<i>New perspective on life</i>	
		Time for...	Self
			Spending time with family and friends
Responses – Postoperative (phase 3)	Emotional responses	Facilitative reactions	Accepts situation/ outcome
			Appreciates social support
			Confident after seeing progress
			Excited about future
			Happy about progress
			Hopeful for a good outcome
			Motivated to succeed
			Positive attitude
		Debilitative reactions	Fear of re-injury
			Feels useless and frustrated watching from the stands
			Frustrated/ irritated about <i>monotony of rehabilitation</i>
			<i>Frustrated/ irritated about slow progress</i>
			<i>Impatient</i>
			<i>Miss being part of a team/ sport</i>
	<i>Negative due to setback experienced</i>		
Nervous/ anxious about future			
Behavioural responses	Avoids potential dangerous situations		
	Seeks reassurance from doctor		

Coping strategies	Approach-orientated coping	Goal setting	
		Use of social support	
	Avoidance-orientated coping	<i>Avoids injury related thoughts</i>	
		Keep busy by doing something that you enjoy	
Types of social support	Emotional support	Motivation and support	From friends, family and teammates
	Informational support	Feedback from medical professionals	From medical professionals doctor gives feedback on progress
		<i>Advice from teammates</i>	Advice and feedback from Physiotherapist
			<i>Advice and feedback from Biokineticist</i>
	Tangible support	Services provided by medical professionals	Doctor examines injured knee
		Physical assistance	Physiotherapist treats injured knee
			Biokineticist provides physical rehabilitation exercises
			Friends and family

Table 4.6.1: Master table of emergent themes: Final-phase rehabilitation themes captured during the return-to-sport phase

Superordinate themes	Themes	Sub-themes	Categories of codes
Establishing identity	Personal identity	Sense of self	Personality: Impatient
			Personality: <i>Optimistic</i>

Cognitive appraisal	Self-reported symptoms and knee function	Pain	
		Stiffness	
		Swelling	
		Good function	
	Rehabilitation and recovery	Positive appraisals	Assumes self-responsibility- <i>educates himself on the injury rehabilitation process</i>
			Confidence in Biokineticist's abilities
			Good relationship with Biokineticist
			Positive rehabilitation/ recovery experience
			<i>Regains confidence in knee</i>
			Self-perceived progress
		Neutral appraisals	Good days and bad days
		Negative appraisals	Compares and measures himself to injured team mate
			<i>Pressures himself to work harder</i>
			<i>Too much too soon</i>
			<i>Medical professional being overcautious</i>
			Rehabilitation/ recovery is challenging
			Monotony of rehabilitation
			Recovery involves more than just the physical
	Still lacking fitness		
		<i>The toughest part is starting to run</i>	
	Sense of loss	Social support	<i>Biokineticist relocates and is no longer able to provide services</i>
<i>Less support from medical professionals</i>			
<i>Support from coach</i>			

Cognitive appraisal (continued)	Perceived benefits of injury	<i>Sees benefit of having second operation</i>	
Responses- final-phase rehabilitation	Emotional responses	Facilitative	Positive attitude
			Confident
			Hope
			Happy
			Excited
			Motivated to succeed
		Debilitative	Miss being part of a team/ sport
			Fear of first contact
			Fear of not being able to participate at previous level
			Fear of re-injury
			<i>Fear of unknown following relocation of Biokineticist</i>
			<i>"Gutted" following setback</i>
			<i>Sad/ low spirited following setback</i>
			<i>Stressed/ worried about being able to participate at previous level</i>
Behavioural responses	Dwells on the injury		
	Seeks social support	Reassurance from doctor <i>New Biokineticist</i>	
Types of social support	Emotional support	Motivation and support	From friends, family and teammates
			From medical professionals

Types of social support (continued)	Informational support	Feedback from medical professionals	Physiotherapist gives advice on progress
			Advice from Biokineticist
		Articles/ internet	
	Tangible support	Services provided by medical professionals	Doctor examines knee – check-up visit
			Physiotherapist treats injured knee
			Biokineticist provides physical rehabilitation exercises
Player becomes a source of social support to others			

Establishing identity

Athletic identity

During the early rehabilitation phase, weeks two to six, one participant appraised rugby as a source of passion: “...at the end of the day playing rugby is a passion, but it’s also my job.” He referred to playing rugby as a job and established himself as a professional sportsman. During the mid to late postoperative rehabilitation phases, ambition emerged as the possibility of returning to sport became a reality: “I want to be in the starting team for the first rugby game of 2017.” According to Martin *et al.* (1997), athletic identity may have important psychological, social and behavioural consequences. Therefore, understanding how an individual identifies with their athletic role might be helpful when trying to understand certain emotions and behaviours reported during the rehabilitation process. Athletic identity did not emerge as a theme during the late rehabilitation period. This seems to be consistent with Brewer *et al.* (2010), who reported a decrease in athletic identity, six to 12 months post ACLR surgery. According to Brewer *et al.* (1999), a reduction in athletic identity is seen following poor athletic performance. Participants appraised their athletic performance as poor in reaction to slow progress and poor knee function experienced during the rehabilitation period.

Personal identity

Early on, one participant reported a sense of self, separate from sport: *“...the reality is that I can't be on the field so I don't break my mind about not being able to play understand, because at the end of the day rugby is only a part of who I am understand? The rest of my life can't stop when one part stops.”* Two personality characteristics emerged during the first six weeks post-surgery and included being independent: *“I'm very independent”* and impatient: *“I was very like, impatient.”* A sense of self also emerged as this participant reported a self, separate from sport during the late rehabilitation phase: *“...it's also nice to sort of see what [name of participant] outside of rugby can do so that's nice.”* Two other personality characteristics emerged: *“I'm not a negative guy”* and: *“I'm very paranoid.”*

As the participants reflected on the final month of rehabilitation, impatience surfaced: *“I have no patience.”* Another participant referred to himself as optimistic during the final stages of rehabilitation: *“I've always been a...you know optimistic person.”* According to Junge (2000), personality traits are not associated with injury and do not seem to predispose athletes to injury. However, having a certain personality trait might affect the way in which an individual appraises the rehabilitation and recovery process. For example, having a positive and optimistic personality will probably lead to a more positive appraisal of the rehabilitation process. On the other hand, impatience might result in a more negative appraisal as athletes try to rush the rehabilitation process. One participant injured his knee on the rowing machine during the early to mid-rehabilitation phase. The same participant also had to undergo surgery to remove a screw during the mid to late rehabilitation period. The surgery was unrelated to the rowing machine incident and was performed in reaction to slow progress and in an attempt to alleviate pain. For this particular impatient rugby player, his impatience and trying to do too much too soon probably resulted in the setbacks that he experienced. This is consistent with Johnston and Carroll (1998) who reported that impatience and eagerness to return-to-sport might result in the athlete either doing too little or too much.

Cognitive appraisal of the rehabilitation process

Rehabilitation and recovery

Two weeks after undergoing ACLR surgery, some participants still experienced pain: *"I wasn't pain free yet"* while others reported: *"I don't have any pain, so it doesn't bother me at all."* Pain wasn't the only symptom reported during the early rehabilitation phase: *"...obviously there was still a bit of swelling."* Another participant reported struggling to get in and out of the car: *"...trouble with getting in and out of the car was the only... only bad thing."* Although muscle strengthening had begun, participants still noted poor muscle strength: *"...my quads are still very weak so I still shake when I lift it up."*

According to Prentice (2007), it might take up to two years to regain pre-injury quadriceps muscle strength. During the late rehabilitation phase, participants reported stiffness: *"I'm very stiff"* as well as swelling: *"...my knee got swollen a bit."* Improvements were seen as participants progressed: *"I can move around quickly without any pain"* and some reported that their injured knee was stronger than the non-injured knee: *"...sometimes it feels almost bigger than my other leg, um like you know, the definition is back with regards to the exercises, sometimes if I do leg press then my right leg tires much quicker than my left... than the operated one."* After months of rehabilitation, an increase in muscle strength was noted: *"...just getting my stability and strength back and I feel like I'm really getting back to where... where I should be."*

Towards the end of the rehabilitation process, one participant reported experiencing pain when doing jumps: *"...a lot of pain with jumps."* Pain wasn't the only symptom experienced during the final month of rehabilitation: *"I'd wake up some mornings just with a bit of stiffness or a little bit of swelling."* Prior to returning to sport, the following participant reported good knee function: *"...my physical condition was, you know, very...very strong and yes, it was very good."*

Positive appraisals emerged throughout the rehabilitation and recovery process. Early during his rehabilitation, this participant reported being motivated to do his

rehabilitation and succeed: *“...would say that when my mind is set then I’m happy and then I want more and to recover more and continue to build on that.”* Another reported: *“I want to do more and more, so every little bit extra that I can do helps...I don’t have to exercise every single day, you know, but I want to exercise constantly.”* Proper rehabilitation is important if an athlete wishes to return-to-sport as explained by this participant: *“...my goal was to not... not necessarily as fast as possible, but to make sure it’s gonna be as strong as possible for when I start riding again..... it’s more important to do it... to do it correctly instead of just fast, because you can do it short and get back on the bike quickly and then something could happen. You could tear it again, so I didn’t ... I didn’t want that at all.”*

According to the Biokinetics Association of South Africa (BASA), Biokinetics is “the profession concerned with health promotion, the maintenance of physical abilities and final phase rehabilitation, by means of scientifically-based physical activity programme prescription” (“What is Biokinetics?”, 2016). One participant reported seeing a biokineticist and noted the importance of individualised rehabilitation: *“I like being pushed and that’s why I think his [referring to the biokineticist] ambitious approach was very good for me, so we would never sit too long on the same thing... if he could see...if I could do an exercise then we’d move on to the next one until the point where okay we need a bit more time before we can start doing that so... but that’s why I think the process up until now has been very fast and very productive.”*

With the recovery in full swing, progress was noted: *“...it was good, I could see the progress which was good, you know...um eventually, you know, I was doing heel slides. I could see that I’m bringing my...my...my foot much closer.”* Another perceived progressing faster than expected: *“I think I am ahead of where I wanted to be at this stage for sure, I think I’m about two to four weeks ahead of where... where I should be.”* For some, the rehabilitation sessions created an opportunity to be part of the team again: *“...was nice, because I...I was with the guys again. I could see the guys, you know, maybe once a week or something.”*

Progress allowed participants to regain a sense of independence as reported by this rugby player: *"I'm very independent, so after twee weeks I started to feel independent."* Towards the end of the early rehabilitation phase, the participant who reported hating his crutches during the first week post-surgery, was allowed to walk without his crutches: *"...it felt like my... I'm dragging another person with me, because I couldn't do anything without the crutches, you know, so it was good...good to let go of the crutches and you know just walk, not freely yet but still with a brace."* Positive appraisals led to positive thoughts and a strong belief in own value: *"I know I will be able to play again, because things are looking very good."* When asked about the future, one participant reported a self-perceived "safe space": *"I'm on contract until next year so at this moment I don't have any worries."*

During this period, participants visited relevant medical professionals and seemed to have confidence in their professional competence. This is supported by the following quote: *"...he is very uh thorough so he...let's say I wasn't where I am today he would say you have another three weeks in the brace... a week longer or whatever the case so I don't think he treats you on a timeline but on your symptoms."* Another participant reported having a good relationship with his physiotherapist and doctor: *"I've known her since under 21, so we get along very well um, I would've worked with [name of physio] from [name of club] but um then they said no, we rather work from here, we get better results whatever um and I know her really well, I get along well with the doctor so I'm very happy with her. She keeps you in the loop, tells me what she does when she does it, so um happy."*

This participant realised that recovery involved more than physical rehabilitation: *"I firstly need to prepare myself mentally."* Psychological recovery could be either facilitative or debilitating, depending on the athlete's self-perception. Realising its importance will probably result in a more facilitative approach towards recovery. If the athlete perceived psychological recovery as a barrier to progress, it could potentially lead to a debilitating response.

As mentioned earlier, the biokineticist played a major role during final-phase rehabilitation: *“I have full confidence in the gu... in the guy I am doing my rehab with and I know that he’s never going to make me do anything that could possibly re-tear it.”* Participants also reported having a good relationship with their biokineticist: *“...like he understands. He has had a lot of guys and at least he is, you know, we can, you know, he makes it easy. We chat about everything and I, you know, he...he...he takes me through the statistics where they say like where I have to be now and everything like every time he tells me I’m doing well.”*

This athlete mentioned the importance of an individually tailored rehabilitation programme: *“...the guy who is doing my...he does not put too much pressure on my leg, but the weights and stuff that I do is perfect for my leg and I can see that my leg is starting to get stronger.”* Another participant reported receiving individualised exercise prescription: *“...some things are easy and we would adjust it. Some things are difficult, but every time it gets too easy we adjust it and if it’s too difficult then we adjust it too, so that I can at least do it.”* Motivation is still present during the later stages of rehabilitation: *“Well the thing is I go...I go on with the day doing my rehab and I make sure that I do what I have to do, understand, what the best thing for my knee is, so I put my mood aside so that I know what I am supposed to do to get my knee better and that’s what I do.”*

Sustained motivation and rehabilitation adherence probably led to the continued progress reported: *“...over the last...last month the progression of my running has become better, and um yes, even today while I was running my...my whole rhythm and everything was looking much smoother and the limp’s almost gone so...so everything’s going well, it really is progressing really well.”* Progress resulted in a positive appraisal of their value and abilities: *“I feel like I’m quickly going... quickly going to recover and I feel like I believe...believe that he would never tear again so it feels really very well, uh and yes, I believe as soon as he’s right then I will, once again, be able to make a big difference so I think I will... the future is much...much better yes.”* Most participants seemed to appraise the rehabilitation process as a

positive experience: *"I think the whole... this whole experience has been positive for me."*

One of the participants reported being back to his old self: *"I could do all the nice things, like with play my friends and socialize and you know um yesterday you know we played cricket, understand, then I can you know play cricket with them. I can bat. I'm careful about what I do, understand, so that I don't do anything wrong, but like uh yes uh, I can at least do all kinds of... like you know... I can at least do all the normal activities that I used to do."* Another reported: *"I think progressively my mood, in general, has just gotten better. I feel like I'm back to the old... old self that I was um, because I can train now. I don't have to worry about as many things... so now its yes... yes, I feel like I'm back to normal."* During the final months of rehabilitation one participant assumed self-responsibility as he educated himself on the injury rehabilitation process: *"...I tried to educate myself as much as possible about everything."* Towards the end of the rehabilitation process, this participant reported regaining confidence in his knee: *"I was starting to get a bit of confidence back."* According to Forsdyke *et al.* (2016), developing self-confidence facilitates successful return-to-sport.

According to Johnston and Carroll (1998), positive and negative appraisals emerged during the rehabilitation process and possibly influenced subsequent emotions and behaviours. This was true for the present study as a mixture of positive and negative appraisals emerged throughout the rehabilitation process. During the first six weeks post-surgery, one participant realised that failure to return-to-sport could end his career: *"I know that if I don't come back now my career is over so there's a lot at stake uh especially with an injury like this so I think that's probably the biggest motivation."* Early rehabilitation involved doing small movements and this was perceived as boring by some: *"...you are very limited to what you can do so it was sort of just... just very boring the whole time."*

Impatience and eagerness to return-to-sport might result in doing too much too soon (Johnston & Carroll, 1998). One participant reported impatience during this

time period: *"I was very like impatient"* whereas another reported a different perspective on progress seen: *"...for everyone on the outside, the, they look at you they think no you're looking good, you're fine, your knee is good but um yes, I could still not to do things freely and...and I wasn't pain free yet."* Unfortunately, there seems to be no quick fix and for most individuals the rehabilitation and recovery process was a long journey: *"I've got a...a long...long journey ahead of me, a long process ahead of me to get my...my knee better and my leg right so that I'll be able to...to be on the field with them you know in a couple of months' time."*

Weiss and Troxel (1986) found that coaches tend to ignore and neglect injured athletes and are more interested in their return-to-sport than their rehabilitation. Towards the late rehabilitation phase, minimal coach-player interaction was reported: *"I wouldn't say there's much interaction between myself and...and the coach. I think it's just a walk past each other in the...the passage, you know, how are you, how's the injury, you know that sort of thing but I don't think there's much of an interaction as to... I think it doesn't really go further than that."* Two of the injured participants were teammates and one progressed much faster than the other during the mid to late rehabilitation period. The slower progressing player compared and measured himself against his injured teammate: *"...so far it's a bit frustrating, because um like you obviously know [name of teammate], he... he is about how can I say three weeks ahead of me."*

Although it was difficult not to compare himself to his injured teammate, he eventually realised that every athlete has different needs and requires an individualised rehabilitation programme: *"...at one stage it felt like they want to rush me um and I couldn't understand it um, because it's difficult. They say I have to and I do it, but I feel I'm not there yet, but I forced it and it's fine now. I asked them why I have to do it, why do I have to run after three months...because every person is different. [Name of teammate] has been running for three weeks and I will only run next or in two weeks' time um but who knows maybe I'll do better than him on the field or whatever so it depends on how you react to the rehab."* As

mentioned above, this participant felt rushed and pressured to progress faster. He experienced a setback during the rehabilitation period: *"I hurt it on the rowing machine."*

As the rehabilitation and recovery process progressed, the psychological implications of recovery seem to become more apparent and resulted in negative emotions: *"I'm a bit nervous you know it's...it's one thing, you know, mentally telling yourself you know you...you gonna be better and get stronger and that sort of thing, but being out on the field is a whole different thing."* The rehabilitation and recovery process remained challenging: *"I think out of all injuries it's the toughest rehab ever"* and was perceived as monotonous: *"...you come in and do the same stuff every day understand? It's the same routine, the same process every day."*

During the final rehabilitation phase, most participants still lacked fitness: *"I could feel in the last month or so um I'm getting tired a lot a lot quicker you know. I could see my...my speed and that sort of thing isn't where...where it needs to be."* Although they were approaching return-to-sport, it remained challenging supporting from the side-lines: *"Yes, that was...that was pretty tough, because you know we were sitting in the stand and you hear people chirping and people throwing comments at your mates and...and your team so it was...it was...that was probably the toughest game to watch while I've been injured."* During the final months of rehabilitation, athletes were eager to return-to-sport and this participant reported pressuring himself to work harder and recover faster: *"...so I pushed myself to...to recover quicker so that I could have a bit more time to focus on those sort of things. If my recovery was going well then you know obviously would speed up the whole process of me returning to the field of play so I thought me putting a bit of pressure on myself to get my knee into a good state so that I could focus on a bit of sprinting and small things like that. I sort of just rushed the process instead of just taking it step by step and I was already thinking two steps ahead. So yes, I think I did put a bit of pressure on myself which was very unnecessary."*

During the mid to late rehabilitation phases, participants often felt demotivated, impatient or overly excited and motivated to return-to-sport. According to Johnston and Carroll (1998), this might result in athletes doing either too much or too little. Putting too much pressure on himself and rushing the process led to this athlete doing too much too soon: *“I was starting to get a bit of confidence back and then just um sometimes trying to push a bit too much and the load got a bit too much for me and uh id wake up some mornings just with a bit of stiffness or a little bit of swelling.”* Another participant tried to rush the process and perceived his biokineticist as being overcautious and a barrier to his progress: *“I think the biokineticists... they were over cautions... some people are different than other people so some people recover faster and other people not so fast like in my case I recovered very...very quickly so they actually kept me back understand? So they work in a system where you treat everyone the same you know you work according to according to that how do you say uh system basically you know on that on that many months you have to do this and do that you are not allowed to do this or that, but like I feel um everyone is different so you can't...can't classify everyone with the same system, because not everyone you know, not everyone recovers the same...at the same you know? Speed or at the same time. Some quick and some recover slow.”*

For rugby players, final-phase rehabilitation involves running. Some of the players perceived running as the most difficult part of the rehabilitation process: *“I think those first two months of starting to run again were probably the toughest part for me.”* Prior to returning to sport, participants realised that rehabilitation involved fixing more than just the physical impairment: *“... just to get over those small hurdles of having that mental block about a knee that's still in pain.”*

During the rehabilitation and recovery process, some appraisals weren't exclusively positive or negative but emerged as neutral. Neutral appraisals seemed to result in mixed emotions as noted by the following participant: *“...there's a few days when you wake up and you feel very good like no pain and you're not stiff, like this morning I felt very good, um so yes, there is good days and bad days.”*

Sense of loss

As mentioned before, Peretz (1970) identified four types of loss; loss of a loved or valued individual, loss of self, loss of external objects or possessions and developmental loss. According to Evans and Hardy (1995), athletes might be able to experience all four types of loss, but loss of self and the loss of external objects seem to be the most common. During the final-phase rehabilitation, participants reported losing valued individuals as a source of social support. For three of the players, their biokineticist relocated and was no longer able to provide his services: *"...at the end of the year the first guy left the practice and I went over to another guy."* This was perceived as problematic: *"The other problem is my biokineticist... he is not here anymore."*

With the focus on medical professionals, the biokineticist wasn't the only loss experienced as one participant reported receiving less support from medical professionals: *"...the babysitting got a bit less, you know, the...the how is your knee feeling? How are you? Have you done your rehab? You know, those sort of questions. It came down to a point that if you not telling me your knee is good then I'm accepting that your knee is fine."* Prior to returning to sport, one participant mentioned losing support from his coach and appraised this as challenging: *"...the coaches don't back you anymore for some or other reason um, but yes, it's a challenge."* In a study on injured skiers, Udry *et al.* (1997) reported that most of these athletes perceived their coaches as distant and insensitive. These athletes expressed that it had seemed to them as though their coaches had lost belief in their abilities.

Perceived benefits of injury

Udry *et al.* (1997) reported personal growth, gaining new perspective and enhanced motivation as potential benefits of injury. All three types of benefits emerged during the rehabilitation period. This participant reported being pushed by his coach to perform well, but he didn't perceive it as being negative and used it to motivate himself. *"...he pushes me to play sevens in December and so on, but I don't know... but I use it as an option to motivate myself to get there."* The injury

motivated the following player to start studying again as he realised that he had nothing to fall back on if his contract is not renewed: *“No, I don’t even have a clue um, so that’s not even an option for me, but yes I know it’s actually scary, so that’s why I actually want to start studying again.... I think that’s probably the biggest motivation.”* Once again, time emerged as a benefit of injury: *“the good thing about you know, all the rehab and that sort of thing is I still get time to spend with the guys.”* Although friends emerged as a source of social support, not all of them remained supportive. Adversity created an opportunity to identify loyal friends: *“...that’s when you really see who your... who your friends are I guess, when they help you out when you’re sort of down in the dumps so that was cool.”*

During the later stages of rehabilitation, some participants reported gaining a new perspective on life: *“...it’s also nice to sort of see what [name of player] outside of rugby can do.”* This participant reported having more time for himself: *“I’ve been doing a lot actually uh it’s nice for me I’m...I’m doing things that I generally wouldn’t do”* and time to sort out personal responsibilities: *“I think the time you get off rugby also helped to sort out everything outside of rugby. Like for myself, I didn’t have a licence so understand I attended my driving lessons and I got my license and sorted out all of the things that you do off the field.”*

Some participants also reported being able to spend more time with family and friends: *“I get to spend time with my family much more now. I’m not going away every other weekend so just being at home seeing my parents every...every day now basically is good for me and I think my girlfriend is very happy as well. I get to get to spend a lot of time with her.”* As mentioned earlier, one participant experienced a setback during the rehabilitation period. Later on he also reported not progressing fast enough and he had to undergo a minor surgery to remove a screw. He remained positive and was able to see the benefit of having a second operation: *“...it was a good thing I suppose to have the second op uh just to get that screw out that was giving me discomfort.”*

Responses captured during the rehabilitation period

Emotional responses

Acceptance emerged during the early rehabilitation phase as noted in the following excerpt: “... *just had to make peace with it and realise that you know it’s over.*” This is consistent with Van der Poel and Nel (2011) who reported that acceptance was at its highest during the early rehabilitation period. During this period, most of the participants recovered at home and for this particular participant, positive feelings emerged following visits from friends: “...*those where, you know, the better days when like I know that they are coming so all of a sudden my mood’s better, I’m in a better place mentally, I’m excited, because, you know, I’ve got something to look forward to in the day.*”

This participant also reported appreciation for social support received: “...*was really nice that a few of the guys, you know, came all the way from, you know, the Southern suburbs or Northern suburbs where they were staying just to come see how I was doing at home, you know, uh [name of town]’s not very close to anything really so you know for them to drive all this way and just to come and see how I am. A few of the guys even took me out for lunch, you know, so it was nice.*” Happiness emerged following such social visits: “...*there were days when I was feeling very good and...and happy.*” Participants also reported being happy after seeing progress: “*I am happy with it too and I think I will... I know I will be able to play again because things are looking very good.*”

Medical professionals need to provide regular feedback during the rehabilitation process. One participant described feeling relieved following support and feedback from his physiotherapist: “...*she puts you very like...at like...at ease.*” While supporting his team from the side-lines, this participant felt hopeful: “...*we can see what they’ve done wrong and...and hopefully get back out there and not make the same mistakes.*” Progress resulted in positive emotions and an increased level of confidence: “...*a lot more positive. It gave me more confidence.*” At the end of the first six weeks, this participant reported being positive: “*I am quite positive at the moment.*”

During the later stages of rehabilitation, another participant reported feeling confident and happy: *“...seeing that there is a bit of progress or actually a lot of progress makes me feel much more confident as well but um yes now I’m just happy...happy to be on the field and...and running again.”* This participant reported having a positive attitude and being motivated: *“I’m still positive, like um, because I want to recover like I can say like the rehab sessions are tough but I enjoy them, because I know that...that is what I must do to fix my knee.”*

While recovering at home and not being able to move, useless and hopeless feelings emerged: *“...useless I just... very useless. I was... hopeless or whatever. Yes, hopeless.”* As the lengthy rehabilitation and recovery process progressed, frustration remained present: *“I knew where I was going, but um yes, it was still just a bit frustrating.”* Clement *et al.* (2015) also reported frustration as an emotional reaction during the rehabilitation period. Sadness emerged as one participant reported watching his team play without him: *“It was sad.”* One of the university rugby players wrote his exams during the rehabilitation and recovery period and mentioned feeling down and stressed: *“...during my exams my mood was very like, how can I say? Down and so on, but after the exams it got a lot better and I was happier, but I think that I was very stressed during the exams.”* This highlights the effect of added stress on an already stressful situation. Consistent with the present study, Johnston and Carroll (1998) found that athletes experience frustration and depression during the early rehabilitation stage. According to Clement *et al.* (2015), the most common emotional response during the early rehabilitation period was frustration.

During the early rehabilitation phase, fear of re-injury, as well as fear of first contact was reported: *“I don’t know how many bumps the knee will be able to take and I think I’m a little bit afraid to play rugby again.”* When asked what he would do if his contract wasn’t renewed, this rugby player reported fear of the unknown: *“No, I don’t even have a clue um, so that’s not even an option for me, but yes I know it’s actually scary so that’s why I actually want to start studying again.”* Apart from fear of re-injury, first contact and the unknown, another participant feared not being able

to participate at his pre-injury level: *“...the biggest one is probably, like I’ve said, if I’ll be able to play at my previous level.”*

Negative feelings emerged during the end of the early rehabilitation phase: *“I guess pretty negative. It... yes, it was probably the worst... the worst couple of weeks of the whole process.”* For him, the first six weeks of rehabilitation was the toughest. Fear of re-injury remained present during the mid to late rehabilitation period as noted by this participant: *“...just to injure my knee again or to sustain any other injury.”* Some of the participants watched their team play, but reported feeling useless and frustrated watching from the stands: *“...to sit in the stands and hear what people are saying about your...your teammates and just your mates and whoever you know it’s not nice and yes, I really wanted to be out there and it was tough sitting there and watching them and being very...very helpless, feeling very helpless.”*

The late rehabilitation period was perceived as being repetitive. This participant reported feeling frustrated and irritated about the monotony of the rehabilitation process: *“...now I am in that phase where I’m getting a bit irritated... well, it’s just the fact that you come in and do the same stuff every day, understand. It’s the same routine, the same process every day.”* Frustration remained present throughout the rehabilitation process. During the final-phase rehabilitation period, participants were eager to return-to-sport, but slow progress often led to feelings of frustration: *“...well it’s quite frustrating actually, because you know how to do it but you can’t. There’s no strength, but oh its normal, you have to start from scratch and build on that.”* After a few months of rehabilitation, this participant reported missing sport: *“Obviously, I miss not being part of a team environment and a rugby setup.”*

As mentioned earlier, one of the participants experienced a setback and this evoked negative feelings: *“I was very negative.”* He had to go for a second operation and reported feeling depressed: *“It was very...very difficult, um I just felt I’m cutting my knee again it’s another three weeks... I was not in a good space, um, I wasn’t really motivated to do rehab. I was very down in the dumps.”* During

the final months of rehabilitation, fear of the unknown emerged following the relocation of their biokineticist as explained by one of the affected athletes: *“I felt a bit frightened, because I was on my own and didn’t really know what to do. I did what I thought was right and um so yes, it was a bit weird...like weird, because I was on my own.”* Towards the end of the rehabilitation process, nervousness and anxiety surfaced: *“I’m a bit nervous... I’m very excited for what’s to come but at the same time I’m very...very... let’s say very anxious about how I’m gonna cope with being out of the game for almost a year.”*

Behavioural responses

During the rehabilitation and recovery period it is important to be careful, take good care of your knee and avoid potentially dangerous situations: *“If I knew I was going to a place where there was going to be quite a few people, I used my crutches instead of just walking around in my brace, because I mean obviously people see them or, you know, the crutches obviously. You should have your own... more space instead of just me being in a brace and someone easily bumping into me.”* Consistent with the present study, Clement *et al.* (2015) identified being cautious as a behavioural response.

A few of the participants sought social support during this time period. One participant reported going back to his doctor for a check-up: *“I went to doc after I wasn’t making progress as much as...as [name if teammate]. We were doing our rehab together and he was progressing much faster than I did. Like I would run and then after running I’d be sore and he wouldn’t be and um so I went to doc and I told him, listen can I go and see [name of surgeon] again.”* Another participant sought reassurance from his physiotherapist: *“...I go to my physiotherapist and he checks to see if everything is okay. I still go and see him when I’m unsure.”* Clement *et al.* (2015) also reports seeking social support as the most common behavioural response.

After their biokineticist relocated, three of the players subsequently lost one of their sources of social support and had to find a new biokineticist. One participant tried

to cope on his own, but realised that he needed professional help: “...it wasn't nice, um I didn't know what to do and then I decided to go on...on my own and then I decided I will go to another biokineticist.” Towards the end of the rehabilitation process, this participant reported dwelling on the injury: “I was always thinking about my knee no matter what I do.”

Coping strategies

Again evidence of approach- and avoidance-orientated coping surfaced. The following extract shows evidence of two types of approach-orientated coping strategies. Firstly, one participant reported writing down his feelings in order to release pent-up emotions. Secondly, he tried colouring as a relaxation technique and every page of the colouring book had a positive quote which he used to motivate himself: “...my iPhone this...this notepad sort of that I just type in, you know, it's just how I'm feeling or what I've done throughout the day and I think that's about the one thing that that got me through...that's what I did or what I thought would help me, you know, just to write down every single day, you know, how I'm feeling or what I did for the day, you know, and it...it...I think it really helped, you know, because eventually I...I could sort of pick up the trend that things were getting better, I was in a better space, I was in a better mood, you know, most of the time I was... I was going out more, not going out but, you know, just getting out the house a bit more so yes, that's I think...that's helped me a lot and um my mom got me a colouring in book so that helped as well and you know at the end of each little page or in the corner there's like a little message, you know? Or a feel good quote, you know? So things like that really helped me, but um yes, I think I'm not, not really one to just go... run my emotions on someone or just cry about... so I think I...I find a way to cope with it by just making sure that I...I don't just bottle it all up and I write it down somewhere, you know, something like that and I think that helped me a lot.”

When asked about coping the following participant said little but revealed a lot. He reported avoidance-orientated coping by distracting himself and doing something that he enjoyed as well as approach-orientated coping through using friends as a

source of social support. He also released pent-up emotions through exercise: *“I mostly played games and talked to friends and sometimes I went to the gym to get rid of my emotions.”* Using social support as a coping strategy was reported by another participant: *“I had a strong...strong, how can I say, mind. So I wouldn’t easily get depressed, but when I felt that it’s getting too much then I would like go and visit them or something like that.”* Another approach-orientated coping strategy involved goal setting: *“I try to motivate myself by setting goals to see if I’m able to achieve it”* and focusing on the positive: *“...thought about how nice it’s gonna be when I can start riding again and start training which is... which is what I want to do and that sort of just kept me going.”*

During the late rehabilitation period approach-orientated coping emerged again: *“I think when something about the rehab irritates me and stuff then like then I go and do some extra, you know, extra stuff. Socialise with friends um and then like or I go...go gym some more or something like that. Do something...something productive then I don’t feel as helpless or weak, understand? Something like that and that’s about all.”* This participant reported seeking social support to cope throughout the rehabilitation and recovery process: *“I go maybe every second week to see our team doctor, just so he can tell me you know how I’m doing as well you know just so that I’m constantly you know keeping them up to date and they actually letting me know you know how the progress is going.”* Towards the end of the rehabilitation process, avoidance-orientated coping was used in an attempt to stop dwelling on the injury: *“I am trying really hard to like just... like think less about my knee and like, because I’m very aware of it so I try to think less about it so that I can get over it.”* According to Udry *et al.* (1997), isolating or withdrawing oneself from a situation might lead to rehabilitation adherence problems.

Types of social support

During the early rehabilitation phase, emotional support emerged in the form of companionship. This rugby player reported: *“...my grandma came to stay to look after me during the day when my parents were at work.”* Friends, family and

teammates emerged as a source of social support throughout the rehabilitation and recovery process as noted by the following rugby player: *“...my mom still supports me and so on, and everyone like my friends and people that play rugby with me, they mostly understand me.”* Another participant reported: *“I’ve got a really good group of friends around me who’ve been very supportive and my family as well... um I get a lot of help from them and a lot of moral support.”*

It was noted that coaches tend to be distant and often appear uninterested during the rehabilitation period (Udry *et al.*, 1997). However, one participant perceived his coach as a source of social support during the early rehabilitation phase: *“...he is trying to motivate me to recover and stuff, because um every time I see him he asks me how my rehabilitation is going and says that I need to... look he...also, my coach, had a knee operation the same as I had, so um he understands how it is so um he motivates me every day.”* The coach did not emerge as a source of support during the mid to late rehabilitation phases.

During the early rehabilitation period, medical professionals offered emotional support: *“He makes you feel very comfortable when you talk to him. He said, especially that first two weeks that was very difficult, he said: “no sms me anytime or phone me” uh so yes he is very competent.”* Another participant mentioned receiving emotional support from his physiotherapist: *“...she puts you very like...at like...at ease.”* Medical professionals such as physiotherapists and biokineticists remained a source of social support during the mid to late rehabilitation phases: *“He motivates me well and like he will, he tries to make me positive and motivate me to do the exercises and so on.”*

During the rehabilitation and recovery process, medical professionals provided the athletes with informational support. This participant reported receiving feedback and advice from his doctor: *“...he told me that it’s looking very good and that I need to take it easy and that I need to rehabilitate it very well because like that is what will help you get your knee right.”* The role of the doctor in providing informational support seemed to diminish as the rehabilitation process progressed.

All of the participants had access to a physiotherapist whom provided regular feedback: *"...the physio saw me you know they all said you know your knee is looking good."* and advice: *"They say the stronger the muscles become, the sooner I can walk again"* and offered reassurance: *"...she reassures you that your knee is fine."* During the rehabilitation period, the biokineticist emerged as a source of informational support as noted by the following participant: *"...the biokineticist also told me that it's fixed and that I need to start moving as normal, but is probably just still in my head."*

Friends, family and teammates also emerged as a source of informational support. One participant explained: *"I have a few of my friends who said listen here, who has also been through it. Listen here, it's stuff that happen it's part of the game understand? It's how it will be and everything comes back to the processes understand? Yes, it's not going to be fun that first week and that second week, but before you know you run again understand so everything is about keeping calm and trusting the processes."* Another participant reported informational support received from teammates: *"...from speaking to a lot of guys obviously who'd been in the same situation, you know they...they say the... the thing is your knee is like... for me at the moment my knee is feeling really good and that makes me feel good as well you know... so they say this is sort of a tough period where your knee is feeling good, but it actually isn't 100% yet."*

The internet emerged as a source of informational support during the rehabilitation process as reported by this participant: *"I educated myself so every time I checked YouTube or I searched ACL at five weeks at six weeks and there wasn't once when I saw on YouTube or on Google something that I didn't do or wasn't on par with. I could see at five months they were doing single leg jumps and I was also doing that understand? So there was never something I felt like I didn't do or did too late I was always on par with what I searched."*

Medical professionals still provided tangible support throughout the rehabilitation period. Although not as involved during this period, the doctor examined the injured

knee during check-up visits: *“...he just moved my knee around into different positions to test the strength of... of the ACL and all of them seemed to be fine.”* Most participants still used their physiotherapists, albeit to a lesser degree towards the end of the rehabilitation process. This participant reported that his physiotherapist was still treating his knee: *“...physio at um or the [name of rugby team]’s physio at the [name of rugby club] just to uh get a bit of treatment on my knee.”*

The biokineticist seemed to have played the most prominent role throughout the rehabilitation process as they provided physical rehabilitation exercises as explained by this participant: *“...the first while that I did rehabilitation, I did like two sessions with the biokineticist and then I had an extra session that I um you know um extra session to do on my own.”* In line with the present study, Gray (2009) found that biokineticists appear during the early rehabilitation phase and provide support up to the remodelling phase.

During the early rehabilitation period, participants still required physical assistance. The following participant reported: *“...my grandma came to stay to look after me during the day when my parents were at work so um, you know, she took really good care of me, you know, I didn’t have to worry about making breakfast in the morning. That was sorted every day. Lunch was sorted, you know, and that sort of thing. So I was really living like a king while I was injured.”*

Tangible support remained present during the late rehabilitation phase: *“...they helped me a lot, so I don’t think that I would’ve felt this way if it wasn’t for them. Maybe if I were alone it would’ve been much harder. My girlfriend’s family were like supportive all the way, like literally when I go in for rehab her dad phoned me or he would pick me up or whatever so he made it very easy for me.”* During the final-phase rehabilitation period, tangible support was limited to a final check-up by the doctor, a few sessions with the physiotherapist and sport-specific rehabilitation exercises provided by the biokineticist.

Emotional, informational and tangible support remained present, but a new type of social support emerged. The injured player himself became a source of support to other injured players: *“I go and watch them and support them.”* Another participant reports being a source of support to others: *“...good to be on the other side where I can sort of help him and you are in the position to give advice.”*

Return-to-sport

Following successful ACLR surgery and rehabilitation, the main goal is to return-to-sport. In the week prior to the last interview, participants were cleared to return-to-sport and played their first practice game. The cyclist competed in his first practice race. Although the sixth interview included data from the final-phase rehabilitation as well as returning to sport, the following section discusses themes that emerged immediately prior to and following their first practice game or race.

Table 4.6.2: Master table of emergent themes: Return-to-sport

Superordinate themes	Themes	Sub-themes	Categories of codes
Establishing identity	Athletic identity	<i>A love for sport</i>	
	Personal identity	<i>There is a life outside of rugby</i>	
Cognitive appraisal	Self-reported symptoms and knee function	No Pain	
		Good knee function	<i>Stronger than uninjured knee</i>
	<i>Functioning better than before injury</i>		
	Return- to-sport	Positive appraisals	<i>Knee survived the first tackle/contact</i>
			<i>Back to old self</i>
			<i>Better than expected</i>
			<i>No pressure</i>
		<i>Improved confidence</i>	

Cognitive appraisal (continued)	Return- to-sport (continued)	Positive appraisals (continued)	<i>Hard work pays off</i>
			<i>Positive return-to-play experience</i>
			<i>Participating at previous level</i>
			<i>Positive about future career</i>
		Negative appraisals	<i>Not at previous level of functioning yet</i>
			<i>Less time available</i>
			<i>Still thinking about/ aware of the injured knee</i>
	Perceived benefits of injury	Sense of loss	<i>Time for self and others, following return-to-sport</i>
			Motivation/ challenge
			<i>Grown in faith</i>
			<i>Personal growth</i>
			New perspective on sport/ life
			<i>Knowledge about physical function</i>
	Time for friends and family	Realise who your true friends are/ build relationships	
Responses – Return-to-sport	Emotional responses	Facilitative reactions	Appreciates social support
			<i>Appreciates being able to play rugby</i>

Responses – Return-to-sport (continued)	Emotional responses (continued)	Facilitative reactions (continued)	Confident about abilities
			Motivated
			Positive
			Excited about <i>first game back</i>
			Happy
		Hopeful for a good future	
		Debilitative reactions	Fear of re-injury
			Stressed/nervous/ anxious <i>about playing first game</i>
	Stressed/ worried about knee		
			<i>Uncertain about future</i>
Behavioural responses	Avoids potential dangerous situations		
Coping strategies	Approach-orientated coping	Accept reality and move on	
		<i>Focus on the good days/ stay positive</i>	
		Releasing pent-up emotions	
Advice/recommendations from injured research participants	Advice for athletes having to go through the same process	<i>Be patient</i>	
		<i>Release pent up emotions</i>	
		<i>Rehab adherence is important/ work hard</i>	
		<i>Stay positive</i>	
		<i>The rehabilitation and recovery process</i>	<i>Trust the process</i>
			<i>Don't be afraid to question it</i>
		<i>Trust in God</i>	

<i>Advice/recommendations from injured research participants (continued)</i>	<i>Recommendations for medical professionals</i>	<i>Provide support up to return-to-play</i>	
		<i>Break the monotony</i>	
		<i>Adjust rehabilitation in line with patients' needs</i>	
		<i>The importance of proper graft selection</i>	

Establishing identity

References to both athletic and personal identity were made throughout the study as both played a role in defining each participant's sense of self.

Athletic identity

Upon return-to-sport, athletes were excited to be able to participate in the sport they love: "...*the game that I love.*" Another reported: "*I'm back playing rugby, which is all I want to be doing.*" The use of the word love suggests a strong association with athletic identity and according to Mitchell *et al.* (2014), athletes need to form a strong relationship with their athletic role in order to stand out as a professional player. In line with Brewer *et al.* (1993) who defined athletic identity as the way in which individuals identify themselves as athletes, these participants seemed to identify some part of who they are with being a competitive athlete.

Personal identity

Following his first practice game, this participant reinforced his personal identity as he realised that there was a life outside of rugby: "*I try to switch off now when I run off the field. Get out and do different things, because I used to think that rugby was everything, but now I've realised there is a life after rugby and outside of rugby.*"

Cognitive appraisal

Self-reported symptoms and knee function

According to Prentice (2007), the criteria for return-to-sport include, but are not limited to, the knee being symptom free. Participants reported being pain free upon return-to-sport as noted by the following participant: “...*where I am at now without any pain...it’s very positive.*” One participant perceived his injured knee to be stronger than the uninjured side: “*I am actually a lot more positive about my left knee, about my operated one.*” Another reported: “...*my confidence levels are quite high. I could do what I could do before the operation and uh if not even better.*” Quinn and Fallon (1999) previously noted that athletic function improves with progression to full recovery.

Return-to-sport

Participants seemed to use the “first contact” to evaluate whether or not their return-to-sport had been successful. This participant explained: “...*the first ball I got I tried to run into them as hard as I could just to feel you understand I just wanted to feel like I tried to get knocks everywhere and that I... I...I can just get that mind-set of it’s fine and I don’t have to worry and yes, I didn’t even feel anything on my knee. I got knocks on it. Yes, it was totally fine.*” Luckily, all of the rugby players survived the first tackle or contact: “*It’s a scary moment um, I still now remember the first time I was tackled in training. The guy was coming from my right hand side and obviously my right knee so when he tackled me literally just stayed down on the ground. I just reached for my leg and I felt my knee and straightened my knee and realised I’m good and I got up and I was feeling really good about it. I’ve had my first contact in a while so it was a good thing and I still remember after practice just being so happy and that I got through it.*”

Another participant reported a positive reaction after being tackled: “*I got up with a smile on my face almost to say like I’m back in it now. It’s done. All of the rehab, the hard work, the worrying, all of the negative thoughts...it’s out of me now. I’m back playing rugby, which is all I want to be doing.*” This participant realised that he was back to his old self during his first game back: “...*we ran on the field and then*

it was just like second nature, it just came naturally. I didn't hesitate on anything. I just got stuck in and it was very nice." The cyclist reported doing better than expected: *"I wasn't expecting anything really I mean it wasn't a great result, but I wasn't expecting to feel as good as I did."*

One participant appraised the first game as a positive experience and didn't feel pressured to perform well: *"...no one is expecting anything of me so I can go out and do what I need to do and then once... once I get fitter, the results will get better."* After playing well, this participant reported an increase in his confidence levels: *"I just got more confidence to see how strong my knee already is and I've got 100% confidence in my... in my knee and that I will be as good as I was... probably even... even better because I've got a bit more determination now... yes, everything is going well."* He realised that all of his hard work had paid off: *"...after coming off that field and getting through the game was a good thing, definitely enjoyed the beer afterwards as well, just to sort of say you know it's done the what was it? Nine and a half months of hard work and battling on has paid off, so very nice reward to play a game after a tough time like that."* Carson and Polman (2008) reported relief and an increased sense of competency following successful return-to-sport.

Most participants had a positive return-to-sport experience as evident from the following quote: *"...once I got back on the field doing what I love, I think it just shifted away or disappeared. I was very nervous before the game, but afterwards very happy to get through it."* This participant felt that he was participating at his previous level: *"...my confidence levels are quite high. I could do what I could do before the operation and uh, if not even better."* Another reported playing to the best of his abilities and being positive about his future: *"I'm happy that I am able to play to the best of my abilities and um, yes I am...I am very excited for the season, I mean the whole year that lies ahead."*

Not all of the participants reported functioning at the same level or better than before: *"I can't really say, but it's not there yet, but I think as the time passes and*

my confidence improves it will be able to get back to that level.” Another reported lacking strength: “I think I still have a little way to go in terms of strengthening uh in the gym, but yes other... other than that, I don’t have any pain on the field so it’s perfect” while the cyclist reported still lacking fitness: “I finished in a respectable position considering um yes, I’ve got a lot of work to do with fitness... it was purely just a fitness... fitness thing that was the only thing holding me back.”

Following return-to-sport, participants were required to start practicing again. This meant less available time as explained by this participant: *“...it’s different now...now we have to check our calendar when we have off weekends, because she has also got her own life um, because normally when I was off I could see her every weekend. I could see her during the week and now it’s totally different. I get home at half past three, four every day. She gets home at six and then we’re both tired um so it is... it’s a different lifestyle basically when you’re playing and when you’re not.”*

Even after a successful return-to-sport, this participant reported that he was still thinking about his injured knee: *“I still think about the knee every day, uh not the injury but the knee itself, because lots of days you wake up and its stiff.”* The rugby player who previously reported being on a contract and not stressed about his future, reported uncertainty: *“...it’s a touchy subject. Yes, I don’t...I don’t know what’s happening, so it’s my last year on my contract and they haven’t spoken to me yet, so I’m taking it they won’t sign me again.”*

Sense of loss

Being able to return-to-sport, is a dream come true following months of rehabilitation. Although this was associated with many benefits, loss still emerged. Returning to sport meant long hours training and travelling. This resulted in having less time available for yourself and others: *“...we have to check our calendar when we have off weekends, because she has also got her own life um, because normally when I was off I could see her every weekend.”*

Perceived benefits of injury

Following return-to-sport, participants reflected on the entire injury rehabilitation and recovery process and reported certain benefits. Clement *et al.* (2015) reported lessons learned as the most common benefit of the injury process. Once again, participants referred to adversity as a challenge and a source of motivation: *"...it tested me to better test my personality, because I am not someone who likes to, you know, uh do nothing and, you know, or to be limited like that."* Another reported that the injury was mentally challenging: *"...challenging mentally as well, because I mean that first few months you start and you do everything, every day, the same thing, for long hours understand? So mentally it tests you."*

A new benefit emerged following return-to-sport as this participant reported that he had grown in faith: *"...my faith um I think that was a big step or not step, a big realisation that I gained out of this injury and now I can say it's been a blessing um, cause who knows I could've probably gone down the wrong path or whatever the case, but now I feel um this knee has really been a blessing in my life... I think like I've said, I think I got closer to God in the time I was off. I wasn't that busy, probably a bad reason, but uh yes like rugby is a fast life. You're always on the go there's never time to really switch off and have time for yourself or whatever so I think like I've said that's probably the biggest thing I've learned or gained from my injury."*

Other participants reported personal growth: *"...the biggest thing I've realised, I've got no patience and I'm also very comfortable being alone. My thoughts run away with me at times, but I think that has been my biggest growth, because I was so used to people in my life being in a boarding house, rugby academy, being at um the [name of rugby club], living with three guys in the house. I was always surrounded by people and during the day I was alone most of the time you know so I've realised I've become very comfortable being alone."* Udry *et al.* (1997) reported that positive growth is possible following injury.

Some were able to gain a new perspective on life: *“I started seeing life from a different perspective, because like I could’ve lost my leg or like there are many people who I know or who I walk past and see that they don’t have a leg. So I started appreciating what I have and I’m seeing what I could’ve lost so it’s helped me a lot. I’m seeing life from a whole new perspective.”* Another player reported: *“...just taught me that I should live every day to the fullest, because who knows, it could be my last day on the training field, my last game or...so yes, I don’t take anything for granted anymore... I try to switch off now when I run off the field. Get out, do different things, yes, because I used to think that rugby was everything, but now I’ve realised there is a life after rugby and outside of rugby.”* This rugby player reported gaining further knowledge about physical functioning: *“I think the lesson I learned was the way in which the body works.”*

Time remained a benefit of injury and allowed participants to spend more time on themselves: *“Had a lot more time do to things I wouldn’t necessarily do so um I think it came at a good time for me.”* They could also spend more time with their family: *“I obviously got to spend a lot of time with my family and my girlfriend um and it, it was nice.”* Lastly, they could spend more time with friends: *“...you are so busy that sometimes you realise oh my one friend I never see him or talk to him or talk to your family. You have so much more time on your hands to do those things, to see our family more often, to talk to people.”* Having had more time available to focus on building relationships, some reported realising who their true friends were: *“I’ve realised that who my really close friends are. I think at the beginning when things are really tough and I couldn’t drive and couldn’t really go place you realise who are the guys. Listen we going to so and so’s house, do you want me to pick you up or organise a braai at your house? You know, it’s something like that and you know it’s really is a big deal, because when you playing rugby and guys see you on the TV week in and week out and every now and again there is a newspaper article about you everyone wants to be associated with you, but once you are not in that spotlight you are just taking a back seat or you not seen on TV every weekend, guys just sort of shift on I don’t know what they do, but yes they*

just seem to stay away, because obviously they don't wanna be sitting at home with you every weekend. So um, I think in a good way and bad way as well that's been the biggest thing I've sort of realised off the field."

Responses – Return-to-sport

Emotional responses

The participants appreciated the social support they received: *"I think the support you get from people that actually care about you is unbelievable"* and being able to play rugby again: *"I appreciate the game so much more."* Following successful return-to-sport, this participant reported being positive and confident: *"It's very positive and obviously just gives me a lot of confidence that my knee will hold up and be strong the upcoming season."* Another participant reported being motivated: *"I'm actually ready for action. I can't wait for the next game"* and positive *"I look at life with lust and I am motivated to do things to achieve my goals. I am very positive at the moment."*

Excitement emerged prior to the first practice game: *"I was very excited that it was the first one and it was just fun again"* followed by happiness once he realised that he survived the first contact: *"I was feeling really good about it. I've had my first contact in a while so it was a good thing, and I still remember after practice just being so happy."* One of the professional rugby player's reported being excited about his first competitive game back: *"I don't think I'm going to be able to sleep on Friday night, because it's my first game of the year at [name of stadium] playing the [name of provincial rugby team] so it's very exciting for me to think of where I was at a couple of months ago just standing on the side-lines, to now having worked so hard and overcome this, to a couple of days to running out on [name of stadium] again playing for the [name of rugby team]."* Clement *et al.* (2015) reports excitement as a common emotional reaction upon return-to-sport.

At the end of the final interview, hope emerged: *"I'm hopefully gonna sign a contract with [name of provincial rugby union] for two more years."* Another player reported being hopeful: *"I hope to make the under 21 [tournament name] team so*

that I can at least play for the [name of university rugby tournament] next year so that's my goals I've set for myself going forward and then we will see, maybe I get a big contract or something." Podlog et al. (2014) reported that emotional responses usually move from negative to positive as athlete's progress to return-to-sport.

Participants reported being stressed and nervous prior to their first practice game: *"...stressed, because it's the first game in a very long time and um I don't know what to expect. I don't know how I will feel after the game or during the game and nervous. I remember the night before, I think it was as if I was playing my first game of rugby ever again. I was just thinking, just overthinking everything really. A lot of bad thoughts going through my mind"* as well as stressed and worried about the knee: *"...the first 20 minutes I think I was a ghost on the field, because I was just a bit worried about my knee."* Once again they reported being afraid of making contact for the first time: *"It's a scary moment, um, I still now remember the first time I was tackled in training the guy was coming from my right hand side and obviously my right knee so when he tackled me literally just stayed down on the ground. I just reached for my leg I felt my knee and straightened my knee and realised I'm good and I got up."* Uncertainty emerged during the final minutes of one participant's return-to-sport interview: *"It's a touchy subject yes, I don't...I don't know what's happening so it's my last year on my contract and they haven't spoken to me yet so I'm taking it they won't sign me again."* Clement et al. (2015) noted negative emotions prior to returning-to-sport as athletes reported being uncertain and cautious. Podlog et al. (2014) mentions anxiety, uncertainty and fear as possible emotional reactions during the return-to-sport phase.

Behavioural responses

Following a successful return-to-sport, this participant still reported avoiding potential dangerous situations: *"...even small things now that I would before my injury not even care about, you know, like walking down the stairs and missing two stairs and stuff like that it's just um it's sort of just changed the way for me a bit. Always just think about my knee with whatever I do now, whether it's on the field"*

and even off the field um I think, cause obviously I try and sort of block that out but uh I think it's just... it's just become a mental thing. Not really in a negative way but just to be more cautious and in what I'll do, because I suppose any small thing can sort of trigger that knee again and something could go wrong. I'm not saying it will happen, but hopefully it doesn't so yes, just anything out of the ordinary, I just sort of take a rain check and say no this isn't for me."

Coping strategies

When asked to reflect on the coping strategies used, this rugby player reported coping with uncertainty by accepting reality and moving on: *"I think if they don't sign me, they don't sign me. If they do, they do. I can only control the controllable. It's very cliché, but you can only do what you can do. Give your best and if your best is not good enough, then you have to move on to a different place."* Some chose to focus on the good days and to stay positive: *"The fact that I knew that there was days that it was good um made...made me sort of stay...stay positive, instead of just going into a negative spiral about things, so I thought the good days outweighed the bad and that gave me a lot of confidence, a lot of positivity just to keep going harder at it."* Others tried to release pent-up emotions: *"...just try and write down, not I would say how you feel, but what you going through. I think uh, I tried to every week write something down and now especially during that first week in Zimbabwe I went back to somewhere in the end of May and it must've been a horrible week, because my notes on my phone wasn't very...very...very positive then, so I think that helped me a lot, because you can sort of see where you were and where you are now and I think I must've said it in one of our first interviews as well and I'm actually very proud of myself that I carried on throughout this entire process."*

Advice and recommendations from injured research participants

Advice for injured athletes

Athletes were asked to draw from this experience and give advice to other athletes. Firstly, this participant reported: *"Be very patient."* Another participant reported patience: *"...have patience, because it is a long injury."* One participant suggested

releasing pent-up emotions: “...*just try and write down, not I would say, how you feel but what you’re going through*” whereas most of the participants suggested hard work and rehabilitation adherence: “...*do everything that you have to do.*” “*You have to work hard otherwise you won’t get to where you want to be.*” “*Don’t go back earlier than the time you are booked off by the doctor, um stay positive and continue to work hard, because um it will heal eventually and come right if not better than what it was*” and “...*do your rehab. That’s...it’s...it’s boring, but it works um, you won’t...you won’t see it immediately, but in a couple of months’ time you will.*”

It appears as if it is important to stay positive: “*If I can give any advice it would be to stay positive, because just from personal experience there is going to be bad times, but um I think also just the hard work you do throughout. There is some reward at the end of the day just that feeling of running out onto the field again.*” Another reported: “...*just stick to the positives, take away the negatives and you will be fine.*” You should trust the process: “...*firstly, trust the process and don’t rush it, because you will get depressed, you will become tired, it will feel long, your knee will hurt, you won’t see results quickly*”, but never be afraid to question it: “*Trust the people who are handling you, but don’t be afraid for a second opinion.*” Lastly, one participant reported: “...*and trust in God.*”

Recommendations for medical professionals

Provide support up to return-to-play: “*I felt at one point before the second operation, um that it was maybe two or three days that they don’t really...not care but...but maybe just want to cut and whatever. I just felt like why me, not why me, but yes it’s...yes it was difficult to describe it’s just that...yes, looking back now it’s almost like they said okay go to [name of specialist] let him sort you out.*” Another recommended to break the monotony and adjust rehabilitation in line with patients’ needs: “...*change up a bit of what we’re doing, because it...you get to a certain stage of you can run now...it’s sort of just do ten 100’s instead of just taking it slow after two 300’s asking how you feeling? Can you do two more? I think when myself and [name of teammate] got to that stage where okay you guys can run now, you*

guys can do a bit of fitness then it was just a case of okay go. I think that part could have been managed a bit better, but I think that was sort of the time when both of us came in the next morning not feeling 100%, but I think apart from that everything was handled very well.” The cyclist felt that the type of graft that was used was important and recommended proper graft selection: “...*the surgery that I had was a big advantage; that I didn’t have to go through the hamstring rehab as well.”*

The above narrative account and discussion include important qualitative data captured during each of the six interviews. Extracts from participants’ transcripts were included to give meaning and to provide the reader with a rich understanding of the athlete’s personal experience of the rupture, reconstruction, rehabilitation and upon return-to-sport. These findings are supported by quantitative data that was gathered throughout the rehabilitation and recovery process. The quantitative data is reported in the next section.

The Knee injury and Osteoarthritis Outcome Score (KOOS)

Participants were asked to complete the self-report KOOS questionnaire prior to each of the six interviews. As the objective of this study was to analyse the personal experiences of participants following ACL rupture, ACLR surgery and throughout the rehabilitation and recovery process, gathering information on participants’ self-perceptions of pain, other symptoms (e.g., swelling, ROM and mechanical symptoms), activities of daily living (ADL), function in sport and recreation (Sport/Rec) as well as knee-related quality of life (QOL) could add value to developing a comprehensive understanding of the rehabilitation and recovery process. According to Vanderzee *et al.* (1996), participants are able to give a better indication of their physical function compared to assessments and interpretations made by medical professionals. Participants were instructed to leave items blank in the Sport/Rec subscale when the question asked was perceived as not applicable and score four when a question in the pain, ADL and Sport/Rec subscales was not applicable due to them being unable to do the movement or being instructed not to perform the movement. The use of a total score is not recommended by the KOOS

scoring guide and, therefore, each subscale was analysed and interpreted separately and then compared with the same subscale for the duration of the six interviews. Results for each participant is reported and visually illustrated below, followed by the mean KOOS results for each subscale. A score of 0 indicates extreme symptoms and a score of 100 indicates no symptoms.

KOOS results: Participant one

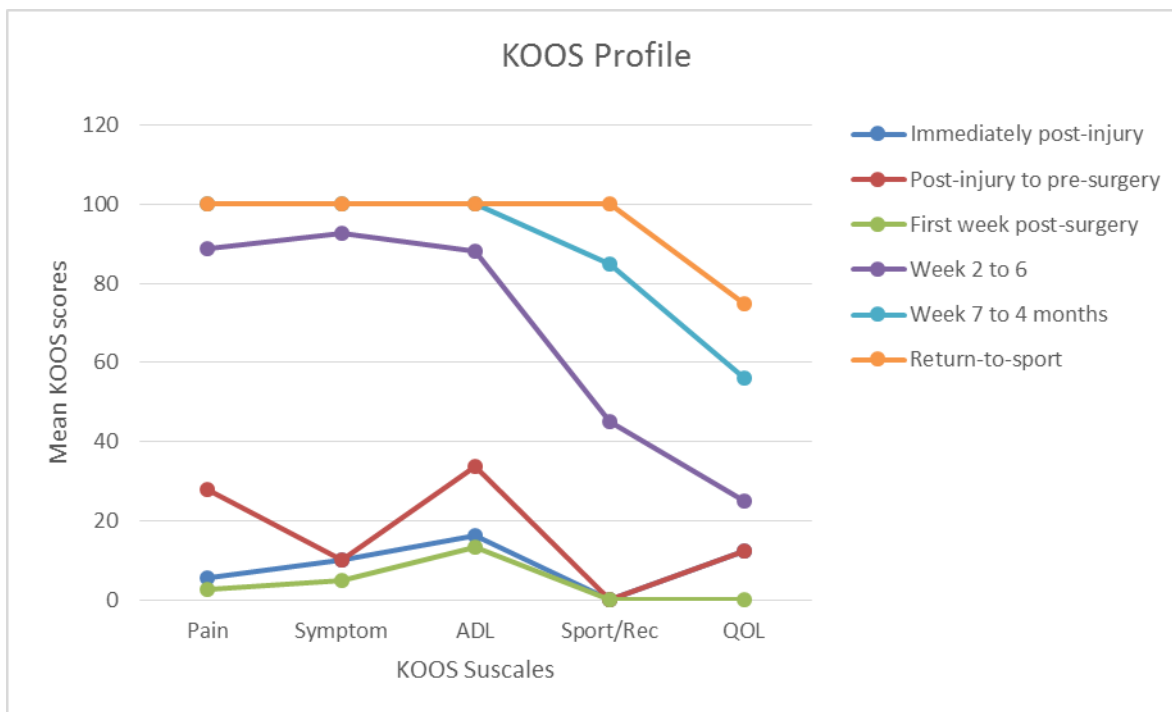


Figure 4.1: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant one.

Participant one (Figure 4.1) is a young professional cyclist who sustained an ACL rupture during a training ride. He underwent ACLR surgery and allograft tissue was used to reconstruct his ACL. He was interviewed in person and was perceived to be confident, relaxed, positive, enthusiastic, self-motivated and eager to return-to-sport. This participant was recruited during the fourth phase of the study (i.e., 2-6 weeks post-surgery) and, therefore, three of the KOOS questionnaires were completed retrospectively. The participant's self-perception for all subscales was at its lowest during the third interview (i.e., one week post-surgery). The second

lowest scores were reported during the first interview (i.e., day of injury). The general trend for all subscales followed an improvement in knee function as the rehabilitation and recovery process progressed. Upon return-to-sport, at approximately five months post-injury, he reported excellent knee function for all subscales except for quality of life. When asked if he still thought about his knee injury after successful return-to-sport, he answered: “*daily.*”

KOOS results: Participant two

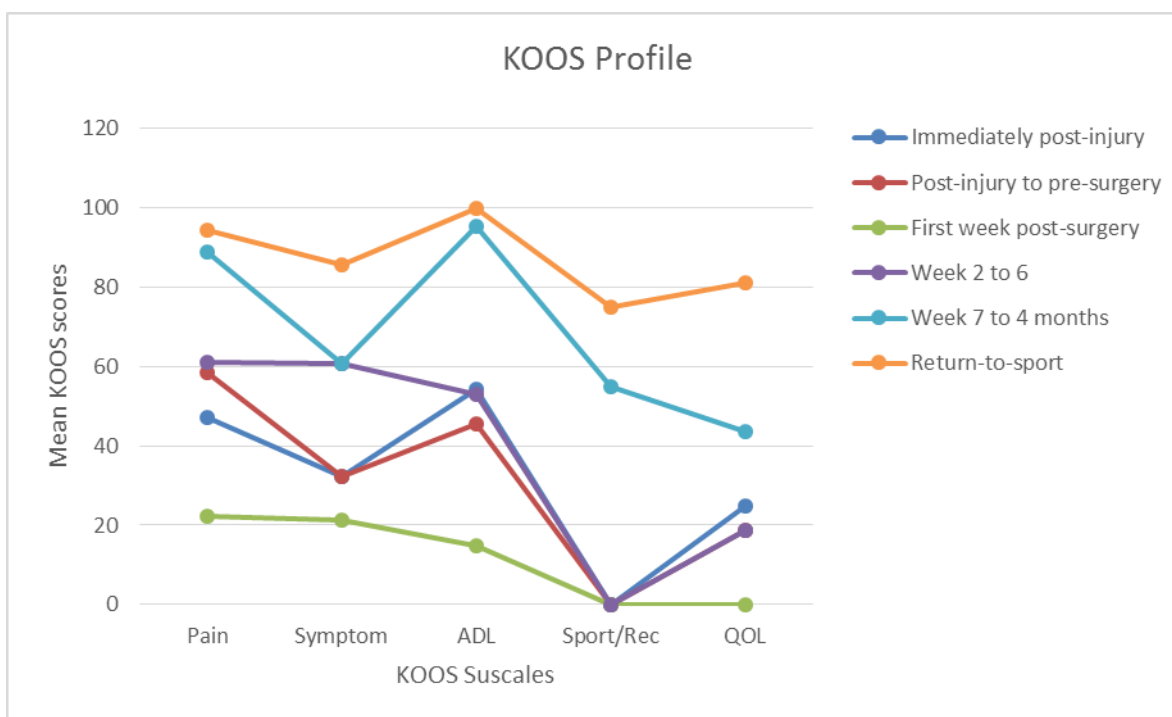


Figure 4.2: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant two.

Participant two (Figure 4.2) is a professional rugby union player and competes at the highest level possible for a provincial player. He sustained a unilateral ACL rupture during a training session and had ACLR surgery within three days of his injury. A quadriceps tendon graft was used to reconstruct his ACL. All of his interviews were done in person and he was perceived to be a friendly, sociable, humorous and easy-going individual who also appeared serious and low spirited at times, especially when asked about the period following surgery, the setbacks he

experienced and about his future. The KOOS questionnaire was used to measure his own perceptions of knee function from the day of injury up until he was able to return-to-sport at approximately nine and a half months following injury. The participant was recruited during phase four (i.e., 2-6 weeks post-surgery) and, therefore, the first three KOOS questionnaires were completed retrospectively. The participant's lowest perception of knee function, for all subscales, was reported during the third interview while he was recovering from surgery and experienced a lot of pain. The scores for all of the five subscales were very similar for interview one and two. Only three days passed between sustaining the injury and undergoing ACLR surgery. Therefore, one would expect that his self-perceptions would be quite similar across these two phases. This participant was instructed not to take part in any sport or recreational activities during the first six weeks post-surgery. This is reflected in the low Sport/Rec subscale scores reported during the first four interviews. As explained earlier, a score of four was given to a question where the answer was left out due to the participant being instructed not to perform the specific activity. Participant two scored a four for all five questions within the Sport/Rec subscale which translated to an overall Sport/Rec score of 0 for the first four interviews. The KOOS data captured during interview four was very similar to interview one, two and three, but an improvement was seen in the symptoms subscale which suggested recovery. Further improvements were seen during interview 5 and the highest scores were present upon return-to-sport (i.e., interview 6). During the last interview, ADL was the only subscale with a score of 100 (reflecting no knee symptoms).

KOOS results: Participant three

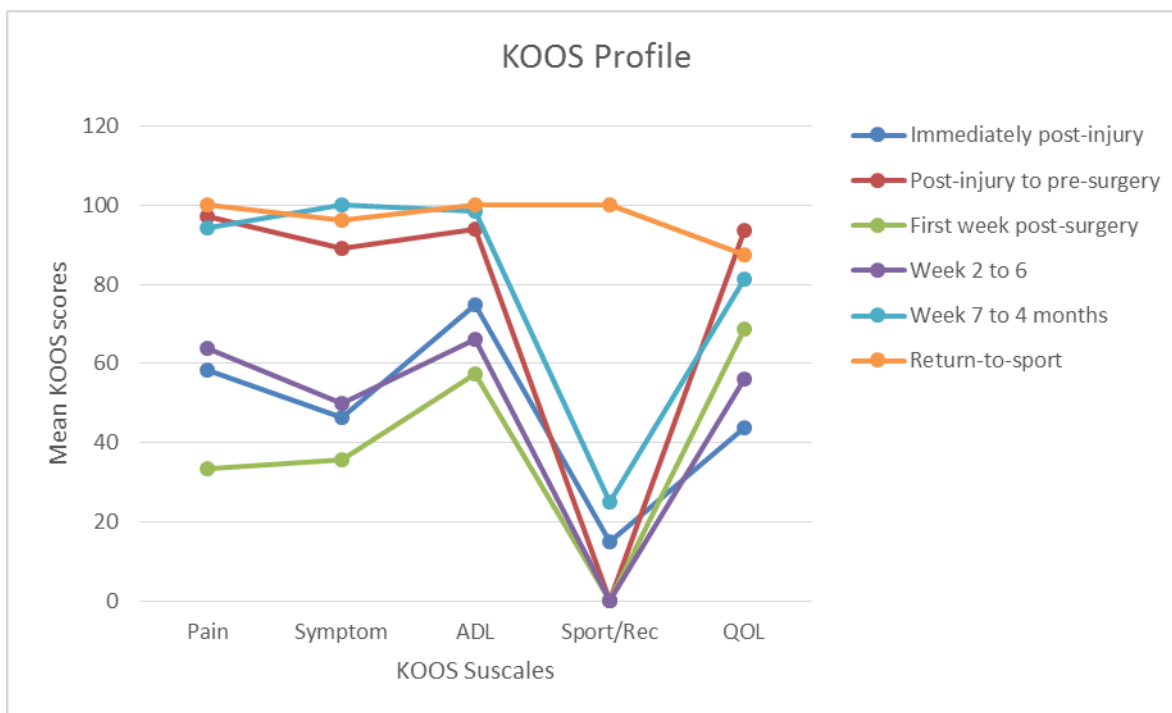


Figure 4.3: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant three.

Participant three (Figure 4.3) is a young individual that plays for a university team and a provincial rugby union. He hurt his knee during a game in the year prior to rupturing his ACL. This injury was not diagnosed and he continued to play throughout the season while being side-lined every now and again for knee pain. He tore his ACL early in the new season during a training session and had ACLR surgery about two weeks later, using his patella tendon as graft. He was interviewed telephonically and although he was not interviewed face-to-face, the researcher perceived him as positive, humorous, playful and determined to cope with adversity. He was serious at times and used his previous rehabilitation experiences to guide himself through the recovery process. His self-reported knee function was measured from the day of injury until he returned to sport at approximately nine and a half months post-injury. His first four KOOS questionnaires were completed retrospectively as he was recruited around 12 weeks post-surgery. His self-reported knee function in terms of pain, symptoms,

ADL and Sport/Rec were at its lowest during interview three (i.e., first week post-surgery). He scored a 0 for the Sport/Rec subscale during interview two, three and four as he was instructed not to do any sport-related movements prior to and following surgery. The participant reported feeling good prior to surgery and this is reflected in his scores during the second interview. An overall improvement was seen in his scores during interview five and he achieved a score of 100, indicating no knee symptoms, for pain, ADL and Sport/Rec upon returning to sport. His QOL did not peak as one would expect when he returned to sport, but during the week prior to surgery. For the symptoms subscale the athlete reported no knee problems during the fifth interview, but this score decreased upon return-to-sport suggesting a possible resurfacing of knee symptoms or a change in self-perception. Interestingly, he did not report any setbacks or difficulties during this interview.

KOOS results: Participant four

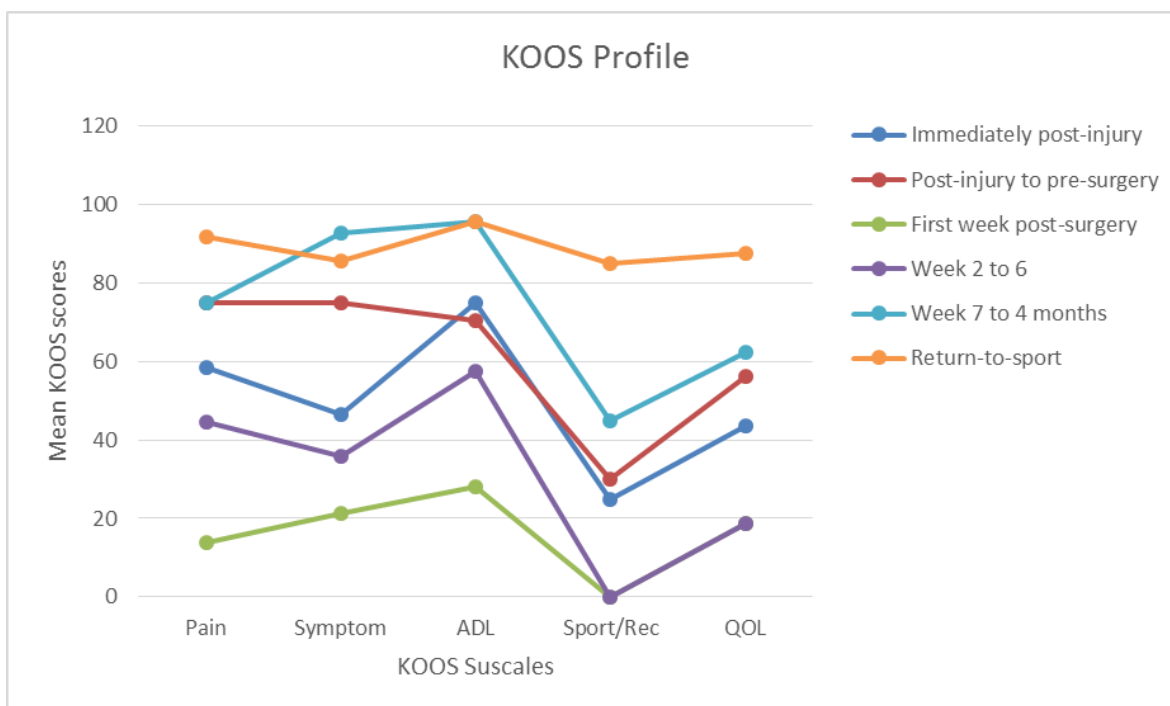


Figure 4.4: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant four.

Participant four (Figure 4.4) is a professional rugby player competing at the highest provincial competitive level. He had no history of previous knee injuries and

ruptured his ACL during a training session. He underwent ACLR surgery within two weeks of his injury and the quadriceps tendon was used to reconstruct his ACL. The participant was recruited at approximately 10 weeks post-surgery and, therefore, four of the KOOS questionnaires were done retrospectively. The KOOS questionnaire captured the participant's self-perceived knee function from the day of injury up to return-to-sport at approximately 10 months post-injury. The participant was perceived to be passionate about his sport, positive, hopeful and determined to return-to-sport. During the first recorded interview the participant stated that he felt fine, didn't think the injury was too serious and that it did not look like what he had seen before. This was reflected in the moderate scores captured during the initial interview. The lowest scores were reported during interview three (i.e., first week post-surgery) with the participant scoring 0 for Sport/Rec due to not being able to perform any sport-related activities. An overall improvement was seen in the QOL subscale as the athlete progressed, with the highest score reported upon returning to sport. The symptoms subscale score decreased upon return-to-sport, suggesting a possible resurfacing of symptoms or a change in his self-perception. This participant did not achieve 100 for any of the subscales upon return-to-sport and, therefore, still perceived his knee as being slightly problematic and not symptom free.

KOOS results: Participant five

Participant five (Figure 4.5) represents a university rugby team and also competes at provincial level. He reported no previous injuries and ruptured his MCL and ACL during a warm-up game. He had ACLR surgery within a week of the injury using his hamstring tendon. He was recruited within four weeks of the initial injury and, therefore, the first three questionnaires were completed retrospectively. Throughout the rehabilitation and recovery process he was perceived as very calm, patient, focused and confident in his ability to recover to his pre-injury participation level. When analysing his KOOS scores it seemed like he experienced the highest levels of pain immediately following injury and it decreased during each phase as he progressed to return-to-sport. His symptoms subscale score improved as his

recovery progressed. He scored 100 for pain, ADL and Sport/Rec upon return-to-sport, but scored relatively low on his QOL subscale, suggesting that he still perceived the injury as having a negative influence on his quality of life. Overall, his scores were the lowest during the first three interviews and improved as he progressed. He returned to sport at approximately 11 months post-injury.

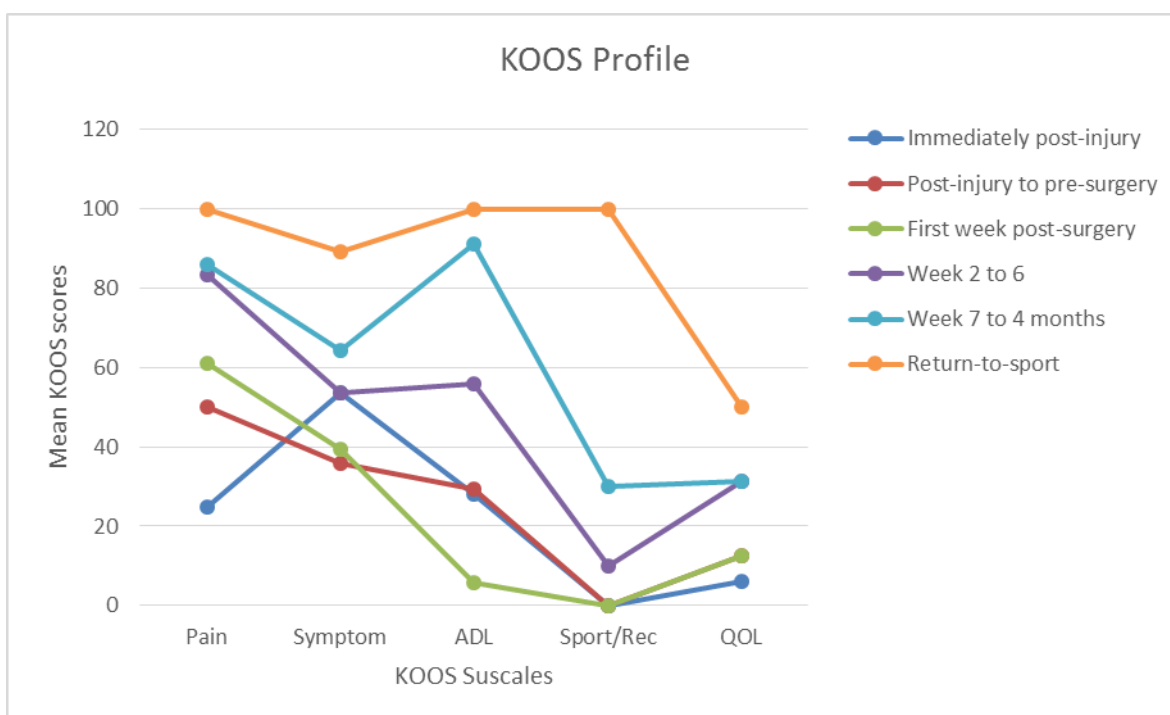


Figure 4.5: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant five.

KOOS results: Participant six

Participant six (Figure 4.6) is a university rugby player who also competed at a provincial level and had never had any knee injuries prior to rupturing his ACL during a training session. He underwent ACLR surgery at about three and a half months following injury and his patella tendon was used to reconstruct his ACL. The participant was recruited approximately five weeks post-surgery and, therefore, his first three KOOS questionnaires were completed retrospectively. He was interviewed telephonically and perceived to be a very positive, friendly, spirited and self-motivated individual who progressed quickly. Interestingly, the

researcher's perception of the participant's fast progression was not reflected in his own perception of knee function as shown in Figure 4.6. During most of the recorded interviews, he reported progressing ahead of schedule. However, during the sixth interview (i.e., upon return-to-sport) he only rated his knee function as problem-free for the ADL subscale. Apart from the symptoms subscale, all other subscales recorded their lowest value during the third interview. The highest subscale scores were reported upon return-to-sport, except for the symptoms subscale. The participant reported above average scores for pain during all six interviews. He returned to play at around eight months post-injury.

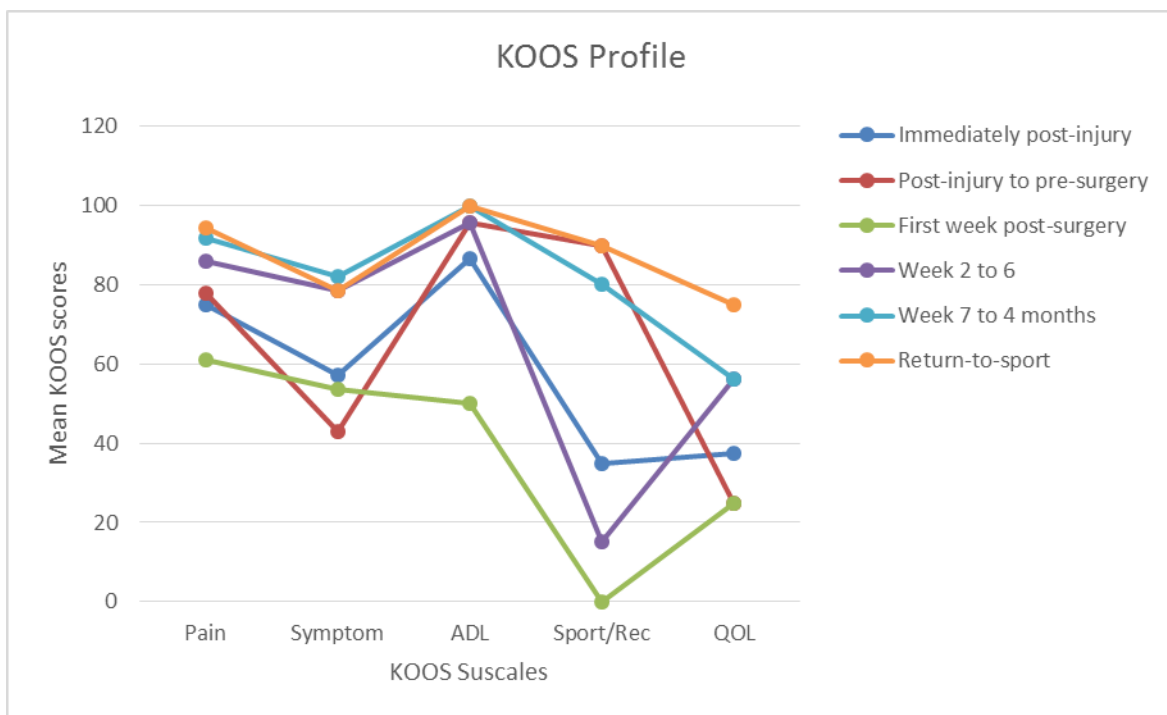


Figure 4.6: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant six.

KOOS results: Participant seven

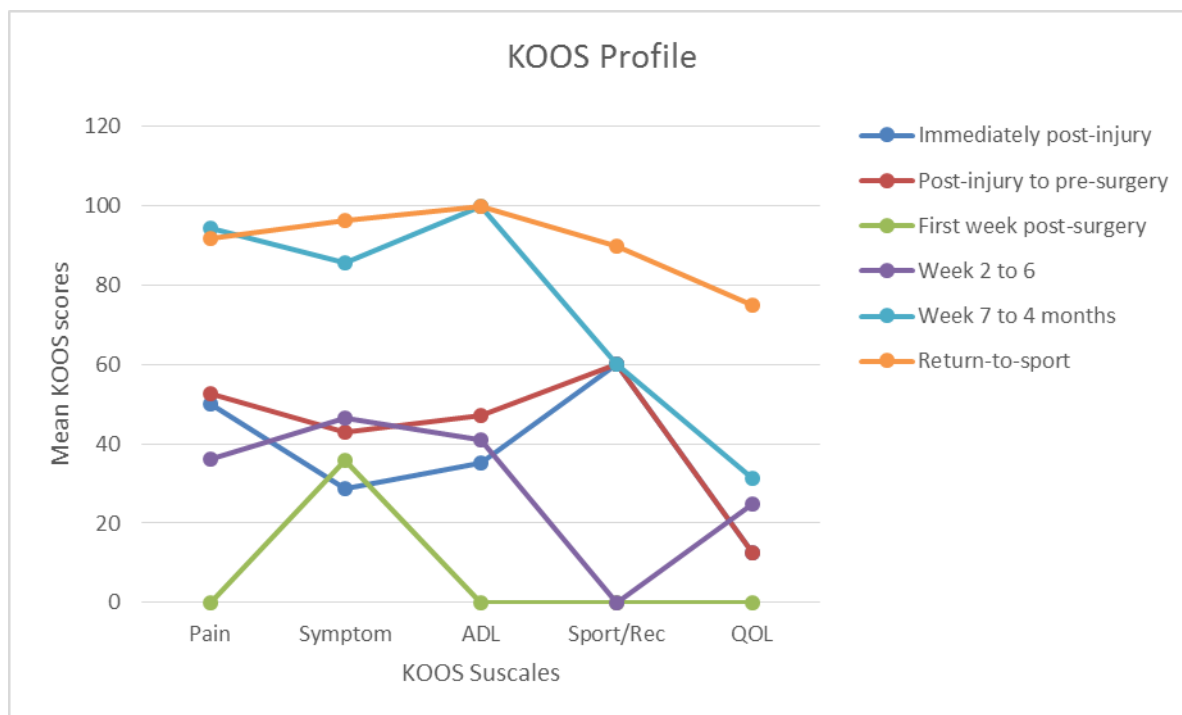


Figure 4.7: The Knee injury and Osteoarthritis Outcome Score (KOOS) profile of participant seven.

Participant seven (Figure 4.7) is a professional rugby player that competes locally as well as internationally. He sustained a unilateral ACL rupture during a training session and had ACLR surgery within a month of the initial injury. His patella tendon was used to reconstruct his ACL and he was recruited at about eight weeks post-surgery. Therefore, four of the KOOS questionnaires were done retrospectively and he returned to sport at approximately eight and a half months post-injury. He was interviewed telephonically and was perceived to be composed, serious, self-motivated and level-headed. He did not experience any setbacks as reflected in the improvements seen as he progressed through interviews four, five and six. His lowest scores for all subscales, except for symptoms, were reported during the third interview (i.e., first week following surgery) with all subscales, except for pain, achieving their highest scores upon return-to-sport. This participant was instructed not to take part in any sport or recreational activities following surgery and scored 0 for the Sport/Rec subscale during interviews three and four.

ADL was the only subscale in which he achieved the maximum score of 100 upon return-to-sport. Similar scores were reported during interview one and two with small improvements seen in the pain, symptoms and ADL subscales.

Mean KOOS scores

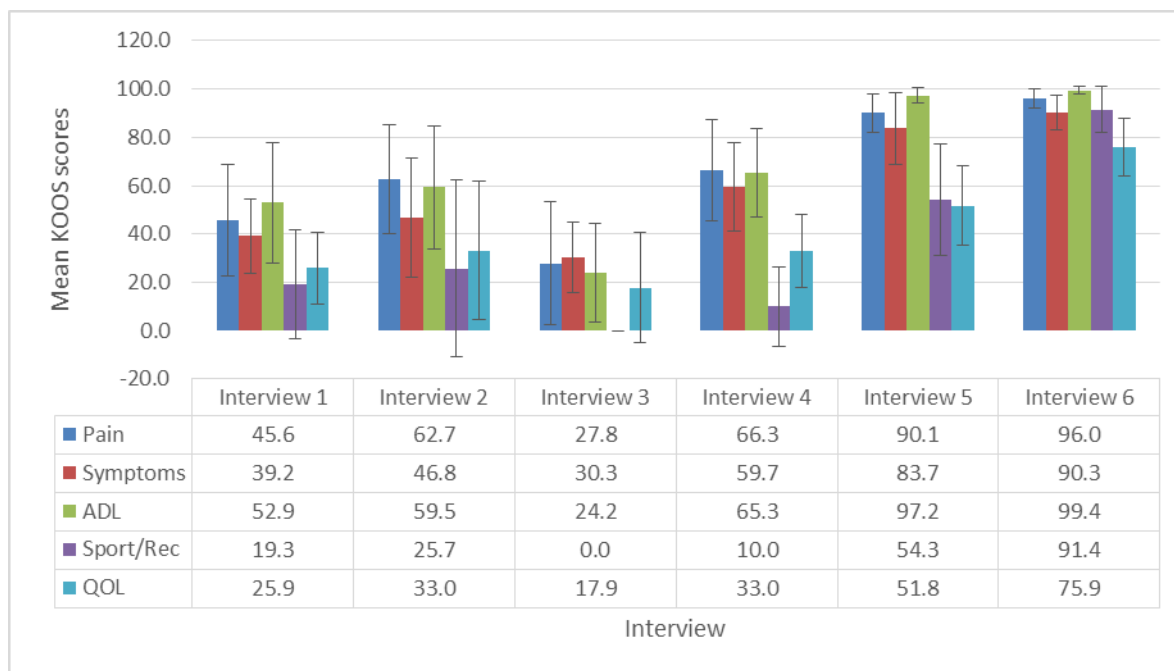


Figure 4.8: Mean KOOS scores for all subscales.

Table 4.7: Standard Deviation (SD) scores for all five KOOS subscales.

Subscales	SD scores					
	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Interview 6
Pain	±23.2	±22.6	±25.4	±20.9	±8.0	±3.9
Symptoms	±15.3	±24.9	±14.5	±18.3	±14.8	±7.1
ADL	±25.1	±25.5	±20.4	±18.2	±3.1	±1.5
Sport/Rec	±22.6	±36.4	±0.0	±16.6	±23.0	±9.4
QOL	±14.7	±28.7	±22.8	±15.2	±16.6	±11.8

The mean KOOS scores (Figure 4.8) were calculated for each of the five subscales. This was done for each of the six interview phases. When comparing the results of all seven participants, the lowest mean KOOS scores were reported

during the third interview (i.e., first week post-surgery). Three participants reported their poorest knee function scores on each of the five subscales during the first week post-surgery. These results are not unexpected as one would assume that the surgery itself would cause the greatest amount of pain and resulting symptoms, as well as limited functioning, leading to an interruption of sport and recreational activities. This will probably have a negative impact on the athlete's QOL. Gupta *et al.* (2016) stated that pain following ACL surgery is an unpleasant experience that might act as a barrier to exercise and that it is present regardless of the type of graft used.

The highest mean KOOS scores, for all the subscales, were reported upon return-to-sport. Interestingly, none of the participants scored 100 for QOL upon return-to-sport. The subscale in which the best scores were obtained (mean score of 99.4) was ADL with six of the seven participants scoring 100 upon return-to-sport. Overall, the mean KOOS scores, for all subscales, were low at the onset of injury, improved during the period prior to surgery, reached their lowest values immediately post-surgery and then increased with each passing phase as the participant progressed towards return-to-sport. The present study's results were compared to the reference values suggested on <http://www.koos.nu>. The normative KOOS values reported by Ageberg *et al.* (2010) included preoperative-, one year postoperative- and two years postoperative scores. However, all of the participants enrolled in the present study returned to sport within one year of undergoing ACLR surgery and, therefore, the results of the present study could only be compared to the preoperative KOOS reference data. In the present study, two interviews were done preoperatively but the first interview only focused on the day of injury and, therefore, the data from the second interview was compared to the preoperative data from Ageberg *et al.* (2010).

The mean KOOS scores (Figure 4.8) for the pain, symptoms, ADL, Sport/Rec and QOL subscales are all lower than that reported by Ageberg *et al.* (2010) who reported mean KOOS scores of 75.1, 68.9, 84.2, 42.7 and 34.0 respectively. It should be noted that although the above mentioned study included male patients

who underwent ACLR surgery, the population differed from the one used in the current study. Therefore, better comparisons could be made if the study population and methodology was similar to that of the present study. To the best of my knowledge there is no KOOS data available on the exact phases as outlined in this study.

ACL-RSI scores

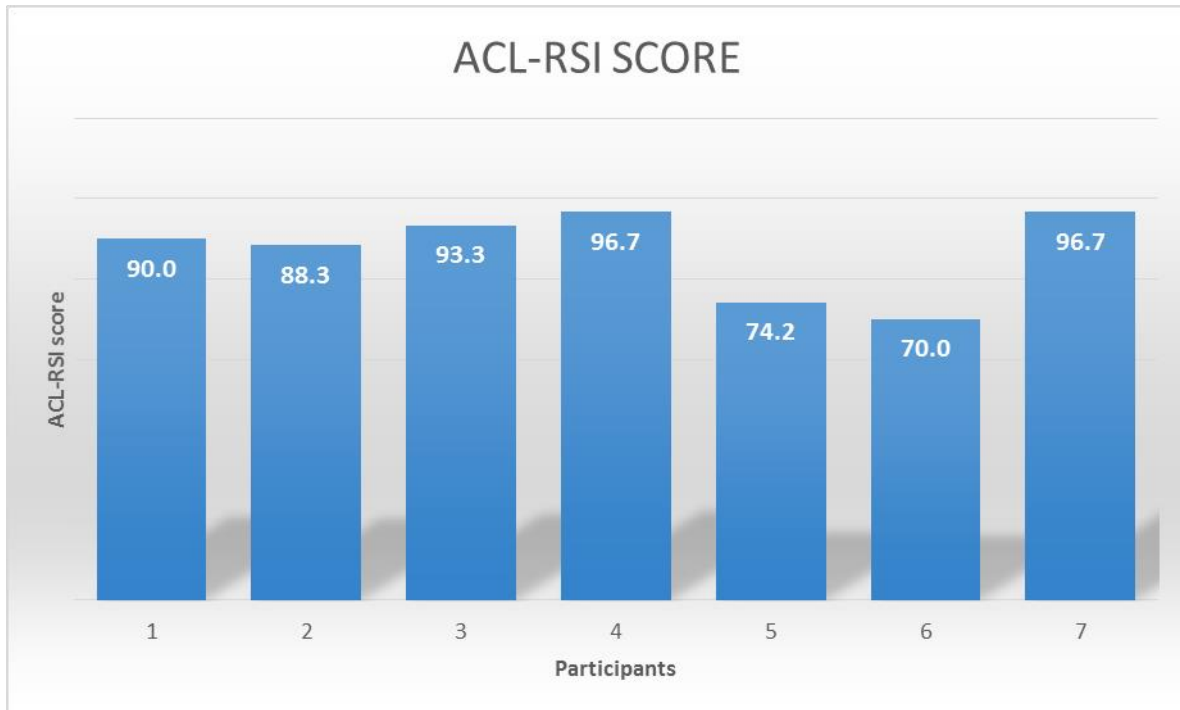


Figure 4.9: A visual representation of the ACL-RSI score for each of the seven participants.

As seen in Figure 4.9, participants four and seven achieved the highest ACL-RSI score (96.7 out of 100) indicating a more positive psychological response to return-to-sport compared to the other participants. Both of these participants were professional rugby players who competed at the highest provincial level. Although the present study's sample size was small, it's interesting to note how the mean ACL-RSI score compares to that of Kvist *et al.* (2013) and Ardern *et al.* (2014). In both these studies a 10-point version of the ACL-RSI was used to predict return-to-sport and found that athletes who returned to the same activity on average scored above 7.0 out of 10 and 6.2 out of 10 respectively. The average ACL-RSI score for

the present study is 87 out of 100 following clearance to return-to-sport. This score is higher than the scores reported by Kvist *et al.* (2013) and Ardern *et al.* (2014) and all seven participants did return-to-sport and are currently still participating in their sport.

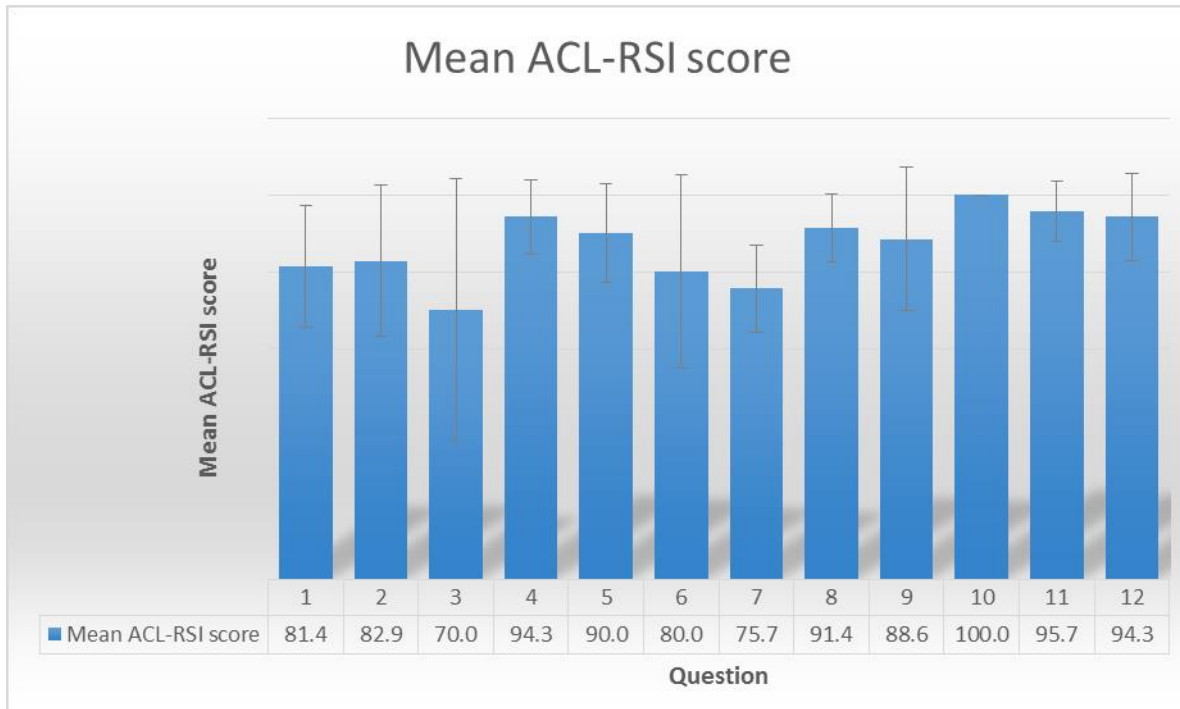


Figure 4.10: A visual representation of the mean ACL-RSI score for each of the 12 questions asked.

Table 4.8: ACL-RSI SD scores reported for each of the 12 questions asked.

Question	1	2	3	4	5	6	7	8	9	10	11	12
SD	±15.7	±19.8	±34.2	±9.8	±12.9	±25.2	±11.3	±9.0	±18.6	±0.0	±7.9	±11.3

Figure 4.10 and Table 4.8 represents the mean ACL-RSI score and SD values reported for each of the 12 questions. Question three measured nervousness and yielded the lowest mean score (70 out of 100; SD = 34.2). However, one participant scored much lower than the other six which might have skewed the data. The high SD value demonstrates the high variability in responses to question three. Question seven measured fear of re-injury and yielded the second lowest

mean score (75.7 out of 100; SD = 11.3). Fear of re-injury seems to be an emotion that remains present up to return-to-sport and might even be present for much longer. Kvist *et al.* (2005) reported fear of re-injury as one of the most common reasons athletes do not return-to-sport. All of the participants scored an average score of 100 (SD = 0) for question 10. Question 10 measured cognitive risk appraisal and asked if thoughts of having to go through surgery and rehabilitation again would prevent them from playing their sport. An average score of 100 relates to a very positive risk appraisal, suggesting that athletes were willing to return-to-sport regardless of the possibility of re-injury or sustaining a new injury. According to Tracey (2003), cognitive risk appraisal plays an important role in the rehabilitation and recovery process by influencing athlete's emotional and behavioural responses. The mean scores for all three questions relating to athletes' confidence in their knee function were above 90 out of 100 while achieving a lower mean score of 81.4 out of 100 (SD = 15.7) when asked about their confidence to be able to perform at their previous level of sport participation (question 1). Interestingly, the participants scored much higher (95.7 out of 100; SD = 7.9) when asked about their confidence in their ability to perform well at sport compared to their confidence about participating at their previous level (question 11). This suggests that they are confident that they will perform well but less convinced of performing as well as before the injury. These results suggest that there might be a difference in athletes' confidence levels relating to their knee function and their overall confidence in sport. This information might be helpful during the rehabilitation and recovery process especially prior to returning to play. Upon return-to-sport, Quinn and Fallon (1999) reported an increase in athletes' confidence levels, as well as an increased confidence in their ability to be as successful as before the injury.

Chapter Five

Summary

The aim of this study was to explore and analyse the personal experiences of athletes who ruptured their ACL and underwent ACLR surgery at various time intervals of the postoperative recovery period and upon return-to-sport. The objectives of this study were to provide a rich narrative and thick description of the personal and situational factors that influences an athlete's response to an ACL injury and undergoing reconstruction surgery; their cognitive appraisal of the injury and recovery process; their emotional response to the injury and recovery process; as well as their behavioural response to the injury and recovery process. The afore-mentioned factors were captured during the following phases:

- Immediate post-injury (the day of the injury)
- Preoperative (first day post-injury up to surgery)
- Postoperative (phase 1) - Acute recovery from surgery (surgery and first week post-surgery)
- Postoperative (phase 2) - Repair (weeks 2 to 6 post-surgery)
- Postoperative (phase 3) - Remodelling (week 7 to 4 months post-surgery), and
- Return-to-sport (time dependent on meeting the criteria for return-to-sport).

This study followed the journey of seven competitive male athletes as they reported their experiences of the ACL rupture, ACLR surgery, rehabilitation, recovery and return-to-sport. At the time of recruitment, six of the participants were provincial rugby players with three of them competing at local, as well as international level and one participant was a professional cyclist. Participants were recruited within 12 weeks of sustaining a unilateral ACL rupture. Data in line with the afore-mentioned aims and objectives were captured during six phases through the use of face-to-face or telephonic semi-structured interviews with the final data collection happening in the week following return-to-sport. Each of the interviews were transcribed verbatim and analysed for themes in line with the present study's

aims and objectives. Not only did the emergent superordinate themes, themes, subthemes and categories of codes capture information in line with the aims and objectives of this study, but valuable information emerged during the final interview as participants gave advice to athletes who may experience the same injury in the future, as well as recommendations to medical professionals. The analysis gave rise to a total of six superordinate themes and these included establishing identity, cognitive appraisal, responses (emotional and behavioural), coping strategies, types of social support and advice and recommendations. The last-mentioned superordinate theme was specific to the return-to-sport phase. The following paragraphs summarise the superordinate themes captured during the rupture, reconstruction, rehabilitation and return-to-sport phases on the road to recovery.

Rupture

A total of five superordinate themes emerged and included establishing identity, cognitive appraisal, responses to injury, coping strategies and types of social support. Identity emerged as participants referred to their athletic identity (i.e., the way in which an individual identified with his athletic role) and/or personal identity (i.e., an idea constructed about oneself in terms of beliefs, attributions, values and personality traits). When asked to talk about themselves most of the participants immediately associated some part of who they were with their role in sport. A wide variety of references to athletic identity emerged during the first interview as participants spoke about their career development, injury history and the meaning they found in sport. Participants strongly associated with their athletic identities as they reported feelings of passion, joy and love towards sport. For the purpose of this study the personal identity theme included beliefs, personality traits and a self-concept that made up the participant's personality. References to personal identity were perceived to emerge as athletes tried to explain why they do what they do, and was not limited to a specific phase. Establishing a personal self relates to establishing a self that is separate from the one related to sport. Participants started to refer to a self, separate from sport immediately after sustaining the injury. During the first interview, one participant attributed certain outcomes to luck and

perceived himself as laid-back whereas another participant reported the importance of having a balanced life.

The cognitive appraisal of the rupture captured participants' self-perceived cause of the injury. The ACL injuries sustained by the rugby players happened as a result of being tackled while carrying the ball, performing a cutting and evasive motion or landing from a jump. The cyclist ruptured his ACL by landing on his heel following a jump. After sustaining the injury, participants reported a wide range of symptoms including pain, a "pop" sound, instability, sensitivity, stiffness and swelling. Most of the participants perceived the injury as serious and season-ending. This self-perceived poor knee function is supported by the quantitative data as the second lowest mean KOOS scores for pain, symptoms, ADL and QOL were reported on the day of injury.

Following injury, some participants mentioned lost travel opportunities while others associated certain benefits with being injured. These benefits included increased motivation, personal growth and having more time available. Participants experienced emotional as well as behavioural responses to injury. Following injury, facilitative emotional responses emerged such as excitement, hope and positivity. However, most of the post-injury reactions seemed to be debilitating in nature and included feeling confused, depressed, disheartened, disappointed, frustrated, negative and stressed. Participants also reported fear of the unknown, being in denial and having trouble accepting reality. The injury itself led to certain behavioural reactions as participants reported drawing from past experiences and adjusting their lifestyles to cope with the present adversity experienced.

Specific coping strategies were implemented throughout the study but avoidance coping was the only strategy reported following injury as athletes reported avoiding and/or withdrawing themselves from specific situations.

Three types of social support emerged on the day of injury and included emotional support from family, friends, teammates and medical professionals; informational

support from medical professionals (e.g., doctor, physiotherapist) and tangible support from family, friends, teammates and medical professionals.

Reconstruction

During this phase, emergent themes prior to and following ACLR surgery was captured and reported. A total of five superordinate themes emerged and included establishing identity, cognitive appraisal, responses (emotional and behavioural), coping strategies and types of social support.

Prior to surgery, references to athletic identity were limited to career development and did not emerge immediately post ACLR surgery. However, references to personal identity were made prior to and following ACLR surgery. Some participants reported relying on their faith to cope with injury and attributed a successful surgical outcome to a higher power. Their faith seemed to provide a sense of security during a difficult time. Following ACLR surgery, participants continued to establish a self, separate from sport and another personality characteristic emerged as one participant referred to himself as independent.

Following injury, participants visited various orthopaedic surgeons to examine knee function and to diagnose the injury. The confirmed diagnosis was a unilateral ACL rupture and was mostly appraised as negative. Some participants reported receiving the wrong diagnosis while others questioned the diagnosis and sought a second opinion. Some of the participants even held negative perceptions about the surgeon, possibly due to information passed on by other players. The injury itself was mostly appraised as negative and participants seemed to have certain existing perceptions about the severity of ACL injuries. Prior to surgery participants reported pain, stiffness, feeling uncomfortable and poor knee function. One participant reported being pain free. The quantitative KOOS data reflected a slight improvement in knee function prior to surgery as the mean KOOS scores improved across all subscales (pain, symptoms, ADL, Sport/rec and QOL). Participants appraised the upcoming surgery and reported having confidence in their surgeon's abilities. This confidence remained present after surgery. Some of the participants

received regional anaesthesia and was able to watch the surgery being performed. This was not perceived as a negative experience and led to a further increase in confidence in their surgeon's abilities. Following surgery, participants became aware of the disabling effect of surgery and reported feeling drowsy, sleepy and uncomfortable. Participants reported knee pain, swelling, sensitivity and poor knee function. One participant reported a headache whereas another reported feeling no pain. Participants reported their poorest knee function post-surgery and this was supported by the lowest mean KOOS scores captured, for all subscales, throughout the duration of this study. During this time period participants appraised the upcoming rehabilitation and recovery process and reported a recovery timeline ranging from six to nine months. Most of them realised that they would be out for the rest of the year and appraised the rehabilitation process as either positive or negative. Positive appraisals included being motivated, believing in their own value and having a good coach-player relationship. Participants that appraised the rehabilitation process as negative, noted that ACL injuries are serious, season-ending and possibly career-ending. The rehabilitation process was perceived as boring and challenging. One participant reported hating the disabling effect of walking with crutches. Once again lost opportunities were reported and included lost social, sport and travel opportunities. A new type of loss emerged as one participant reported losing his independence. Participants were still able to associate certain benefits with being injured and reported increased motivation and having more time available.

Emotional and behavioural responses were reported both prior to and following surgery. Prior to surgery, participants mentioned facilitative reactions such as acceptance, appreciation, excitement, happiness, hope, positivity and relief. These reactions remained present following surgery. Participants also reported feeling confident and motivated post-surgery. Prior to surgery the participants reported experiencing denial, disappointment, fear, negativity, problems accepting reality, sadness, shock and stress. Participants also reported feeling nervous and hopeless. Following surgery fear of the unknown was replaced by fear of the

surgical outcome. Participants reported feeling depressed, frustrated, negative, nervous, sad and stressed. New debilitating reactions emerged and included feeling distressed, useless and grumpy. Not all responses were exclusively facilitative or debilitating as some participants reported a neutral response where they did not perceive the situation as positive or negative. Behavioural responses were reported and included acting confident in a difficult situation, drawing from previous experiences, dwelling on the injury, questioning adversity, lifestyle adjustments, pushing on through injury and seeking social support.

To cope with adversity, participants implemented approach- and/or avoidance-orientated coping strategies. Approach-orientated coping involved accepting reality and moving on, positive self-talk and the use of social support. Avoidance-orientated coping involved avoiding or withdrawing oneself from a situation and keeping busy by doing something that you enjoy.

Three types of social support emerged during this time period and include emotional, informational and tangible support. Emotional support (e.g. motivation, support and companionship) was provided by family, friends, teammates and medical professionals (e.g., doctor, physiotherapist) both prior to and following surgery. Following surgery, one participant mentioned his coach as a source of emotional support and another reported receiving emotional support from an older and more experienced rugby player. Informational support (e.g., advice, feedback) was provided by family and medical professionals throughout this time period. Prior to surgery a new source of informational support emerged as participants report receiving advice from previously injured players as well as using the internet as a source of informational support. Tangible support (e.g. services provided, physical assistance) was offered by family, friends, teammates and medical professionals. A new source of tangible support emerged post-surgery as participants mentioned nurses attending to them within the hospital environment. During this time period support offered by medical professionals were limited to that of the doctor, physiotherapist and hospital nurses.

Rehabilitation

Although mentioned already, athletic identity became less apparent as athletes progressed through the rehabilitation and recovery period. This reduction in athletic identity was interpreted as a form of self-protection; to protect their sense of self. References to personal identity remained present throughout the rehabilitation process as participants continued to refer to a self, separate from sport. Personality traits were mentioned in reaction to questions about coping and emerged throughout the rehabilitation process. During the early rehabilitation period, personality characteristics emerged that included being independent and impatient. Personality characteristics remained present during the mid to late rehabilitation period as one participant referred to himself as a positive individual and another as being paranoid. Impatience, once again, emerged during the final rehabilitation period while another participant reported being optimistic. In both the early and late rehabilitation phases, impatience emerged in reaction to slow progress.

Pain, swelling and stiffness was common during the rehabilitation period while good knee function emerged as participants started to progress towards recovery. The quantitative data also reports progress and improved knee function as seen in the steady increase in the mean KOOS scores achieved for pain, symptoms, ADL, Sport/Rec and QOL as participants progressed through the rehabilitation phases. During the early rehabilitation phase, positive appraisals emerged as participants reported a strong belief in own value, feeling motivated, realised the importance of proper and individualised rehabilitation and were able to regain some sense of independence. Participants reported receiving good social support from medical professionals throughout the rehabilitation process. Participants also seemed to realise that recovery involved more than just the physical. During the mid to late rehabilitation period, participants reported being back to their “old self” as they started to regain independence, mobility and confidence. During the final phase rehabilitation period the biokineticist was appraised as being a positive source of social support. Participants reported having a good relationship with their

biokineticist and had confidence in their abilities. Most of the participants had a positive rehabilitation and recovery experience. However, not all of their cognitive appraisals were positive. During the early to mid-rehabilitation phase, rehabilitation was appraised as a long, boring, challenging and repetitive process. Participants realised that failure to return-to-sport could end their career. Towards the mid to late rehabilitation phase, participants appraised the injury as a mental hurdle that they needed to overcome and reported that they still lacked fitness. One participant felt pressured and another pushed himself too hard and subsequently experienced an injury setback. Although participants reported receiving good social support, one participant mentioned poor coach-player interaction. Another reported that his biokineticist was overcautious and a barrier to his progress during the final months prior to returning-to-sport. According to two of the participants, starting to run was deemed to be the most difficult part of the rehabilitation process. Once again, participants mentioned benefits associated with injury. Newly emerged benefits included realising who their true friends were and gaining a new perspective on life. Participants mentioned losing sources of social support (e.g., medical professionals, coach) during the late rehabilitation phase.

A variety of emotional reactions emerged that included facilitative as well as debilitating responses. Relief emerged during the early rehabilitation phase. Facilitative responses such as acceptance, appreciation, confidence, excitement, happiness, hope, motivation and positivity emerged throughout the rehabilitation process. Participants reported feeling frustrated, hopeless, impatient, irritated, negative, nervous, sad, stressed and useless. Fear emerged as the most dominant debilitating reaction as participants reported fear of re-injury, first contact, the unknown and not being able to participate at their previous performance level. Behavioural responses were similar to those reported previously, however, participants mention avoiding potential dangerous situations in reaction to their fear of re-injury.

Approach-orientated coping strategies mentioned during the rehabilitation period included accepting reality and moving on, positive self-talk, goal setting, releasing

pent-up emotions and the use of social support. Avoidance-orientated coping involved avoiding injury related thoughts or withdrawing oneself from specific situations. Some participants also kept themselves busy by doing something that they enjoyed.

Participants received emotional, informational and tangible support throughout the rehabilitation process. Although all sources and types of social support remained similar to those mentioned in earlier phases, the biokineticist emerged as a new source of emotional (e.g., motivation), informational (e.g., advice, feedback) and tangible support (e.g., physical rehabilitation exercises). Although they remained present, the role of the doctor and physiotherapist seemed to diminish as the biokineticist's role became more prominent. During the early and late rehabilitation phase some of the research participants emerged a source of social support as participants reported supporting their team from the sidelines and giving advice and guidance to other injured players.

Return-to-sport

Although one participant still mentioned athletic identity and the love he had for his sport, the disassociation with athletic identity continued up to return-to-sport and this participant seemed to have strengthened his personal identity as he realised that there was a life outside of rugby.

Prior to and following return-to-sport most participants reported being pain free with good knee function. All of the participants successfully completed their rehabilitation programmes, were cleared for participation and returned to sport. As expected, the highest mean KOOS scores were reported upon return-to-sport as participants scored within the 90th percentile for the pain, symptoms, ADL and Sport/Rec subscales. This reflects a self-perception indicative of good knee function. The lowest SD values for the mean KOOS scores were calculated upon return-to-sport, indicating less variability in athletes' self-perception of pain, symptoms, ADL, Sport/Rec and QOL. As they returned to sport, they realised that months of hard work had paid off. For the rugby players, physical contact after the

injury became the event that revealed whether or not their rehabilitation had been successful. They all reported coming through the first contact unscathed and this positive appraisal resulted in an increase in their confidence levels. Positive appraisals included being back to their old self, doing better than expected and participating at their previous levels of play. The participants seemed to have had a positive return-to-sport experience and were positive about their future. These positive appraisals were supported by an average ACL-RSI score of 100 on item 10. An average score of 100 relates to a very positive risk appraisal. The SD score for this item was 0, indicating no variability when answering this question. In other words all participants were willing to return-to-sport regardless of the possibility of re-injury or sustaining a new injury. Not all of these appraisals were positive as one participant reported not being at his previous level of functioning and another being uncertain about his future. Some of them realised that they still thought about the injured knee and needed to recover psychologically as well. Lastly, one of the professional rugby players realised that returning to sport meant having less available time to spend with loved ones. The mean KOOS score for QOL (75.9) reflects these negative appraisals as this was the only KOOS subscale to achieve a score below the 90th percentile upon return-to-sport. Upon return-to-sport the participants reported two new benefits associated with adversity and these included gaining knowledge about physical functioning and having grown in faith.

Emotional responses following return-to-sport were mostly facilitative and included appreciation, confidence, excitement, happiness, hope, motivation and positivity. Debilitative responses were still present following successful return-to-sport and included feeling nervous, stressed and uncertain. Question three of the ACL-RSI measured nervousness and reported the lowest mean ACL-RSI score and the highest SD score measured. This quantitative data affirms the presence of nervousness. The high SD score substantiates a high variability in the experience of this emotion among athletes. In other words, some participants felt very nervous prior to returning to sport whereas nervous emotions did not affect other athletes' self-perceived readiness to return-to-sport. Fear of re-injury remained present upon

return-to-sport and the lower SD value scored for this item emphasizes its negative effect on all of the athletes' readiness to return-to-sport. Participants only reported approach-orientated coping during this time period. Focusing on the good days/ staying positive emerged as a new coping strategy.

It should be mentioned that one of the rugby players achieved his life-long dream of playing for the South African national team following return-to-sport and although his knee was physically recovered, he still played with a knee brace. A few months after returning to sport, this player was contacted telephonically and asked why he was still playing with his brace. He said: "...*they gave me the option to play without it, but I decided to only do so from next season.*", hinting towards the psychological aspect of recovery that tends to take slightly longer.

Recommendations for athletes and medical professionals

After months of rehabilitation and recovery, participants are ideally equipped to provide feedback, advice and recommendations to future injured athletes, as well as medical professionals involved in the rehabilitation and recovery process. It should be noted that these recommendations were made by the participants of this study after reflecting on the rehabilitation and recovery process. The advice and recommendations for athletes who will, in future, go through the same process are listed below:

- Be patient
- Release pent up emotions
- Adherence to the rehabilitation programme is important
- Stay positive
- Trust the process but don't be afraid to question it
- Trust in God, and
- Work hard.

Recommendations for medical professionals:

- Choose the most suitable graft for the patient, specifically in line with the performance aspirations of the athlete

- Adjust the rehabilitation timeline in line with patients' individual needs and speed of recovery
- Break the monotony, and
- Provide support up to return-to-sport.

Link with literature

Three types of models were discussed in the literature review to establish a theoretical framework and included a discussion of stage models, cognitive appraisal models as well as the biopsychosocial model. Upon reflection the researcher identified two models that share certain similarities with the results of the present study and include the Kübler-Ross (1969) grief-response model and the Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process (Wiese-bjornstal *et al.*, 1998).

The present study found support for four of the five stages of grief as described in the Kübler-Ross (1969) model. Denial was reported on the day of injury, during the first week post injury as well as pre-surgery. Anger (sometimes evoked as frustration and hate) and depressive emotions were reported on the day of injury, pre- and post-surgery and throughout the rehabilitation process. Acceptance was reported on the day of injury and seemed to remain present at various stages of the rehabilitation and recovery process. No support was found for the bargaining stage. Although denial, anger, depression and acceptance was reported, it did not follow the same linear progression as proposed by the five stages of grief.

The Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process include both pre- and post-injury factors that influence the psychological response to injury. Similar references to pre-injury factors such as personality (e.g., laid back, impatient, positive), history of stressors (e.g., previous injuries, daily hassles) and coping resources (e.g., good social support) were made during this study. Similar post-injury factors were also reported such as personal (e.g., injury history, perceived cause of injury, athletic identity, coping skills, prior sport experience) and situational factors (e.g., type of sport, playing status, teammate

influence, social support, rehabilitation environment). In support, participants' cognitive appraisals were influenced by both personal and situational factors throughout the duration of this study. Athletes' cognitive appraisals gave rise to certain emotional (e.g., fear of the unknown, anger, depression, frustration, positive outlook) and behavioural reactions (e.g., use of social support, rehabilitation adherence) in line with those identified in the Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process. The cognitions, emotions and behaviours captured also supported the dynamic and reciprocal nature of this model as they continued to influence one another throughout the changes experienced in each unique phase of the rehabilitation and recovery process. The aim of this study was not to reaffirm the usefulness and validity of this model, however, the present study's results confirm its value in providing a proper theoretical framework from which all medical professionals involved in the rehabilitation and recovery process could potentially benefit.

Challenges and limitations

Recruiting competitive athletes proved to be challenging. It was not easy to gain access to these athletes or medical professionals as the injury itself seemed to be a private and sensitive subject. Participant recruitment had to happen within a certain timeframe in order for all of the interviews to be completed within the duration of this study and, therefore, only seven participants were enlisted in this study. Although this sample size seems small, a total of 42 interviews were conducted over a period of 12 months. Conducting and analysing 42 interviews resulted in a challenging, overwhelming and lengthy process, especially for a researcher inexperienced in the field of qualitative analysis. Another challenging aspect of this study was the use of retrospective interviews as participants' recollection of events might have been influenced by their present state of mind. Doing telephonic interviews was another drawback and proved to be more challenging than face-to-face interviews due to bad lines and not being able to read the participants' non-verbal cues. Some other limitations were noted. The population was pre-dominantly homogenous which could have limited the

variability of emergent themes. Due to time constraints and participants being unavailable in such a short period of time, the return-to-sport interview had to capture themes related to the final-phase rehabilitation period, as well as prior to and following return-to-sport. This meant that the return-to-sport phase master list had to be split into two tables, one for final-phase rehabilitation (Table 4.6.1) and one for return-to-sport (Table 4.6.2). The use of two separate interviews might have provided a wider variety of themes. This study's timeline also did not allow for a 2-year follow-up interview which might have added valuable information to this study. It is foreseen that this interview will be conducted in 2018. Quantitative data was included to facilitate a rich and comprehensive account of participants' experiences. Although it adds value to the individual cases, this is not a case study and triangulation didn't really happen. The quantitative data could have been used more effectively.

Future recommendations

Conducting and analysing 42 interviews was challenging, however, it offered ample opportunities to become more experienced in conducting thematic analysis. For future studies, the use of a smaller sample size or fewer interviews per participant is recommended to ease the process of analysis, however this may refrain from obtaining the rich data elicited during the present study. Although the researcher was interested in the variety of responses captured during each phase, it resulted in generating themes that are not applicable to every participant in the different phases. This disrupts the unique storyline of each individual. Future research interested in each athlete's individual storyline and subsequent healing should make use of a case study design to track continuous and individual progress. Even though participants recovered physically during the study, future studies should aim to follow participants up to two years post-surgery as it could take much longer for athletes to recover psychologically.

Closing comments

This study reported a wide variety of thoughts, feelings and behaviours experienced by competitive male athletes associated with the ACL rupture, ACLR surgery, rehabilitation and recovery process, as well as prior to and following return-to-sport. To the best of my knowledge, this is the first study of its kind conducted within a South African context and one of only a few studies to note the role of a biokineticist as a source of social support. This study contains valuable advice and recommendations for medical professionals involved in the ACL rehabilitation process. All participants had access to a registered psychologist but none of them asked for or reported seeking psychological counselling. This is quite alarming since each participant experienced a range of emotional and behavioural reactions that could have benefitted from psychological support. This emphasizes the need that those involved in the rehabilitation process should be aware of the cognitions, emotions and behaviours associated with the rupture, reconstruction, rehabilitation and return-to-sport phases on the timeline to recovery in order to facilitate proper psychological support. Including a psychologist could potentially help medical professionals to tend to the athlete as whole person and possibly facilitate physical and psychological healing. In conclusion, focusing on the cognitive, emotional and behavioural responses experienced during these five important events (i.e., rupture, reconstruction, rehabilitation, return-to-sport and recovery) might help provide medical professionals with a better understanding of their patients' needs.

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Appendix A: Flyer used to recruit participants

PARTICIPANTS NEEDED FOR RESEARCH



- Are you a competitive male athlete between the ages of 18 and 28?
- Did you rupture your Anterior Cruciate Ligament?
- Did you undergo or are you scheduled for ACL reconstruction surgery?

If you answered **YES** to all three questions, I would like to invite you to take part in the following study:

ANTERIOR CRUCIATE LIGAMENT RUPTURE, RECONSTRUCTION, REHABILITATION AND RECOVERY: THE LIVED EXPERIENCES OF COMPETITIVE ATHLETES.

As a participant in this study, you would be asked to take part in 6 one-on-one interviews. Each interview will last 30 to 60 minutes and will take place in a private setting at a convenient location. Your participation in this study could potentially help medical health professionals to tend to both the physical and psychological demands during the rehabilitation and recovery process.

For more information about this study, or to volunteer, please contact:

Anel Borman on [REDACTED] (Email: [REDACTED])

The study has been reviewed and approved by the Research Ethics Committee, Stellenbosch University.



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Appendix B: Informed consent form



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**STELLENBOSCH UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH**

**ANTERIOR CRUCIATE LIGAMENT RUPTURE, RECONSTRUCTION, REHABILITATION AND
RECOVERY: THE PERSONAL EXPERIENCES OF COMPETITIVE ATHLETES.**

You are asked to participate in a research study conducted by Anel Borman (MSc Sport Science student), from the Department of Sport Science at Stellenbosch University. The results of this study will contribute to Anel Borman's thesis. You were selected as a possible participant in this study because you are a competitive athlete, who sustained a unilateral Anterior Cruciate Ligament (ACL) rupture, and underwent or are scheduled to undergo Anterior Cruciate Ligament reconstruction surgery. As a possible participant in this study you should have no previous history of Anterior Cruciate Ligament injuries.

1. PURPOSE OF THE STUDY

This study aims to explore and analyse the personal experience of athletes who underwent ACL reconstruction surgery at various time intervals during the postoperative recovery period.

2. PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

2.1 Meet the researcher for an initial meeting to:

- Discuss the aims, objectives and potential benefits of the study.
- Discuss the interview procedures.
- Give voluntary participation.
- Complete an informed consent form.
- Complete a demographic questionnaire.
- Arrange a date, time and private location for the first of six interviews to be conducted.

2.2 Arrive for Interviews:

- Each interview will be scheduled at a convenient time during six different rehabilitation phases:
 - Immediate post-injury (the day of the injury)*

Appendix B: Informed consent form

- Preoperative (first day post-injury up to surgery)*
- Postoperative (phase 1) - Acute recovery from surgery (surgery and first week post-surgery)*
- Postoperative (phase 2) - Repair (weeks 2 to 6 post-surgery)*
- Postoperative (phase 3) - Remodelling (week 7 to 4 months post-surgery)
- Return-to-sport (time dependent on meeting the criteria for return to sport).

* These interviews may occur retrospectively and/or simultaneously.

- Prior to the start of each interview, you will be asked to complete the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire.
- Each interview will last 30 to 60 minutes.
- During the interviews, broad open questions will be asked to allow you to talk about your thoughts, perceptions and feelings.
- At the end of every meeting you and the researcher will arrange a date, time and private location for the next interview.
- Data will be collected for up to 12 months post-operation.
- At the end of the final interview (after your return-to-sport), you will be asked to complete an additional questionnaire called the ACL Return to Sport Index.

3. POTENTIAL RISKS AND DISCOMFORTS

Interview questions will be aimed at understanding your appraisal of the injury situation and analysing your emotional and behavioural responses. Recalling traumatic events could be distressing and may cause some degree of discomfort. Therefore, you can be referred to a qualified psychologist if needed.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Exploring injured athletes' personal experiences of rupturing their ACL, undergoing reconstructive surgery, the rehabilitation and recovery process and upon returning to sport could further enhance our understanding of the complexities of this injury and the recovery process. Understanding an athlete's appraisal of the injury situation and analysing their emotional and behavioural responses could potentially help medical professionals to tend to both the physical and psychological demands of the client during the recovery and rehabilitation process. The results of the present study will be reported back to all participants following successful completion of the researcher's thesis.

5. PAYMENT FOR PARTICIPATION

No remuneration is offered for participation in this study.

Appendix B: Informed consent form

6. **CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Your participation in this study is entirely voluntary and anonymous. Interviews will be audiotaped and transcribed verbatim. Participants have the right to review the audiotapes and transcripts. All audiotapes and hard copies will be stored on a password protected computer at the Department of Sport Science (office 401) for three years, after which they will be destroyed. The researcher and study leader will be the only persons to have access to the stored data. The interview data and demographic information will be coded so that it cannot be linked to your name. Your identity will not be revealed while the study is being conducted or when the study results are reported in the researcher's thesis. The information received during this study will only be used for research purposes.

7. **PARTICIPATION AND WITHDRAWAL**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

8. **IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about the research, please feel free to contact the study supervisor, Dr H.W. Grobbelaar, at xxx xxx xxxx or the researcher, Anel Borman, at xxx xxx xxxx.

9. **RIGHTS OF RESEARCH SUBJECTS**

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [xxxxxxx@xxx.xx.xx; xxx xxx xxxx] at the Division for Research Development.

Appendix B: Informed consent form

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE
--

The information above was described to _____ by Anel Borman in [Afrikaans/English] and I am in command of this language or it was satisfactorily translated to me. I was given the opportunity to ask questions and these questions were answered to my satisfaction. I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of Participant

Name of Legal Representative (if applicable)

Signature of Participant or Legal Representative

Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____. He/she was encouraged and given ample time to ask me any questions. This conversation was conducted in [Afrikaans/English] and no translator was used.

Signature of Investigator

Date

Appendix C: Demographic questionnaire



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DEMOGRAPHIC QUESTIONNAIRE

Please complete all sections.

Surname: _____

First Name: _____

Email: _____

Contact Number: _____

Emergency Contact Name and Number: _____

Please answer all of the following questions. Please circle where appropriate.

1. What is your date of birth? _____
2. Gender? MALE / FEMALE
3. Please state your preferred language. ENG / AFR
4. Which type of sport do you play? _____

5. At what level do you participate? _____

6. Do you have a history of previous ACL injuries? If yes, please specify. YES / NO

7. Do you have a history of previous knee injuries? If yes, please specify. YES / NO

8. Did you rupture your Anterior Cruciate Ligament? YES / NO
 - a.) The date of injury: _____
 - b.) How did the injury occur? _____

 - c.) Which knee was injured? LEFT / RIGHT
9. Have you undergone Anterior Cruciate Ligament reconstruction surgery? YES / NO

Appendix C: Demographic questionnaire

If yes, please specify:

- a.) The date of surgery: _____
- b.) Who performed the surgery? _____
- c.) The type of graft used: _____
- d.) Any complications following surgery: _____

10. Are you scheduled to undergo Anterior Cruciate Ligament reconstruction surgery? If yes, please specify: YES / NO

- a.) The date of surgery: _____
- b.) Who will perform the surgery? _____
- c.) The type of graft used: _____
- d.) Any complications following surgery: _____

11. Is there any medical condition or injury that the researcher should be aware of? YES / NO

If yes, please specify. _____

TO BE COMPLETED LATER

List the names and contact details of other medical professionals involved in your rehabilitation and recovery. _____

Appendix D: Knee injury and Osteoarthritis Outcome Score (KOOS)

Knee injury and Osteoarthritis Outcome Score (KOOS), English version LK1.0

1

KOOS KNEE SURVEY

Today's date: ____/____/____ Date of birth: ____/____/____

Name: _____

INSTRUCTIONS: This survey asks for your view about your knee. This information will help us keep track of how you feel about your knee and how well you are able to perform your usual activities.

Answer every question by ticking the appropriate box, only one box for each question. If you are unsure about how to answer a question, please give the best answer you can.

Symptoms

These questions should be answered thinking of your knee symptoms during the **last week**.

S1. Do you have swelling in your knee?

Never	Rarely	Sometimes	Often	Always
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S2. Do you feel grinding, hear clicking or any other type of noise when your knee moves?

Never	Rarely	Sometimes	Often	Always
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S3. Does your knee catch or hang up when moving?

Never	Rarely	Sometimes	Often	Always
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S4. Can you straighten your knee fully?

Always	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S5. Can you bend your knee fully?

Always	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Stiffness

The following questions concern the amount of joint stiffness you have experienced during the **last week** in your knee. Stiffness is a sensation of restriction or slowness in the ease with which you move your knee joint.

S6. How severe is your knee joint stiffness after first wakening in the morning?

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S7. How severe is your knee stiffness after sitting, lying or resting **later in the day**?

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix D: Knee injury and Osteoarthritis Outcome Score (KOOS)

Knee injury and Osteoarthritis Outcome Score (KOOS), English version LK1.0

2

Pain

P1. How often do you experience knee pain?

Never	Monthly	Weekly	Daily	Always
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What amount of knee pain have you experienced the **last week** during the following activities?

P2. Twisting/pivoting on your knee

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P3. Straightening knee fully

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P4. Bending knee fully

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P5. Walking on flat surface

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P6. Going up or down stairs

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P7. At night while in bed

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P8. Sitting or lying

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

P9. Standing upright

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Function, daily living

The following questions concern your physical function. By this we mean your ability to move around and to look after yourself. For each of the following activities please indicate the degree of difficulty you have experienced in the **last week** due to your knee.

A1. Descending stairs

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A2. Ascending stairs

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix D: Knee injury and Osteoarthritis Outcome Score (KOOS)

Knee injury and Osteoarthritis Outcome Score (KOOS), English version LK1.0

3

For each of the following activities please indicate the degree of difficulty you have experienced in the **last week** due to your knee.

A3. Rising from sitting

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A4. Standing

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A5. Bending to floor/pick up an object

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A6. Walking on flat surface

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A7. Getting in/out of car

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A8. Going shopping

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A9. Putting on socks/stockings

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A10. Rising from bed

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A11. Taking off socks/stockings

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A12. Lying in bed (turning over, maintaining knee position)

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A13. Getting in/out of bath

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A14. Sitting

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A15. Getting on/off toilet

None	Mild	Moderate	Severe	Extreme
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix D: Knee injury and Osteoarthritis Outcome Score (KOOS)

Knee injury and Osteoarthritis Outcome Score (KOOS), English version LK1.0

4

For each of the following activities please indicate the degree of difficulty you have experienced in the **last week** due to your knee.

A16. Heavy domestic duties (moving heavy boxes, scrubbing floors, etc)

None Mild Moderate Severe Extreme

A17. Light domestic duties (cooking, dusting, etc)

None Mild Moderate Severe Extreme

Function, sports and recreational activities

The following questions concern your physical function when being active on a higher level. The questions should be answered thinking of what degree of difficulty you have experienced during the **last week** due to your knee.

SP1. Squatting

None Mild Moderate Severe Extreme

SP2. Running

None Mild Moderate Severe Extreme

SP3. Jumping

None Mild Moderate Severe Extreme

SP4. Twisting/pivoting on your injured knee

None Mild Moderate Severe Extreme

SP5. Kneeling

None Mild Moderate Severe Extreme

Quality of Life

Q1. How often are you aware of your knee problem?

Never Monthly Weekly Daily Constantly

Q2. Have you modified your life style to avoid potentially damaging activities to your knee?

Not at all Mildly Moderately Severely Totally

Q3. How much are you troubled with lack of confidence in your knee?

Not at all Mildly Moderately Severely Extremely

Q4. In general, how much difficulty do you have with your knee?

None Mild Moderate Severe Extreme

Thank you very much for completing all the questions in this questionnaire.

Appendix E: Interview schedule

Interview 1: Immediate post injury (day of injury)	
Questions	Potential probes
1.1 Provide a brief overview of your injury history?	Type of injury? Body part? Rehabilitation? Recovery?
1.2 Explain your perception of the injury situation.	What, how, when, where?
1.3 What was your immediate reaction to the injury?	Pain? Discomfort? Fears/ Uncertainties? Thoughts, feelings, mood?
1.4 Were you experiencing any life stressors at the time of the injury?	Daily hassles, academic, family, relational, financial, sport-related pressures etc.?
1.5 What are you hoping for in terms of your recovery from here on?	Thoughts? Feelings? Motivation? Positive? Negative? Additional comments?

Appendix E: Interview schedule

Interview 2: Preoperative (first day post-injury up to surgery)	
Questions	Potential probes
2.1 Tell me about your actual experiences since our last interview.	Thoughts? Feelings?
2.2 Who made the initial clinical diagnosis and what was the outcome? What was the initial prognosis (estimated time needed to fully recover and return to play)?	How did this diagnosis make you feel? Were you satisfied? Did you agree/disagree, seek a 2 nd / 3 rd opinion? Thoughts? Feelings?
2.3 Tell me about the period between sustaining the injury and getting the operation.	Pain/Discomfort? Fears/ Uncertainties? Thoughts/feelings/mood?
2.4 How do you feel about the upcoming operation?	Fears/ Uncertainties? Thoughts/feelings/mood?
2.5 What are you hoping for in terms of your recovery from here on?	Thoughts? Feelings? Motivation? Positive/Negative? Additional comments?

Appendix E: Interview schedule

Interview 3: Postoperative (phase 1) - surgery and first week post-surgery	
Questions	Potential probes
3.1 Tell me about the period after the operation. Tell me about your actual experiences since our last interview.	Feelings? Thoughts? Pain? Discomfort? Fears?
3.2 Talk to me about your interactions with the medical professionals, coach, friends, family, and teammates.	Feelings? Thoughts? Positive? Negative? Relationship?
3.3 How is your rehabilitation sessions coming along?	Number of rehabilitation sessions? Improvement? Satisfaction levels?
3.4 What are you/ have you been doing to cope?	Problem-, emotion-, avoidance-, withdrawal-focused?
3.5 What are you hoping for in terms of your recovery from here on?	Thoughts? Feelings? Motivation? Positive? Negative? Additional comments?

Appendix E: Interview schedule

Interview 4: Postoperative (phase 2)- weeks 2 to 6 post-surgery	
Questions	Potential probes
4.1 How is your rehabilitation programme coming along? Tell me about your actual experiences since our last interview?	Number of rehabilitation sessions? Improvement? Satisfaction levels? Feelings? Thoughts? Pain? Discomfort? Fears?
4.2 Talk to me about your interactions with medical professionals, coach, friends, family, and teammates.	Feelings? Thoughts? Positive? Negative? Relationship? Other social interactions?
4.3 Describe your current mood?	Feelings? Thoughts? Positive? Negative?
4.4 What are you/ have you been doing to cope?	Problem-, emotion-, avoidance-, withdrawal-focused?
4.5 What are you hoping for in terms of your recovery from here on?	Thoughts? Feelings? Motivation? Positive? Negative? Additional comments?

Appendix E: Interview schedule

Interview 5: Postoperative (phase 3)- week 7 to 4 months post-surgery	
Questions	Potential probes
5.1 How are your rehabilitation sessions coming along? Tell me about your actual experiences since our last interview?	Number of rehabilitation sessions? Improvement? Satisfaction levels? Feelings? Thoughts? Fears? Pain? Discomfort? Setbacks?
5.2 Talk to me about your interactions with the medical professionals, coach, friends, family, and teammates.	Feelings? Thoughts? Positive? Negative? Relationship? Other social interactions?
5.3 Describe your current mood?	Feelings? Thoughts? Positive? Negative?
5.4 What are you/ have you been doing to cope?	Problem-, emotion-, avoidance-, withdrawal-focused?
5.5 What are you hoping for in terms of your recovery from here on?	Thoughts? Feelings? Motivation? Positive? Negative? Additional comments?

Appendix E: Interview schedule

Interview 6: Return-to-sport	
Questions	Potential probes
6.1 Tell me about your actual experiences since our last interview. How do you feel about returning to sport?	Feelings? Thoughts? Excited? Scared? Setbacks? Confidence?
6.2 How have your injuries affected your life outside of sport?	Feelings? Thoughts? Positive? Negative? Relationships?
6.3 Describe your current mood?	Feelings? Thoughts? Positive? Negative?
6.4 Based on your injury experiences, what advice would you give to sport medicine professionals about the future treatment of other injured athletes?	Thoughts? Advice?
6.5 If it were possible to do so, in hindsight, what aspects of your rehabilitation would you change (if any)?	Thoughts? Feelings? Physical? Psychological? Additional comments?

Appendix F: Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI)

ACL-RSI SCALE

Instructions: Please answer the following questions referring to your **main** sport prior to injury. For each question tick a box between the two descriptions to indicate how you are feeling right now relative to the two extremes.

1. Are you confident that you can perform at your previous level of sport participation?

	0	10	20	30	40	50	60	70	80	90	100	
Not at all confident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fully confident

2. Do you think you are likely to re-injure your knee by participating in your sport?

	0	10	20	30	40	50	60	70	80	90	100	
Extremely likely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Not likely at all

3. Are you nervous about playing your sport?

	0	10	20	30	40	50	60	70	80	90	100	
Extremely nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Not nervous at all

4. Are you confident that your knee will not give way by playing your sport?

	0	10	20	30	40	50	60	70	80	90	100	
Not at all confident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fully confident

5. Are you confident that you could play your sport without concern for your knee?

	0	10	20	30	40	50	60	70	80	90	100	
Not at all confident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fully confident

6. Do you find it frustrating to have to consider your knee with respect to your sport?

	0	10	20	30	40	50	60	70	80	90	100	
Extremely frustrating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Not at all frustrating

Appendix F: Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI)

7. Are you fearful of re-injuring your knee by playing your sport?

Extremely fearful	0	10	20	30	40	50	60	70	80	90	100	No fear at all
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

8. Are you confident about your knee holding up under pressure?

Not at all confident	0	10	20	30	40	50	60	70	80	90	100	Fully confident
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

9. Are you afraid of accidentally injuring your knee by playing your sport?

Extremely afraid	0	10	20	30	40	50	60	70	80	90	100	Not at all afraid
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10. Do thoughts of having to go through surgery and rehabilitation again prevent you from playing your sport?

All of the time	0	10	20	30	40	50	60	70	80	90	100	None of the time
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

11. Are you confident about you ability to perform well at your sport?

Not at all confident	0	10	20	30	40	50	60	70	80	90	100	Fully confident
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

12. Do you feel relaxed about playing your sport?

Not at all relaxed	0	10	20	30	40	50	60	70	80	90	100	Fully relaxed
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

To score: Sum individual item scores; divide by 12.
 Maximum score = 100; higher score indicates more positive psychological response

From: Webster KE, Feller JA, Lambros C. Development and preliminary validation of a scale to measure the psychological impact of returning to sport following anterior cruciate ligament reconstruction surgery. *Phys Ther Sport*; 2008;9:9-15.

ACL-RSI	
Kate Webster [REDACTED]	Thu, Mar 24, 2016 at 6:33 AM
To: Anel Bester [REDACTED]	
<p>Hi Anel,</p> <p>Please find the ACL-RSI scale attached.</p> <p>I should note that the response format slightly differs between our papers. The original scale (as published in Webster et al 2008) was scored using a 10cm VAS. However, we found that it was rather time consuming to score a VAS and we wanted the scale to be as simple as possible so it could be potentially used clinically. Therefore, for subsequent papers we changed the VAS line to a tick in the box format, still with a 0 to 100 range but with 10 point increments. For the total scale score the answers are simply summed and averaged. Attached is the version we used for the Langford et al BJSM paper. Please note that we have not formally compared changing from a VAS to a tick in the box version. If you prefer to use a VAS the boxes are to be replaced with a 10 cm line- the same end descriptors are used.</p> <p>Best of luck for your research.</p> <p>Kate Webster Ph.D. Associate Professor School of Allied Health College of Science, Health and Engineering La Trobe University, Bundoora, Vic, 3086, Australia Office location: Room 426, Level 4, Health Sciences 3 building</p>	