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Developing Excellence in Rugby Union: A Multidisciplinary and Mixed Method Approach to Enhancing the Efficacy of the RFU Talent Development Pathway

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School of Human and Behavioural Sciences

College of Human Sciences

**Developing Excellence in Rugby Union: A Multidisciplinary and Mixed Method
Approach to Enhancing the Efficacy of the RFU Talent Development Pathway**

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A thesis submitted to

Bangor University

in fulfilment of the requirements of the degree of

Doctor of Philosophy

Supervisors: Dr Ross Roberts and Dr James Hardy

Declaration and Consent

‘I hereby declare that this thesis is the results of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards. I confirm that I am submitting this work with the agreement of my Supervisor(s).’

‘Yr wyf drwy hyn yn datgan mai canlyniad fy ymchwil fy hun yw’r thesis hwn, ac eithrio lle nodir yn wahanol. Caiff ffynonellau eraill eu cydnabod gan droednodiadau yn rhoi cyfeiriadau eglur. Nid yw sylwedd y gwaith hwn wedi cael ei dderbyn o’r blaen ar gyfer unrhyw radd, ac nid yw’n cael ei gyflwyno ar yr un pryd mewn ymgeisiaeth am unrhyw radd oni bai ei fod, fel y cytunwyd gan y Brifysgol, am gymwysterau deuol cymeradwy. Rwy'n cadarnhau fy mod yn cyflwyno'r gwaith hwn gyda chytundeb fy Ngoruchwyliwr (Goruchwylwyr)

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Dedication

I would like to dedicate this thesis to my wonderful Mum. You saw me begin this journey and, despite not being here to see me finish, I know you were with me every step of the way.

You were, and always will be, my hero.

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Thesis Abstract

The development of excellence in team sports such as rugby union is not yet fully understood and to date, the understanding of factors predicting progression in rugby is unknown. This thesis builds on the existing research exploring the multidisciplinary factors which underpin the development of excellence in sport (Doherty et al., 2018; Gulbin et al., 2013; Güllich et al., 2019; Lovell et al., 2017; Tribolet et al., 2018). In it we take a multidisciplinary approach to exploring the psychosocial factors important to the development of excellence in some of the best rugby union players in the world, the multidisciplinary factors which influence progression through the RFU's development pathway and the influence of personal factors on the efficacy of constraints-led training.

The thesis consists of a general introduction (Chapter 1), four empirical studies (Chapters 2, 3 and 4), and a general discussion (Chapter 5). More specifically, Chapter 2 (Study 1) presents an in-depth qualitative investigation of the psychosocial factors underpinning success and development in rugby union. We conducted in-depth retrospective interviews (lasting 32 hours in total and producing over 300,000 words of text) with former world's best International male rugby union players ($N = 5$) and their nominated coaches ($N = 5$). Interviews covered early critical developmental experiences, personality, relationships, and training behaviours. Abductive thematic analysis revealed commonalities, which are discussed under three main headings: 1) Formative Experiences, 2) Personality, and 3) Training Behaviours. The findings from Study 1 suggest early negative experiences, particularly disruptions to parental relationships, and the realisation of insecure attachment, coupled with a positive sport related event, may underpin the drive and development of the necessary personality traits and behaviours to achieve excellence in rugby.

Chapter 3 presents two longitudinal studies (Studies 2 and 3) which examined the factors predicting progression in rugby. We employed a multidisciplinary approach and using pattern recognition analysis we aimed to identify the psychosocial, demographic, and practice and training factors which differentiated between players who progressed, and players who failed to progress, at two key stages along the pathway, from U18's to U20's (Study 2) and from age grade rugby to the premiership (Study 3). Findings in these studies indicated that a variety of psychosocial, demographic, and practice and training factors were able to differentiate between groups who were and were not progressing. In particular, results indicated that players who progress at both stages undertook fewer hours of constraints-led practice suggesting there may currently be too much challenge and not enough support within practice at present. Further, in Study 2, those players progressing appeared to demonstrate a number of highly desirable psychosocial characteristics (e.g., mastery orientation, commitment to training), yet those progressing in Study 3 had a psychosocial profile that was potentially more challenging for coaches and managers to work with. In addition, findings suggest that the RFU may be using current performance as an indicator of future potential, which could present a risk to coaches and the RFU in the loss of talented players early in the pathway.

Chapter 4 presents a study (Study 4) which explored the influence of avoidant attachment styles (dismissive and fearful) and ASD traits (systemising and empathy) on the effects of CL practice on progression through the RFU Development pathway. We re-used some of the data collected in Studies 2 and 3 but subjected these data to a different and comprehensive set of analyses to explore the research question. Findings revealed that increases in the percentage of CL practice were associated with greater decreases in the likelihood of progression when dismissive avoidant attachment was high than when it was low. Conversely, increases in CL practice predicted a greater increase in the likelihood of

progression when fearful avoidant attachment was high, as opposed to when it was low. No interaction was found between systemising and CL practice in relation to progression.

Finally, analyses revealed that lower levels of CL practice were associated with an increase in the likelihood of progression when empathy was high. These findings provide initial support for the suggestion that not all individuals will benefit from CL practice to the same extent and provide support to the notion that individual differences may influence the effects of certain training protocols on performance.

A summary of the empirical findings from these four studies are then discussed in Chapter 5, along with the theoretical and applied implications of this research. Strengths, limitations, and directions for future research are also discussed.

Chapter 1

General Introduction

The increase in international sporting competition has driven national governing bodies (NGB's) from around the world to establish organised talent identification (TID) and talent development (TD) programmes. Such programmes are designed to advance their most promising young athlete's performance development and facilitate increased individual and collective athletic success (Güllich & Cobley, 2017). This approach to TID and TD has resulted in a worldwide sporting culture where significant resources and infrastructure are directed towards selecting athletes who are seen as having the greatest potential for success on a global sporting stage (Wattie & Baker, 2017). Despite large investment in developing evidence-based approaches to finding the 'sporting edge', conclusions from different national sport systems suggests a relatively low success rate with one statistic suggesting that only 2 percent of young athletes involved in TD programmes in football attain international success (Güllich & Cobley, 2017). Research-based evidence that definitively informs the development of TID is still scarce and thus policy makers and researchers are concerned with questions of how best to identify and develop talent (Güllich & Cobley, 2017). To examine these issues further, this chapter will first explore the theoretical underpinnings of talent and outline the errors made in many TID programmes. It will then go on to outline the current TD literature and explore other factors which influence the development of excellence. The chapter concludes with a summary of the current research limitations and finally provides a thesis rationale and structure.

1.1 The Underpinnings of Talent

TID is the process of recognising current participants with the potential to excel in a particular sport (Vaeyens et al., 2008). While giftedness and talent researchers use different terminology to describe similar characteristics, in general talent is defined by an individual's ability (potential) for certain achievements (performance), with an important emphasis on talent being the potential for achievements and not the achievements themselves (Fischer-

Ontrup & Fischer, 2017). Researchers have long attempted to conceptualise talent and its origins, with the nature-nurture debate persisting since Francis Galton first coined the phrase in 1869 (Davids & Baker, 2007). The nature-nurture debate concerns the extent to which an individual is a product of their genes or environment and how genetic and environmental constraints correlate or interact to shape performance variations in sport (Davids & Baker, 2007). Galton's theory was informed by Darwin's *Origin of Species* and based on the conclusion that biology was the main constraint to expertise and achievement (Davids & Baker, 2007). Conversely, work from the environmentalist camp during the same period, emphasised the dualist 'all or nothing' approach by proposing that all forms of learning and behaviour result from interactions with our environment (Davids & Baker, 2017). While decades of academic research support the position that the nature-nurture debate cannot be resolved in favour of one constraint over the complete exclusion of the other (Davids & Baker, 2007) the debate endures and beliefs about the roles of nature and nurture still have real relevance in applied settings (Wattie & Baker, 2017). In view of this Wattie and Baker (2017) suggest that it may be more meaningful to conceptualise talent as either something relatively stable (inherent ability, IA) or something that can be modified (acquirable skill, AS). These conceptualisations draw largely on the work of Dweck (1991) who suggests that an AS perspective, which views skill as being predominantly acquirable, is associated with more constructive motivational dispositions and response to failure. There may be important practical implications of ability beliefs on the effectiveness of TID as regardless of whether a coach believes ability is modifiable (AS) or non-modifiable (IA) a strongly held dichotomised theory could lead to implicit bias and compromise TID (Wattie & Baker, 2017).

1.2 Errors in Talent Identification

An issue for most TID programmes is that within current theory and practice there doesn't seem to be a clear set of variables which consistently predict future success (Johnson et al., 2018). In addition, there remains a lack of consensus on how talent should be defined or identified, and no uniformly accepted theoretical framework exists to guide current practice (Vaeyens et al., 2008). As such, misconceptions regarding what talent looks like are widespread in high performance sport settings (Johnson et al., 2018), for example, young athletes are often selected based on physical size and maturation (Lidor et al., 2009). The way practitioners view talent and ability are likely to influence their selection decisions, and research continues to highlight some of the implicit biases that exists within TID programmes (Mann et al., 2017), such as relative age effect and using current performance as an indicator of future potential.

1.2.1 *Relative Age Effect*

The relative age effect (RAE), a well-established phenomenon in sport, reflects the increased likelihood of talented young athletes, who are among the relatively older members of their age cohort, to be selected into youth sport teams. The policy of grouping learners by age, with the intention of providing equal opportunity for development and success, provides advantages to some athletes whilst disadvantaging others (Wattie et al., 2014). Children born earlier in the year (Quarter or Q1) will have up to a whole year of maturation advantage over children born later in the year (Q4), which has the potential to lead to selection advantages, systematically excluding younger, less matured, but potentially more talented players (Côté et al., 2005). An example of this implicit bias was seen in a recent study by Furley and Memmert (2015) which suggests that the abstract concept of "sport giftedness" is partly grounded in the perception of physical height amongst youth sport coaches and has the potential to influence selection decisions. In addition, research investigating the RAE within

rugby union suggests there is an overrepresentation of Q1 and Q2 athletes in professional rugby academies (McCarthy et al., 2016). It has been suggested that this competitive advantage starts early in development where players are initially selected onto (and remain attached to) talent pathways based on early success, i.e., physical dominance (Jones et al., 2018). However, it should be noted that there are examples in the literature of reversals of the RAE from junior to elite level (Gibbs et al., 2012) as well as inter and intra-sport differences (Jones et al., 2018; Langham-Walsh et al., 2021), suggesting that this phenomenon is not present at every level in every sport. For example, Gibbs et al. (2012) found a strong RAE amongst Canadian National Hockey League (NHL) players in the minor league and first round draft picks but discovered the effect had significantly diminished or reversed at elite levels. They present the *underdog hypothesis* as an explanation for this reversal, suggesting that the challenge experienced by relatively younger athletes facilitates the development of necessary attributes required for superior performance.

1.2.2 Confusing Current Performance with Future Potential

The RAE phenomenon is underpinned by the assumption that the important characteristics of success in adult performance can be extrapolated to identify talented young players (Vaeyens et al., 2012). However, the issue with this assumption is that innate or pre-adolescent characteristics do not automatically translate into exceptional adult performance (Vaeyens et al., 2012) and maturation-related performance should not be confused for talent or the potential to develop talent (Wattie & Baker, 2017). Bailey and Collins (2013) suggest that distinguishing between determinants of performance and determinants of potential is essential as current performance is often influenced by things which have little to do with potential, such as parental income and support. Inferring potential from current levels of performance is problematic and according to Baker et al. (2018) could create risk to coaches within the selection process. Their risk matrix (see Figure 1.1 below) highlights how

1.2.3 Unidimensional Approaches

Despite current research highlighting the importance of considering the many constraints which interact and contribute to an athlete's behaviour (Gullich et al., 2019), TID and TD programmes have, to date, been largely unidimensional in nature (Abbot et al., 2005). The problem with an over-reliance on discrete, often genetically driven, unidimensional performance measures is that such approaches place a large emphasis on the selection of “talented” individuals, rather than the development and monitoring of potential (Abbot et al., 2005). Research has acknowledged the need to reconceptualise talent as a multi-dimensional construct and has begun to recognise that many of the key determinants of talent in sport can be developed with the right training opportunities and environments (Abbot et al., 2005). For this reason, researchers and practitioners have begun to shift their theoretical and applied focus from early TID and selection to TD approaches (Vaeyens et al., 2012).

1.3 Talent Development Approaches

The factors which optimise the development of expertise in sport have been the subject of much research, with current literature suggesting that there are many influences which may have a crucial impact on the development and eventual success of a talented athlete (Martindale et al., 2005). Several Talent Development models, including the Development Model of Sport Participation (Côté et al., 2007), the Long-Term Athlete Development model (Balyi & Hamilton, 2004) along with Ericsson et al.'s (1993) theory of deliberate practice, have advanced our understanding of the possible pathways to developing excellence and are discussed below.

1.3.1 Theory of Deliberate Practice

Ericsson et al. (1993) offered a theoretical framework which played down the role of innate, inherited characteristics and explained the acquisition of expert performance as the result of extended deliberate practice. They argue that there is little evidence heritable

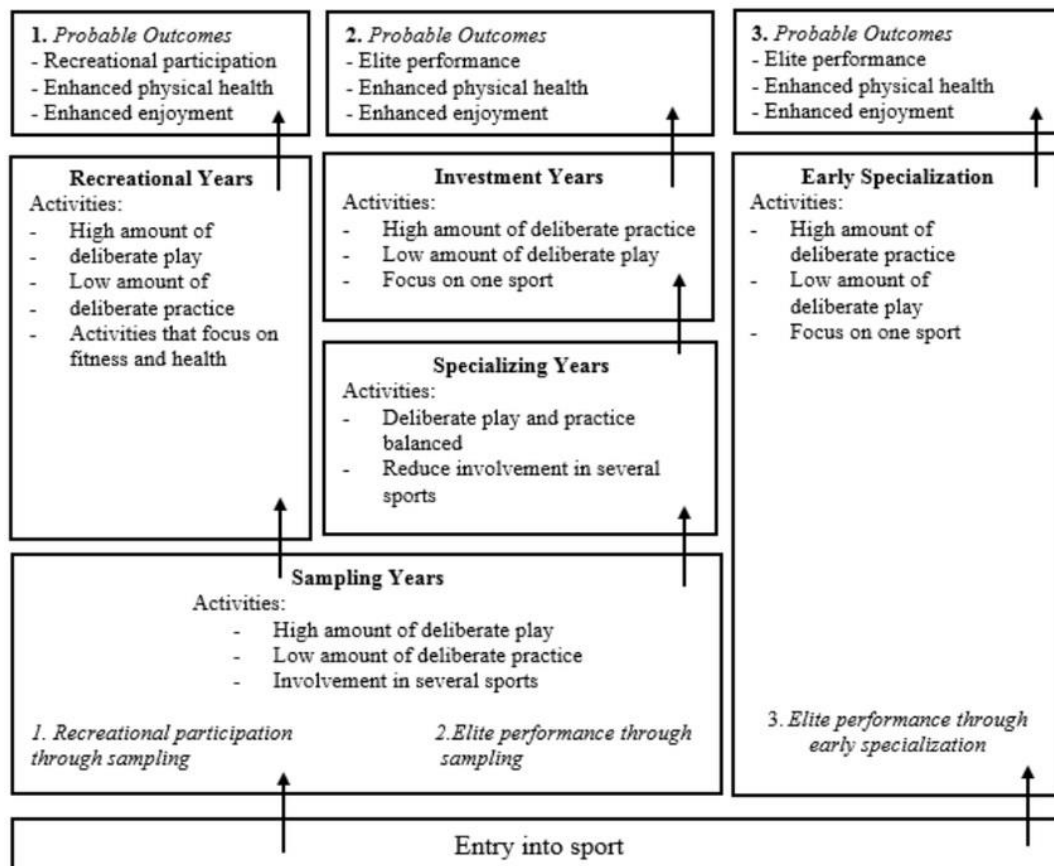
characteristics will predict or account for the development of expert performance and instead, suggest that expert performance in a particular domain reflects a life-long effort of deliberate practice. The theory of deliberate practice proposes that the effective development of expertise occurs through involvement in a minimum of 10,000 hours (the approximate equivalent of 10 years) of highly structured form of practice known as deliberate practice (although it should be noted that Ericsson has since clarified that his earlier work was somewhat misconstrued and that the focus should not solely be on accruing the set number of hours in any given activity, see Lloyd et al., 2015). Despite this clarification however, the notion that expertise requires a minimum of 10,000 hours of deliberate practice has endured. Critics of this theory have suggested that while deliberate practice is undeniably important to the development of expertise, it does not largely account for individual differences, and so there is a need to develop a theory of expertise which includes multiple factors (MacNamara et al., 2016).

1.3.2 Development Model of Sport Participation

One of the most predominant theories of talent development is the Development Model of Sport Participation (DMSP; Côté et al., 2007). The DMSP proposes two distinct types of early sport environment which could potentially lead to elite performance: early specialisation and early sampling. The early specialisation pathway is characterised by large volumes of deliberate practice and small amounts of deliberate play, with a focus on one sport and is in line with Ericsson et al.'s, (1993) theory of deliberate practice. According to Ericsson et al. (1993), engagement in deliberate practice requires effort, generates no immediate rewards, and is motivated by improvement as opposed to inherent enjoyment. Early specialisation implies a focus on a rigid skill-based model, an early selection of talented children and a training regime that is not always consistent with children's motivation to participate in sport at this age (Côté et al., 2009). In addition, a meta-analysis by MacNamara

et al. (2014) concluded that deliberate practice accounted for less than 26% of the variance in sporting performance.

An alternative pathway is that of early sampling, which the DMSP suggests is the route to both elite and extended recreational sport participation (Côté et al., 2011). Early sampling is defined by two main elements, involvement in various sports and participation in deliberate play. According to the DMSP participating in a variety of different sports at an early age allows children to experience various physical, cognitive, affective, and psychosocial environments which facilitate the development of the foundational physical, personal, and mental skills required to specialise in one sport during adolescence. The DMSP identifies three stages of sport development from childhood to late adolescence, namely the sampling years (5-12), the specialising years (13-15) and the investment years (16+). Côté et al. (2007) suggest that the structure of deliberate practice and deliberate play changes as a function of the child's age, with activities associated with optimal learning and motivation in later years differing from those in early years. The DMSP suggests that the sampling years should be characterised by large volumes of deliberate play, designed to maximise inherent enjoyment, and as athletes move through specialising and investment years their involvement in deliberate play reduces. Conversely involvement in deliberate practice activities and organised games start at a low level but increase gradually in the specialising and investment years. Despite a tendency by NGB's, practitioners, and parents to favour early specialisation, research has begun to highlight the issues with specialising too early in one sport, including increased risk of injury and burnout (Gould, 2010; Waldron et al., 2019) There is now a growing body of evidence which supports the benefits of early sampling, and which argues that a broad base of motor skill competence is beneficial to the long-term development of excellence in sport (Bridge & Toms, 2012; Goodway & Robinson, 2015).

Figure 1.2*Development Model of Sport Participation*

Note: From “Play to Practice: A developmental Framework for the Acquisition of Expertise in Team Sports” by J. Côté, J. Baker, & B. Abernathy. 2007, *Expert Performance in Sports. Advances in Research on Sports Expertise*, 89-110.

1.3.3 Long-Term Athlete Development Model

The Long-Term Athlete Development model (LTAD; Balyi & Hamilton, 2004) has been adopted by some NGB’s around the world to align training more closely with the timing of maturation as opposed to chronological age (Lloyd et al., 2015). The model classifies certain sports as early specialisation sports (such as diving, figure skating, gymnastics), requiring early specialised training, and other sports as late specialisation sports (such as track and field, cycling, and all team sports) requiring early development of general motor and technical-tactical skills instead. The model suggests within late specialisation sports there

are six stages in athlete development which can be used by NGB's, practitioners and coaches (see Figure 1.3 below). During the FUNdamental stage (age 6-9 males/age 6-8 females) the emphasis is on the overall development of the child's physical capabilities with sessions being structured and fun. Within the Learning to Train stage (age 9-12 males/age 8 – 11 females) specialised movement skills are developed with the objective of learning all fundamental sport skills. Balyi and Hamilton (2004) highlight the importance of these two stages and argue that skipping them could be detrimental to the child's future participation in physical activity and sport. The challenge for early specialisation sports therefore is to find a way to incorporate these stages by combining or amalgamating them. The purpose of the Training to Train stage (Stage 3) is to consolidate basic sport-specific skills and tactics. This stage addresses two of the critical periods of physical development and Balyi and Hamilton (2004) argue that athletes who miss this stage may not reach their full potential. The training to Compete and Training to Win stages (Stages 4 and 5) optimise fitness preparation, individual and position-specific skills, as well as performance. By this time the athlete's physical, technical, tactical, mental, lifestyle and personal capacities are fully established, and the focus has shifted to the maximisation of performance. Despite the general acceptance of this model by NGB's, recent criticisms from researchers have questioned its rigid view of athletic development and the fact that the model lacks any real empirical evidence (Lloyd et al., 2015). Specifically concerns exist around the lack of evidence to support the notion of windows of opportunity which the model suggests should be exploited to ensure that the child reaches their full athletic potential (Lloyd et al. 2015). In addition, the LTAD model fails to consider the multidimensional nature of development and the influence of psychosocial characteristics (Gould et al., 2002) and early developmental experiences (Côté et al., 1999).

Figure 1.3*Long-Term Athlete Development Model*

Early Specialisation Model	Late Specialisation Model
1. Training to Train stage	1. FUNdamental stage
2. Training to Compete	2. Learning to Train
3. Training to Win	3. Training to Train
4. Retirement/ retainment	4. Training to Compete
	5. Training to Win
	6. Retirement/ retainment

Note: From “Long-Term Athlete Development: Trainability in Childhood”, by I. Balyi and A. Hamilton, 2004, *Olympic Coach*, 16(1), 4-9.

1.4 Microstructure of Practice

Whilst talent development models highlight the importance of practice, recent literature suggests that not all practice is equal and has highlighted the importance of considering the microstructure of practice in relation to athlete development and skill acquisition (Low et al., 2013). Differences in practice characteristics, such as what activities are engaged in and how, can lead to a variation in adaptations and improvements in performers (Low et al., 2013). For example, in their relatively recent study, Jones et al. (2020) found that super-elite cricket batsman undertook a larger volume of skills-based practice than their elite counterparts, which was both more random and more varied in nature. In addition, the specificity of practice has been investigated, using the specificity of practice principle (Henry, 1958) which states that practice under conditions which closely mimic target conditions will result in more optimal performance. Research has demonstrated that training under conditions of anxiety has increased performance under pressure (Lawrence et al., 2014; Oudejans & Pijpers, 2009). In addition, Jones et al. (2020) suggest that optimising challenge, at both a psychological and technical level, may be a catalyst for the development of expert performance.

1.4.1 Constraints-Led Practice

Guadagnoli and Lee's (2004) challenge point framework suggests that learning is most robust when an optimal level of challenge is attained, which is dependent on a) the skill level of the performer, b) the task complexity and c) the task environment. In-line with this framework a constraints-led (CL) perspective to training has been adopted by many NGB's, including the Rugby Football Union (RFU). A CL perspective, introduced originally by Newell (1986), is a recognised approach in motor learning and control and helps to shift the perspective of coaches and practitioners so that they might organise practice to optimise learning (Davids et al, 2008). Davids et al. (2003) describe constraints as boundaries which limit the expression of form, and favour some emergent features of behaviour over others, leading to the development of reliable and functional movement patterns which facilitate learning and performance. Newell (1986) classified constraints into three distinct categories; organismic constraints, which refer to the characteristics of individual performers; environmental constraints, which refer to the physical environment of the performer; and tasks constraints, which are usually specific to the performance, such as rules, equipment, surface, boundary markings etc. (Davids et al, 2008). In a CL approach where there is an emphasis on discovery learning, problem solving behaviours are enhanced as learners are required to actively engage in their own learning rather than just passively receive information (Davids et al., 2003). Performers are discouraged from developing optimal movement patterns but are instead encouraged to attune to relevant perceptual variables required to perform a specific task which ultimately improves their ability to cope with inherent performance variability (Davids et al., 2008). According to Davids et al. (2003) exploratory practice is beneficial to athletes at both the "co-ordination" stage of learning, as they assemble the coordination structures to successfully achieve a specific task goal and later, at the "skill" stage, where they refine and adapt those structures. A 2019 meta-analysis

by Clark et al. reviewed the empirical evidence in support of the effectiveness of this approach. Eighteen studies across eight different sports (tennis, cricket, hockey, baseball, basketball, table tennis, soccer, and badminton), applying informational, spatial, and perceptual constraints, were included in the review. Fourteen of these studies found a positive effect in skill acquisition following a CL manipulation in training protocol (Clark et al, 2019). Despite the wide appeal of this type of training, research to date has assumed that the effectiveness of a CL approach is equal for all individuals. Although this type of practice requires athletes to engage in their own learning, research has so far overlooked the effect of individual differences on the effectiveness of this type of training. Given this apparent gap in the research, the aim of Chapter 4 of this thesis was to explore the influence of personal factors on the effects of CL training on progression through the RFU development pathway.

1.5 Psychosocial Factors

There is now extensive research which validates the role of psychological characteristics in the development of excellence in sport (e.g., Collins & MacNamara, 2012; Gould, 2002; Gould et al., 2010; Hardy et al., 2016). Recent research has also begun to explore the influence of psychosocial factors, such as personality and early life experiences in the development of expertise. Traits such as narcissism (Manley et al., 2018; Roberts et al., 2017; Woodman et al. 2011), perfectionism (Appleton et al., 2010; Curran et al., 2014; Gould et al., 2002; Hill et al., 2010; Oliveira et al., 2015; Rasquinha et al., 2014; Roberts et al., 2013), obsessiveness (Vallerand et al., 2008), and alexithymia (Roberts & Woodman, 2017; Woodman et al., 2008), which are often perceived as maladaptive in other domains, have all been found to be important in the development of excellence in sport. In addition, the impact of early life experiences on the development pathways of athletes has also been explored (Fletcher, 2018; John et al., 2019; Hardy et al., 2017; Jannika et al., 2019) with findings suggesting that early life experiences likely underpin the development of the necessary

personality traits and behaviours to achieve excellence. Despite many researchers acknowledging that early life experiences underpin the development of the necessary personality traits and behaviours to achieve excellence (Jannika et al., 2019; Hardy et al., 2017; Fletcher, 2018; John et al., 2019), the process by which this happens has not yet been explored. Early negative life events are known to interrupt the development of secure attachment (Bartholomew & Horowitz, 1991), however the role of attachment in the development of excellence has not been investigated to date and is therefore not yet understood.

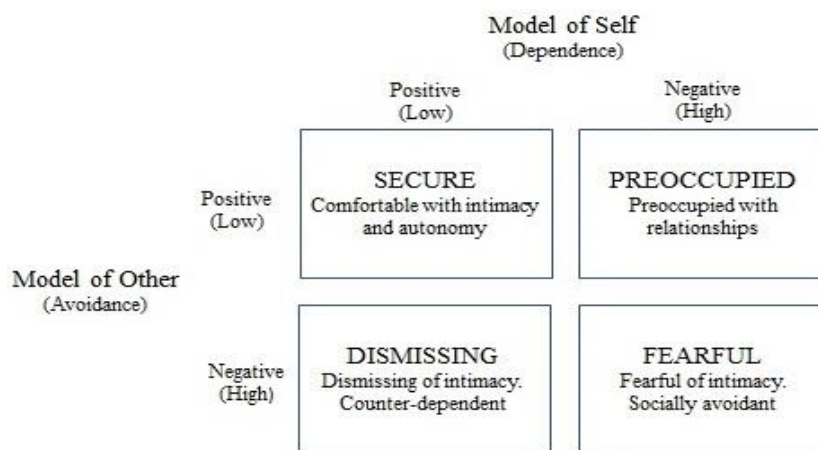
1.5.1 Attachment

Attachment systems are thought to have evolved to maintain proximity between infants and their caregivers under conditions of threat or danger (Bowlby, 1973) and function continuously to provide the child with sense of security (Ainsworth, 1978). Over time, children internalise experiences with their primary caregivers in such a way to form the prototype for later relationships (Bowlby, 1973). According to Bowlby, these internal representations of attachment have two key features, the first concerns the child's image of themselves and the second concerns the child's image of other people. Based on these working models of attachment, Bartholomew and Horowitz (1991) first proposed the four-group model of attachment styles in adulthood (see Figure 1.4 below), which are defined by combinations of a person's self-image as positive or negative (as worthy of love and support or not) and their image of others as positive (trustworthy and available) or negative (unreliable and rejecting). Secure attachment is defined by a positive view of self and other which leads an individual to be low in dependency and low in avoidance and as such they are comfortable with intimacy and autonomy (Bartholomew & Horowitz, 1991). Preoccupied attachment is defined as a negative view of self and a positive view of others, which leads an individual to strive for self-acceptance and self-worth by gaining the acceptance of others

(Bartholomew & Horowitz, 1991). The remaining two attachment styles, which share a negative view of others, are classified as avoidant attachment styles. Dismissive avoidant attachment is defined by a positive view of self and a negative view of others (Bartholomew & Horowitz, 1991). Such individuals protect themselves against disappointment by avoiding close personal relationships and maintaining a sense of counter-dependence and invulnerability (Bartholomew & Horowitz, 1991). Fearful avoidant attachment is defined by a negative view of self and others (Bartholomew & Horowitz, 1991). By avoiding close involvement with others, individuals protect themselves against, what they perceive to be, inevitable rejection from others (Bartholomew & Horowitz, 1991).

Figure 1.4

Model of Adult Attachment



Note: From Attachment Styles Among Young Adults: A Test of the Four Category Model by K. Bartholomew and L.M. Horowitz, 1991, *Journal of Personality and Social Psychology*, (pp, 226-244).

The development of a positive internal working model of oneself and others (secure attachment) facilitates the development of an innate sense of self-worth (Bartholomew & Horowitz, 1991). However, when the development of secure attachment is disrupted, so too is the development of innate self-worth and as such self-worth may become contingent upon

demonstrating skill and competency within a particular domain and subsequently increases an individual's motivation to achieve success in that domain (Crocker & Knight, 2005). It seems plausible therefore that insecure attachment may underpin the motivation for certain athletes to pursue excellence. Given the lack of understanding regarding the role of attachment in the development of expertise in sport, a further aim of this thesis was to explore the role of attachment in developing excellence in rugby.

1.6 Summary of Research Limitations

The factors which optimise the development of expertise in sport have been the subject of much research, with current literature suggesting that it is likely the result of a complex interaction between genetic and developmental features (Jones et al., 2020). Despite this position however, early TID and TD programmes have predominantly been unidimensional in nature. The use of multi-disciplinary approaches to investigating the factors which underpin athletic success are now becoming increasingly common (Doherty et al., 2018; Gulbin et al., 2013; Güllich et al., 2019; Lovell et al., 2017; Tribolet et al., 2018), however, a multi-disciplinary approach has not yet been used to specifically explore the development of excellence in rugby union. In addition, to date there has been a lack of longitudinal studies and a focus more on cross-sectional designs, which lead to the risk of prematurely applying causality to the findings (Johnston et al., 2018). Moving forward there is a need for longitudinal research to help determine the factors which influence the development of skill and expertise in sport (Johnston et al., 2018). There has also been a recent move towards utilising the superior predictive values of machine learning techniques in TID and TD research, enabling a more in-depth investigation of the multiple factors likely involved in the development of expertise in sport (Güllich et al., 2019; Jones et al., 2019). Given the need for more multi-disciplinary, longitudinal studies within TD research we took this approach in Studies 2 and 3, and utilised pattern recognition analysis to explore the

multi-disciplinary factors which influence progression through the RFU development pathway.

The role of psychological factors in the development of excellence in sport is widely acknowledged, and research into personality has increased our understanding of the relationship between individual differences in personality and sport performance. However, whilst most TD approaches acknowledge the need for challenge in training, to maximise skill acquisition and the development of expert performance, to date there has been no exploration of the influence of individual differences on the effectiveness of this type of training. Understanding the influence of individual differences on various training protocols has a clear applied implication and would allow practitioners to take a more individualised approach and better understand the effectiveness of each training practice for different individuals. For this reason, we have explored the influence of personal factors, specifically ASD traits (systemising and empathy) and avoidant attachment (dismissive and fearful) on the effects of CL training on progression in Study 4 of this thesis.

Finally, whilst some of the current literature acknowledges that adversity related trauma may act as an extreme motivational trigger, fuelling ambition, effort, and application (Hardy et al., 2017; Sakar & Fletcher, 2017; Savage et al., 2017) research to date has not directly addressed this within the sport of rugby, or investigated questions around the origins of the motivation and drive to pursue excellence in the first place. Early life trauma is known to disrupt the development of secure attachment (Batholomew & Horowitz, 1991) however the role of attachment in developing excellence has not yet been explored and warrants investigation. In addition, several of the personality traits associated with expert performance in sport, notably narcissism, perfectionism, and obsessiveness, have all been associated with disruptions and distress within early parental relationships, including parental invalidation, parental criticism, high parental expectations, and authoritarian parenting style (Flett, et al.,

2002; Huxley & Bizumic, 2016; Timpano et al., 2010). It is certainly plausible therefore that attachment may indeed play a part in the development of excellence in sport. Based on this premise, our aim in Study 1 of this thesis was to investigate the role of psychosocial factors, including attachment, and early life experiences in the development of expertise in rugby.

1.7 Thesis Structure

The framework for this thesis was developed in collaboration with the RFU with the aim of exploring the multi-disciplinary factors which contribute to the development of excellence in rugby and progression through the RFU development pathway. The remainder of the thesis comprises three empirical chapters comprising four separate studies designed to meet the objectives stated above, followed by a general discussion chapter to conclude the thesis. The structure of the thesis is as follows:

1. Chapter 2 (Study 1) presents a qualitative investigation of the psychosocial characteristics of the world's best rugby players. In-depth interviews were conducted with five former world's best rugby players and their nominated coach to explore the psychosocial factors which underpinned their development, and which may have been important in reaching the pinnacle of their sport.
2. Chapter 3 (Studies 2 and 3) presents two studies that provide a multidisciplinary examination of factors which influence progression within the RFU development pathway at two different stages. Using a longitudinal design and pattern recognition analysis we identified the factors which differentiated between players who progressed from U18's to U20's, and those who failed to progress (Study 2) and between players who progressed from the pathway to the Premiership and those who failed to progress (Study 3).
3. Chapter 4 (Study 4) investigates the influence of individual differences, specifically ASD traits (systemising and empathy) and avoidant attachment (dismissive and

fearful) on the effectiveness of constraints-led training on progression through the RFU development pathway.

4. Chapter 5 provides a general discussion of both the theoretical and applied implications of this research along with future research directions.

The thesis was structured in its condensed manner in line with the University policy to meet the dual needs of completing a thesis as well as learning to write empirical papers for publication. Therefore, some of the content from introductions and discussions (including the above) is repeated in the following chapters in varying abbreviated formats to be compatible with publication standards and function as standalone multi-study papers. Consistent with convention from APA guidelines, I utilise the pronoun ‘I’ where appropriate. However, I emphasise that this PhD was collaborative and so, where appropriate, the pronoun ‘we’ is utilised. These chapters are followed by Appendices, and it should be noted that tables and figures are labelled cumulatively with reference to their respective chapter followed by a period (for example, Table 3.1 would be the first table within Chapter 3).

Chapter 2

Study 1: The Psychosocial Characteristics of World's Best Rugby Union Players

2.1 Abstract

The purpose of this study was to investigate the psychosocial factors underpinning success and development in rugby union. We conducted in-depth retrospective interviews (totalling over 32 hours and over 239,700 words of text) with former world's best International male rugby union players ($N = 5$) and their nominated coaches ($N = 5$). Interview topics covered early critical developmental experiences, personality, relationships, and training behaviours. Abductive thematic analysis revealed commonalities, which are discussed under three main headings: 1) Formative Experiences, 2) Personality, and 3) Training Behaviours. Results revealed that negative early life events coupled with a positive sport experience and career turning point, obsessiveness, perfectionism and narcissism, a dual mastery and outcome focus, importance of sport, a need for success, and performance under pressure, appear to be important to the development of excellence in rugby. In addition, dichotomous thinking, self and team focus, and avoidant attachment were also found to be commonalities among participants. Two distinct personality profiles emerged, one underpinned by a dismissive avoidant attachment style and the other underpinned by a fearful avoidant attachment style. Findings suggest early negative experiences, particularly disruptions to parental relationships, and the realisation of insecure attachment, coupled with a positive sport related event, may underpin the drive and development of the necessary personality traits and behaviours to achieve excellence in rugby.

2.2 Introduction

In the pursuit of understanding the development of excellence, the respective influence of nature and nurture have long been debated. In support of the argument for nurture, Ericsson et al. (1993) offered a theoretical framework which played down the role of innate, inherited characteristics and explained the acquisition of expert performance as the result of extended deliberate practice. Ericsson et al. (1993) state that there is little evidence

that heritable characteristics will predict or account for the development of expert performance and instead, suggest that expert performance in a particular domain reflects a life-long effort of deliberate practice. Although this framework has been used as a foundation for a substantial amount of work exploring the development of expertise (Baker et al., 2020; Baker & Young, 2013; Ward et al., 2017) it offers little insight into the psychological characteristics which likely underpin the extraordinary levels of effort and determination required to overcome the numerous challenges involved in achievement of the highest levels of sporting success. To fully understand the development of excellence there is also a need to recognise the importance of an individual's psychological capacity to learn and develop, as opposed to merely concentrating on how they currently perform (MacNamara & Collins, 2011).

There is now extensive research which validates the role of psychological characteristics in the development of excellence in sport (e.g., Collins & MacNamara, 2012; Gould, 2002; Gould et al., 2010; Hardy et al., 2017). Early research by Gould et al. (1981) explored the cognitive strategy differences between more and less successful athletes, finding that self-confidence and attentional focussing were among the factors which separated the two groups. Similarly, Orlick and Partington (1988) found that the most successful Olympic athletes in their study made good use of specific mental skills, such as goal setting and imagery. Smith et al. (1995) developed a multidimensional measure of sport specific psychological skills and examined factors such as coping with adversity, confidence, concentration, and achievement motivation. Having carefully reviewed this, and other relevant research, Williams and Krane (2001) concluded that several psychological characteristics appear to be associated with peak performance, specifically high levels of motivation, commitment, coping skills, heightened concentration, self-confidence, and self-regulation along with the frequent use of mental skills such as goal setting and visualization.

Much of this early sport research shares a theoretical assumption, akin to Ericsson et al.'s (1993) theory of deliberate practice, that the characteristics required for expert performance can be developed, by almost anyone over time, given the right environment. The implication of such an assumption is that the right performance environment will provide an almost equal opportunity for all talented junior athletes to maximise their potential. For example, Gould et al. (2002) suggest that the psychological characteristics developed by Olympic champions in their study, were developed through the influence of family, the sport process, the sport environment, and the individual themselves over a long period of time. However, despite experiencing similar environments, coaches, and training practices, and developing many of the same physical and mental skills, not all athletes within high performance sport development pathway maximise their potential and some derail from the system regardless of early promise. Therefore, it is evident that there is a need to go beyond a simple focus on the role of psychological skills of the performer, and more recent research has moved to explore the influence of other psychosocial factors, such as personality and early life experiences in the development of expertise.

The relationship between personality and sport performance is complex and there are differing views on which traits to measure (Allen et al., 2012), however Roberts and Woodman (2017) suggest that researchers should consider focussing on traits which have a clear performance-focussed theoretical basis. A study by Vaughan and Madigan (2021) suggests that athletes report higher levels of dark triad traits (sub-clinical narcissism, Machiavellianism, and psychopathy) than non-athletes and although typically considered to be maladaptive, may enable athletes to get ahead by disregarding others' objectives and emotions. Vaughan and Madigan's (2021) study builds on earlier work exploring the effects of traits also often perceived as maladaptive within certain domains or associated with negative mental health outcomes, most notably narcissism (Manley et al., 2018; Roberts et

al., 2012; Roberts et al., 2014; Woodman et al. 2011), perfectionism (Appleton et al., 2010; Curran et al., 2014; Gould et al., 2002; Hill et al., 2010; Oliveira et al., 2015; Rasquinha et al., 2014; Roberts et al., 2013), obsessiveness (Vallerand et al., 2008), and alexithymia (Roberts & Woodman, 2017; Woodman et al., 2008). While there are now numerous studies investigating the direct effects of personality dimensions on sport performance, personality test scores have struggled to predict short-term success in sport (Allen et al., 2012). A potentially more meaningful way of identifying the influence of personality on sport performance is to explore how personality dimensions relate to behaviours associated with sporting success (Allen et al., 2012). For instance, conscientiousness has been positively associated with an athlete's quality of preparation, while emotional stability has been positively associated with effective coping during competition (Woodman et al., 2010). In addition, until recently many studies investigated the effects of only one or two dimensions of personality on sport performance and failed to consider the interaction between multiple dimensions of personality, or indeed the combined influence of personality alongside other factors, such as early life experiences, training practices, and demographic factors (see Anderson et al., 2022 for a recent exception).

Multidimensional approaches to investigating the factors which underpin athletic success are now becoming increasingly common (Doherty et al., 2018; Gulbin et al., 2013; Güllich et al., 2019; Lovell et al., 2017; Tribolet et al., 2018). In one of the most comprehensive studies to date, Hardy et al. (2017) investigated the psychosocial, demographic, and practice and training factors that differentiated between elite and “super-elite” athletes, using both quantitative and qualitative methods. The quantitative analysis revealed several demographic and practice and training factors which differentiated between elite and super-elite athletes, including place of birth, position within the family, late specialisation and hours of deliberate practice and play. The qualitative analysis also revealed

some novel psychosocial factors which differentiated between the two groups, including the experience of an early negative life event coupled with an early positive sport event, a career turning point which enhanced motivation, the need for success, obsessiveness and/or perfectionism, ruthlessness and/or selfishness in pursuit of their goals, a dual mastery and outcome focus, total preparation, and the relative importance of sport. Whilst it is difficult to demonstrate causal links in a qualitative study, Hardy et al. suggest that it is unlikely that the discriminating factors, outlined above, are totally unrelated. The experience of adversity and other foundational early life events are likely to facilitate the development of the extraordinary levels of the characteristics, and in turn behaviours, necessary to reach the highest level in elite sport (Fletcher, 2018; John et al., 2019; Sarkar et al., 2015).

Whilst these more recent multidimensional examinations offer an enormous insight into the factors which underpin excellence in sport, there are several limitations to Hardy et al.'s (2017) study. Many involve athletes from multiple different, predominantly individual, sports and to the best of our knowledge the studies which do involve single team or individual sports have failed to consider psychosocial factors. The development of excellence in team sports, such as rugby union, is not yet fully understood and as such a primary aim of this study was to explore the developmental biographies of the Worlds' best rugby players to investigate the psychosocial underpinnings of success and development in this team sport. In addition, whilst some of the literature acknowledges adversity related trauma may act as an extreme motivational trigger, fuelling ambition, effort, and application (Hardy et al., 2017; Jannika et al. 2019; Sakar & Fletcher, 2017; Savage et al., 2017) research to date has not directly addressed questions around the origins of the motivation and drive to pursue excellence in the first place. Theoretical reasoning and popular commentary suggest that early childhood pain and trauma provide a psychological underpinning which compel some individuals to push beyond normal limits and drives them to pursue athletic victory as a

matter of life or death (Gogarty & Williamson, 2009). There is potentially some merit in this assertion as early negative life events are known to interrupt the development of an innate sense of self-worth through disruption to the development of secure attachment (Park et al., 2006). Attachment theory explores the propensity to make strong affectional bonds with primary caregivers, through which we develop internal working models of ourselves (as being worthy or unworthy of love) and others (as being reliable and responsive or unavailable and rejecting, see Batholomew & Horowitz, 1991). The development of a positive internal working model of oneself and others (secure attachment) facilitates the development of an innate sense of self-worth (Batholomew & Horowitz, 1991). However, when the development of secure attachment is disrupted, so too is the development of innate self-worth and as such self-worth may become contingent upon demonstrating skill and competency within a particular domain and subsequently increases an individual's motivation to achieve success in that domain (Crocker & Knight, 2005). In addition, some of the characteristics associated with expert performance in sport, notably narcissism, perfectionism, and obsessiveness, have all been associated with disruptions and distress within early parental relationships, including parental invalidation, parental criticism, high parental expectations, and authoritarian parenting style (Flett et al., 2002; Huxley & Bizumic, 2016; Timpano et al., 2010). The role of attachment in the development of excellence in sport has received little attention thus far. Thomson and Jaques (2017) however, investigated attachment and childhood adversity amongst groups of high achievers, including athletes, dancers, and actors and found a higher prevalence of dismissive attachment amongst athletes, compared to actors, dancers, and the general population. The concept that early life events and attachment style, may underpin not only the development of the necessary personality traits and behaviours to achieve excellence in sport, but also the motivation and drive to pursue athletic glory in the first place, warrants further investigation and is an additional aim of this study.

2.3 Method

2.3.1 *Theoretical Orientation*

Informed by a constructivist theoretical orientation (Varpio et al., 2017), we acknowledged the unavoidable influences and perspectives of the research team and built this subjectivity into the interpretive process with the knowledge base of the research team integral to our data collection and analysis. We asked participants to describe their life and experiences without making any interpretation or causal link between those events and their subsequent success. This approach is more likely to elicit reliable reflections of their past (Côté et al., 2005) and allows all factors to be considered, even those that the athlete may themselves not consider inherent to their success. In addition, applying this theoretical framework to the analytical process allows the research team to draw on their collective knowledge and experience to bring meaning to common experiences, traits, and behaviours of the sampled athletes, resulting in a deeper and more erudite interpretation of the factors which likely contributed to their success.

2.3.2 *Participants*

Participants were five, former international rugby players, all of whom were widely considered to be the World's best in their position at the peak of their career. Although this is arguably subjective criteria, all five participants have been described in this manner by rugby journalists, fellow players, coaches, and administrators from around the world. Further definition of the selection criteria may compromise participant anonymity and therefore hasn't been provided for this reason, however the following demographic information can be presented. Participants were all male and ranged in age from 37 years to 47 years at the time of the interview, with a mean age of 43 years ($SD = 3.70$). Participants had a mean domestic playing career of 16.8 years ($SD = 1.10$), and a mean number of international caps of 76.4 ($SD = 10.95$).

2.3.3 Data Collection Methods

We used semi-structured, retrospective interviews as the data collection method for this study. Since outstanding athletes can only truly be distinguished after they have reached the highest level, retrospective interviews remain one of the primary sources of information on athletic development (Côté et al., 2005) and are the most frequently used interview technique in qualitative research (Kallio, 2016). This type of interview consists of a pre-determined set of themes and questions which define the areas to be explored but allow the interviewer to deviate to pursue a particular response in more detail (Gill et al., 2008). Subsequently we developed a semi-structured interview schedule which was informed by previous research and aimed to examine previous findings within the context of elite sport, whilst also allowing for the discovery of information that may not have previously been thought of as pertinent by the research team (Gill et al., 2008). See Appendix A for details of the full interview schedule.

2.3.3.1 Research Advisory Team. Rigorous development of a qualitative semi-structured interview schedule contributes to the objectivity and trustworthiness of the data collected and makes the results more plausible (Kallio et al., 2016). One step in ensuring such rigour was to put together a Research Advisory Team who could provide expertise and feedback in the development of the interview schedule. The Research Advisory Team consisted of 3 researcher-practitioners within the field of sport and exercise psychology, with 30 years' collective experience, the RFU's national lead psychologist and a consultant clinical psychologist. The inclusion of a clinical psychologist on the RAT was deemed essential as not only did they provide a unique insight when developing the parts of the interview schedule focussed specifically on early life events, but they also offered guidance on the most appropriate ways to navigate the more sensitive parts of the interviews with participants. The interview schedules were based on previous work examining psychosocial

factors influencing excellence (e.g., Gould, 2002; Gould et al., 2010; Hardy et al., 2017; Sarkar & Fletcher 2017). Following development of the interview schedules by the lead author, the Research Advisory Team was asked for feedback. There were several rounds of feedback and further refinement until agreement was reached on the final versions of both the participant and coach interview schedules.

2.3.4 Procedure

The first participant was a very well-known, former international rugby player, who agreed to act as an ambassador for the study and allowed us to send signed letters from him to a select group of other former international players encouraging them to sign up. Five players responded positively, and interviews dates were scheduled. One player was unable to commit to an interview date, thus reducing the sample size to five. The skill base of interviewers is an important consideration in all qualitative research, and it's recommended that interviewers are fully acquainted with the interview schedule and confident in conducting the process (Cridland et al., 2015). Accordingly, following institutional ethics approval, we piloted the participant interview schedule on three amateur athletes and then piloted on three recently retired professional rugby players, with each interview lasting approximately 2 – 3 hours. This process allowed for some final, minor, adjustments to the interview questions and the opportunity for the interviewer to hone their expertise in conducting this type of data collection (cf. Kallio et al., 2016). We conducted participant interviews with two interviewers. The two-on-one interview approach is still relatively innovative; however, studies suggest that having two interviewers offers an increased capacity to collect relevant data (Monforte et al., 2021). Employing two interviewers allows for different interpretations and meaning of the discourse, recognising there is no single 'correct' interpretation (Lyndon & Edwards, 2021). In each of the interviews, one interviewer led the process and followed the interview guide while the other interviewer focused on taking notes and identifying

unexpected topics for further enquiry. Participants were reminded that their data would remain completely confidential and would not be seen by anyone outside of the research team. They were also reminded of their right to withdraw from the study at any time and then asked to provide their consent to participate.

An important consideration for this type of interview is the sensitive nature of the subject matter being discussed. Disclosing detailed personal experiences and emotions may leave participants feeling vulnerable. It was important that the interviews yielded rich, meaningful data while at the same time allowed participants to feel at ease discussing difficult or sensitive information with a stranger (Dempsey et al., 2016). When planning the interviews, we adhered to guidance from the literature and followed a similar framework as outlined by Dempsey et al. (2016) to ensure that participant's needs were safeguarded. The interviews were all conducted face-to-face between December 2016 and February 2017 and in a location of the participants choice, sometimes their home. Sensitive topics were signposted to the participant, as were the details of relevant support services. We considered how we might deal with distress from the participant if it arose and carried out a short debrief at the end of the interview to ensure a positive closure to the process. In addition, for three of the five interviews, a consultant clinical psychologist, took the role of second interviewer. This was not possible for the remaining two participant interviews due to scheduling issues, in which case the second interviewer role was filled by one of the other members of the research team (all of whom were experienced researcher-practitioners themselves).

Previous knowledge of the subject creates a predetermined framework for the interview (Kallio et al., 2016). Consequently, we prepared biographies of each participant prior to the interview, ensuring that both interviewers had a comprehensive understanding of the participant's career history. Interviews commenced with a discussion informed by this biography, verifying performance milestones (age at which they started playing rugby, age at

which they made their senior club debut, the clubs they played for and for what periods, age at which they made their international debut etc.). The interviewer then proceeded with the interview schedule. The order of the questions was determined naturally by the direction the participant took and were subsequently asked in a different order for each interview. It was the job of the first interviewer to ensure that all questions relating to each topic within the interview schedule, had been asked by the end of the interview. At the end of the interview the participants were asked whether there was anything else, that they felt was relevant to their success, that had not already been covered. They were then thanked for their time and told that a copy of the interview transcript, along with a summary document would be sent to them. The total duration of the interviews was between 171 minutes and 212 minutes ($M = 189$ minutes, $SD = 17.6$)

2.3.4.1 Coach Interview Process. We asked each participant to nominate a coach, who they had played under during their career, and who would be happy to participate in the study as an informant. We then contacted nominated coaches and asked whether they would agree to take part in the study. All the nominated coaches agreed to take part and we scheduled interviews with them at a time, date, and location of their choice. The coach interview schedule was individually constructed for each coach. Once the participant interview was complete the first interviewer listened to the interview in full to determine the structure and focus of the coach interview. The primary purpose of listening to the participant interview prior to finalising the coach interview schedule was to determine whether any information required additional exploration and secondly whether any information would benefit from verification by the coach. Although the coach interview made use of the information provided by the participant, we took great care to preserve the confidentiality of participants. We made no assumptions about what the coach did or did not know about the participant and the events in his life, and no reference to specific life events were made. The

duration of the coach interviews was between 85 mins and 152 mins ($M = 115$ mins, $SD = 25.3$)

2.3.5 Data Analysis Methods

The participant and coach interviews were all transcribed verbatim by professional transcribers resulting in 885 transcript pages (239,759 words). To preserve the anonymity of participants they were each assigned a random two letter initial and no further reference to their name was made from the point of analysis onwards. The random initials assigned to participants were, KO, OB, TI, TS and WS. We used NVivo software for data analysis using a combination of traditional inductive and deductive thematic analysis, a process which can be described as abductive analysis (Ryba et al., 2012; Webster et al., 2017). The abductive approach enables dialectical movement between real world observations (inductive) and theoretical propositions (deductive) allowing us to investigate the lived experiences of each participant whilst also establishing whether experiences could be understood through pertinent theoretical constructs (Tavory & Timmermans, 2014). The six broad themes for the deductive analysis were 1) Critical developmental experiences, 2) Relationship with rugby and motivational orientation, 3) Emotional regulation, 4) Personality, 5) Relationship with family and coaches 6) Career turning points. We sought to enhance rigour throughout the analysis process through “critical friend” meetings between the first two authors to challenge perceptions and assumptions around the findings (Rossman & Rallis, 2017). Once agreement had been reached between the first two authors this was presented to another member of the research team for a further opportunity to challenge perceptions and assumptions. Finally, in an additional step to ensure trustworthiness of the analysis, a copy of the full transcript, along with a one-page summary document was sent to each participant to ensure that their words matched their intended meaning.

2.4 Results

As we went through the analysis, each participants' story started to emerge as three separate phases. They all described their early life experiences, various personality traits, and the behaviours that subsequently developed. We therefore organised the results to reflect these phases and report them in the first three sections; foundational developmental experiences, development of personality traits, and behaviour: who they became. Finally, during analysis we observed two distinct profiles amongst the participants, where the behaviours being described appeared to be very similar but were evidently driven by a different and distinct set of traits. This latter point is described in more detail in the fourth section of the results. The results are presented under the following headings:

- Foundational Developmental Experiences
 - Relationship with Parents
 - Parentification
 - Critical Negative Events
 - Attachment
 - Working Model of Others
 - Working Model of Self
 - Positive Critical Sport Related Event
 - Finding Sport
 - Influential Coach
 - Inspirational Sporting Pathway
 - Participating in Sport with Older Peers
 - Proficient Training Environment
 - Relationship with Siblings
 - Family Culture

- Development of Personality Traits
 - Narcissism
 - Self and Team Focussed
 - Perfectionism
 - Obsessiveness and Obsessive Passion
 - Fear of Failure
 - Fearless Dominance
 - Dichotomous Thinking
- Behaviour: Who they Became
 - Career Turning Points
 - Importance of Sport
 - Need for Success
 - Mastery and Outcome
 - Difficulty Expressing Emotion
 - Performance Under Pressure
 - Total Preparation
 - Counterphobic Attitude
- Different Profiles Leading to Similar Outcomes

2.4.1 Foundational Developmental Experiences

2.4.1.1 Relationship with Parents. Four of the five participants talked about how their father was relatively unavailable to them, either physically or emotionally. KO provided an example of an athlete who grew up with a father who was absent from the family home a large proportion of the time, due to work commitments.

"...my Dad, obviously, I had less interaction with on a day-to-day basis, because he was just out working and he worked incredibly hard, long hours, [this industry] is notoriously bad. He wouldn't come home some nights because he'd stay at the hotel or whatever."

Similarly, WS recalled how his father was often out at work and said "My memories of him are he worked hard. He often worked nights. Sometimes 7 days every week." TI suggested his father perhaps had certain expectations of him in terms of expressing emotions and hinted at the fact that he may have been less emotionally available. He talked about having a "rugby macho image" of his father and described him as "quite a man's man":

"Probably my Mum I'd have told, yes, I'd have thought, and she'd have spoken to my Dad, I think. Not that I...I wouldn't have been adverse to telling my Dad either but I think it was always likely to be my Mum, she was the one who was picking us up from school every day so that was my first point of contact but also maybe, that was more likely, you know, the rugby image of macho, get out there, was very....which was the one I had familiarised with my Dad, [our] relationship was that it was a very man to man thing."

The same four participants also described a very close relationship with their mother and the significant role she played in their life. Some described an empathy and understanding for the challenges their mothers faced in day-to-day family life. An example of this is provided by OB,

"So, I do have a very strong relationship with my Mum, because the illness has probably affected her more than - well, I have more sympathy for my Mum. That sounds quite harsh, but I just feel Mum has had a - she is a sole carer, so that, it is the whole situation now, you know."

Other participants described an admiration they held for their mother. This admiration was evident for KO,

“....it was just fascinating, just to watch her at work. She was the most incredible woman, and just funny. Funny, funny. I’d give you millions of examples of that drive, and determination, and ambition, which clearly had an impact on me, either subconsciously or consciously, because I’d [be] told constantly, and reminded constantly, about everything that was good in life.”

The fifth participant did not provide much detail regarding his relationship with his parents. He described being equally close with both parents and said that there were very few occasions when either parent was absent from the family home.

2.4.1.2 Parentification. It is worth noting that the same four participants who described differing relationships with each of their parents also described a degree of reverse parenting, known as parentification. Parentification involves an emotional role reversal in which a child sacrifices his own needs for attention, comfort, and guidance in order to accommodate and care for the emotional needs of their parent (Engelhardt, 2012). The obligation, and in some cases guilt, felt by the child to meet the parents’ emotional needs, severely disrupts the development of secure attachment (Engelhardt, 2012).

KO provides an example of a participant who felt responsible for protecting his parents emotionally. When talking about being away from home he said,

"There was one phone [X], and to get to it you had to wait your turn really. Every time I got to it, some bloke would come and beat me up and get on the phone. So, it took me about five weeks before I spoke to my Dad, we used to speak every day. He said 'why have you not phoned me?' I didn't say I was being beaten up. I didn't think that helped. I just said 'Well it's only one phone Dad, it's a bit remote out here.'"

He also talked about feeling a sense of responsibility to help his parents following a tragic family event,

"They love you and will look after you but you can see what's happened to them, you know what I mean? You can see that part of them just wants to sort of go in that direction as well. It's really, difficult. Really, really, difficult. I watched it. I mean, yes, it's just a very hard place to be. I think at some point, because I stopped [messing] about and realised that 'actually, I need to do something quite dramatic really'."

He went on to say how his rugby career gave them something to focus on: "Actually my parents started to re-engage with what I was doing. I think that became a key driver, because I think they needed an outlet for their grief." The fifth participant did not describe any kind of parentification.

2.4.1.3 Critical Negative Event. Literature suggests that early critical negative events, including sport and non-sport adversities, may impact on the dynamic pathway to excellence and facilitate the development of extraordinary levels of the characteristics necessary to reach the highest level in elite sport (John et al., 2019; Sarkar et al., 2015; Sakar & Fletcher, 2017). Consistent with this, all five participants experienced at least one foundational negative event in their childhood. In some cases, participant's experienced multiple foundational negative events. Experiences ranged from serious relationship issues (e.g., disruptions within parental relationships, reverse parenting), death (or serious illness) of a close family member, experiencing physical discipline (at home or at school), separation from parents (e.g., attending boarding school) and issues around body shape and size. Details of specific events have not been given to protect participants anonymity.

2.4.1.4 Attachment. Regardless of the number or type of critical negative events participants experienced, one commonality appears to be around attachment. Bartholomew and Horowitz (1991) proposed a four-group model of attachment in which they suggest that interactions with others (e.g., primary caregivers) result in the development of positive or negative mental models of the self (as either worthy or unworthy of love) and others (as

either trustworthy and available or unreliable and rejecting). When crossed these two dimensions produce four attachment classifications: Secure attachment, (positive self and other models), preoccupied attachment (negative self-model and positive other model), dismissive avoidant attachment (positive self-model, negative other model), and fearful avoidant attachment (negative self and other models).

2.4.1.4.1 Working Model of Others. Four of the five participants demonstrated behaviours indicative of an avoidant attachment style (dismissive and fearful) which share a negative view of others, seeing them as unreliable and rejecting (Bartholomew & Horowitz, 1991). All four of these participants described relationships in which they had experienced inconsistent emotional support and in which they had felt rejection. KO provides an example of this when describing his feelings about attending a new school, where he hints at feelings of rejection,

"I said to her 'Why [X school]?' 'Well, it's the best [X] school in the country and it's.....' I said 'but its 250 miles away, have I done something wrong?' She said 'Oh no, you'll be alright' this that and the other. I said 'but its boarding' you know? 'Well, you'll be alright."

In some cases, participants described an early childhood experience in which they were extremely distressed or anxious about being separated from a parent, typically their mother, which may suggest that they viewed their parent as inconsistent or unavailable. OB and WS provide an example of this;

OB: "I had a real 'Oh where is Mum, where is she?' And my brother and the other kid didn't really give me any security on where they were and I was like 'Oh my God, they've gone, they've gone, they've gone' and I got a sudden panic on."

WS: "I was up against the front window crying my eyes out. My Mum still went out, as you would. I was upset because they were going out and I thought crying would make them not go out, but they still went out. My Grandparents were looking after me." "I can

remember it vividly, standing on the windowsill crying up against the window like that. She just went and left but that was the right thing to do."

TI also talked about experiencing separation anxiety when parted from his family and implies that their presence only had a minimal impact on his emotional security:

"...there was definitely a degree of the separation, about it. So, when I was around that support base, I felt more comfortable. It maybe just took, took the edge of the pain..." He goes on to say: "I was just upset, in tears just saying, and I would not let it go to the extent that, I knew that no one could help me, that was the thing, no one could help me."

2.4.1.4.2 Working Model of Self. The difference between the two avoidant attachment styles (dismissive and fearful) is that dismissive avoidant individuals hold a positive self-view, whereas fearful avoidant individuals hold a negative self-view. Alongside their negative view of others, two participants demonstrated a positive self-view, indicating a dismissive avoidant attachment style. KO provides an example of a participant who held a positive self-view and describes how his mother helped shape this belief,

"No, I don't think it did. I mean, obviously, you're nervous about certain things when you're that age, but I think when you've got a parent who's right behind you....Not in a sense that they're sort of bullying you, but in a sense that of course you can achieve anything you want, I think it just gives you a huge amount of confidence and belief really."

Two other participants demonstrated a negative self-view alongside their negative view of others, indicating a fearful avoidant attachment style. TI provides an example of a participant who had a negative self-model and described needing to prove his self-worth,

"I think there was a fair feeling of proving worth and everything, for me was that, maybe there was, you know, I needed to score highly on everything in order to prove that I was worthy and, in a way, maybe, I was already starting from a lesser position, which is why all these things were just ticking boxes, instead of making me feel great."

The fifth participant did not provide enough information around his early childhood experiences and relationship with his parents to suggest a specific attachment style.

2.4.1.5 Positive Critical Sport Related Event. Previous research looking at the impact of negative developmental events has identified that foundational traumatic events alone are unlikely to provide an adaptive framework to develop the necessary attributes required to achieve the highest levels of performance (Douglas et al., 2010). Hardy et al. (2017) found that the foundational negative critical event(s) experienced by ‘Super-Elite’ athletes occurred in close temporal proximity to a positive critical sport related event. Our findings also support this conjecture, as all five participants described a critical sport related event, which occurred in early childhood and in close temporal proximity to a negative critical life event. For two participants the positive critical sport event occurred shortly after the negative critical life event. For one participant the positive critical sport event occurred shortly before the negative critical life event and for two participants the exact order of events was unclear. The positive sport related events can be categorised as *finding sport*, having an *influential coach*, and experiencing an *inspirational sporting pathway*. In addition, most participants also described experiencing a *proficient training environment* and *participating in sport with older peers*.

2.4.1.5.1 Finding Sport. All five participants talked about the significance of finding a sport in which they could thrive, or which fulfilled some kind of need. TI described how sport allowed him to express himself and how it broadened his horizons:

“The sport was phenomenal. I made a load of friends through rugby. I played nothing but sport the whole time. I literally hid away probably when I first got there; very shy and reserved, introverted. I hid away but expressed myself through sport and through the ability to play sport”.

OB described finding a sport at the age of nine which laid the foundations of his sporting development and which represented qualities he admired;

“[X] was the first club I joined – I did that from nine to seventeen. That would have laid a good foundation for me, for – in hindsight, lots of good things came out of that.” He went on to say: “Yes. I’m quite structured in the way I do things. I’m quite a stickler for the rules, and so I quite like that. And it is very principled, and we do the right thing, and everyone is very courteous and respectful, and again I like that.”

2.4.1.5.2 Influential Coach. All five participants talked about a significant coach, who was a big influence on their sporting aspirations and development. WS provides an example of this when describing his first rugby coach as being the best coach he’s ever worked with:

“I met [X] who sadly died last year. He was ahead of his time. He was my first coach. He made it fun, he made it enjoyable for everyone. He coached me probably for the first three of four years whilst I was there. When people ask me, “Who was the best coach?” I always say, “Him, bar none.”

He went on to say,

“Because he made it fun, enjoyable, about skill development. It wasn’t just about the rugby ball, it is all different types of balls, different types of skills. He taught me tackle technique that I used as a player through my career in the [X] final and coached on to other people...”

OB described the lasting influence his coach had had on him personally:

“And we caught up at the funeral, you know, I mean, we all spoke at the funeral, and it was then when everyone had to sort of write [a] bit for the funeral, and we all spoke about, actually, the influence [X] had had ...on our lives was quite significant, you know, [he] was a real guide for us.”

2.4.1.5.3 Inspirational Sporting Pathway. Four of the five participants talked about a moment, event, or a person they met early on in their sporting development, which inspired them and allowed their sporting aspirations to develop. WS recalled the facilities he had at school, as well as sessions run by ex-professional athletes:

“There was lots of sport available. They invited local ex-sportsmen and women to come and coach. I remember a guy – what was his name now? [X]. He came in to teach cricket. We played rugby, football, netball, rounders. We had an amazing gym that would make our PC world turn in its grave because there were wall bars, there were rings, there were vaulting boxes, there were climbing ropes.”

TS described being inspired by watching rugby at his local rugby club.

“....as a youngster growing up, from my parents’ house, you could see almost like the light pollution from the rugby club's club lights. So, on a Tuesday or Wednesday night, if we could see that, we’d know there was a game on. So, I’d badger my dad to go up and watch. We’d go up, and there’d be a bank on top of, overlooked the pitch. You sat on that, and then we’d watch five minutes of rugby. And by that point, probably about four or five of my mates would’ve turned up, my rugby mates. And we’d go off into the shadows on the hockey pitch behind, and we’d then start making up rugby games.”

2.4.1.5.4 Participating in Sport with Older Peers. All five participants described how they regularly played sport with older peers while they were growing up. An example of this is from OB:

“So, I would train with people a lot older than me, and that Sunday session was quite a long training day. We would start the day with a run, we would do lots of skipping, and then lots of training – it was like quite a big block of time, and I would do that. So I would train Tuesday, Thursday night, I would be the only one under 16 training with that group – it was all University students. So that was a real step up for me. And I was probably – you

know, I was big as a 15, 16-year-old, tall, but that whole training was definitely a very positive physical effect on me and just because of the amount of kind of stretching you did and the controlled movements, that core strength, so I kind of, I grew up with that.”

WS also recalled playing sport with older peers, in this case his older brother and his friends: “I think [X], my elder brother, because of the age gap and because a lot of the other kids were [my brother]’s age, it always meant I was playing with older kids.”

2.4.1.5.5 Proficient Training Environment. Four of the participants described either experiencing a disciplined training environment early on in their development or being encouraged and rewarded for their own high standards in terms of training. KO said: “...we were the fittest team that you’d ever seen.” He went on to say: “I understood what it took to be successful, because we trained very hard....”

OB described the training discipline which was instilled in him through the sport he played at a young age,

“So, I really enjoyed it. It was very disciplined training and I always used to train, quite quickly – I suppose 12 or 13, 12 maybe, I got to black belt, and then I would train on the Sunday with the University.”

2.4.1.6 Relationship with Siblings. All participants had one older sibling. Four participants had an older brother, and one participant had an older sister. Only two of the participants also had a younger sibling. One participant had a younger sister, and one participant had a younger brother. Relationships with siblings seemed to vary between participants and there was no consistent pattern which characterised all of these relationships. Some of the participants talked about a strong rivalry within the relationship with their older sibling, for example OB said “yes, yes, neither of us were kind of passive. We would – you know, if we did things, we would...I would do it to win, yes.” WS said “Yes, there was

competition definitely.” However, other participants described a relationship which reflected a stronger allegiance to one another, for example, TI said,

“We learnt early on that it wasn’t a good idea to compete against each other just because there was never a winner, as in, whoever won ended up feeling like they’d lost because they didn’t like the fact the other person lost.”

However, all four participants with an older brother, indicated a belief that they had the competitive edge over their older brother, in relation to sport. OB provides an example of this when he said, “I felt quite active and sporty, more so than my brother was.” “Yes, so he was less sporty, I was probably the slightly more, you know, became physically stronger than he was.”

2.4.1.7 Family Culture. All participants talked about growing up within a culture of striving. Whether that was through hard work or just ‘doing your best’ they all appear to have been encouraged to try and achieve. KO provides an example of this: “I came from a culture where you’re expected to win.” Similarly, OB described his parents’ strong work ethic,

“I look back on my parents, you know, they’ve got a strong work ethic and they’re very – I look at them as very good people, principled and, you know... I look at that as something that hopefully I’ve inherited, and I admire in them.”

TI provides an example of a participant who was encouraged to always do his best. He acknowledged that for him, this translated into winning:

“It was nothing to do with winning or losing and success and all that. It was very much a case of just, you know, if you're going to do something give it your best shot”.

He went on to say, “Everyone in the family had... I'm sure their different perspective of what ‘give it your best shot’ meant and whether that was process or outcome related, more process and more outcome related but, for me, that translated hugely. Not because of the value system but because of my take on it. For some reason because of my experiences

around that area, that age and everything, I crept hugely towards outcome, as in ‘give it your best’ translated immediately to winning, as in if you didn't win it wasn't your best...”

2.4.2 Development of Personality Traits

2.4.2.1 Narcissism. Narcissism has been defined as a relentless striving to assert self-worth and superiority (Gebauer et al., 2012), a trait which could easily be seen as advantageous within a sporting context; indeed, there is evidence showing that narcissism predicts improved performance under pressure (see Roberts et al., 2018 for a review). Multiple studies provide evidence of two forms of narcissism which are referred to as vulnerable and grandiose (Miller et al., 2011). Grandiose narcissism primarily reflects traits of aggression and dominance whereas vulnerable narcissism reflects a defensiveness which obscures feelings of inadequacy and incompetence (Miller et al., 2011). Four of the five participants described behaviours characteristic of narcissism, some described thoughts and behaviours reflecting aspects of grandiose narcissism while others described thoughts and behaviours reflecting aspects of vulnerable narcissism. The two participants who described behaviours consistent with a dismissive avoidant attachment style, where a positive self-image is held, also described traits of narcissistic grandiosity. This link is consistent with earlier research which has found that narcissistic grandiosity is positively correlated with explicit self-esteem, suggesting that grandiose narcissists have a high sense of self-worth (Stoeber et al., 2015) as well as feelings of superiority (e.g., Jauk, et al., 2017). Both participants demonstrated a sense of superiority and indicated a belief that they were more proficient than others. KO provides an example of this; "But I knew I was definitely good enough to do it. I think some of my colleagues probably either sensibly admitted to themselves that, one, I don't think I'm as good as you...." In addition to this, both players described a sense of gratification, derived from being recognised or receiving admiration. WS highlights this when he said,

"Obviously when you arrive into [X airport] and there are 25,000 people there at 5.30 in the morning, or there are a million people around, then that's a different experience and that makes it all good."

WS also described a preoccupation with his physical appearance which could be observed as vanity; "So I was in good shape at fifteen, sixteen, aesthetically as well as physically..."

The two participants who described behaviours consistent with a fearful avoidant attachment style, where a negative self-image is held, described behaviours consistent with narcissistic vulnerability. This link is consistent with previous research which has found that narcissistic vulnerability is negatively correlated with explicit self-esteem, suggesting that vulnerable narcissists have a low sense of self-worth (Stoeber et al., 2015). Vulnerable narcissism is characterised by a sense of self-worth which is contingent upon other people's recognition (Stoeber et al., 2015). OB provides an example of this when talking about the media, where he admits to reading the papers following a good performance; "And if I played badly I wouldn't read the paper. If I had a particularly good game I thought 'maybe I will read it' but their opinion wasn't the most important, it was more of ego." In addition, OB also hints at a desire to be acknowledged as training better than his peers. When talking about training he states, "...and I'd watch the others joke around and doss and they'd all be finished before me, because they cheated, they used to annoy me." Similarly, TI talked about feeling that he had trained harder and wanted success more than others,

"My way of preparing during the week was to try to cover every base of making it, you know, of dealing with that 'not okay to lose' thing by literally going into a game and being able to say, "I have trained so much harder than everyone here. I have wanted it so much more. I need it so much more. I'm better than any of you. I've been through way more than any of you. What I'm feeling in here is so much stronger in terms of any of you."

Other attributes of vulnerable narcissism include becoming absorbed in thinking about oneself and forgetting the existence of others (Jauk et al., 2017). These features come through in TI's interview when he says,

"It's probably the way I am now that I can't see it, but a lot of people have strong opinions when they talk about their parents today, [they] are very much like this, this is what he believed in but I don't know hugely what they believe in other than, like I said, giving it their best shot and doing their best for those around them, and that's pretty much it."

TS showed an explicit lack of narcissistic grandiosity and no evidence of narcissistic vulnerability. He described feeling very uncomfortable with the praise he received from members of the public,

"I felt uncomfortable with the incessant praise you get sometimes.....I still feel uncomfortable at times, when people come up to me and start talking about me and saying how great I am and...particularly when they've been a fighter pilot in World War II and they've done all these great things and you're meant to be the best thing that ever happened. You're like 'mate, seriously, could you just shut up? You've done something far more impressive than I have.' I just don't get it."

2.4.2.2 Self and Team Focussed. All five participants demonstrated behaviours consistent with both agentic and communal traits, supporting the notion that they were both self-focussed and an effective team player. The agency and communion framework suggest that agentic qualities are relevant to goal attainment and include assertiveness and competence, while communal qualities are relevant to the establishment and maintenance of social relationships and include warmth and a concern with the welfare of others (Abele et al., 2016).

All five participants described agentic traits and articulated a focus and assertiveness in satisfying their own needs. OB provides an example, where he demonstrates how he

exerted control and influence over his playing and training environment to suit his own needs,

"You know, being effective and efficient was a driver for me: I wanted to, you know, [be] the best I could be. So, influencing how the team thinks, was important. So, I would be a senior player and leader in how we set training, how we did things."

However, participants also appeared to display behaviours consistent with communal traits. Three of the participants displayed what appeared to be communal behaviours, whereby they demonstrated a genuine concern and consideration towards their team-mates. TS provides an example of this when talking about leading a training session at school. He demonstrates helpfulness and encouragement towards his classmates so that they all avoided the repercussions for not training,

"I do remember taking some of the fitness where the sports master may not turn up. So, we had these, it was about a mile run from school, you'd run to this big, massive set of steps. And he just wouldn't turn up every now and again. And where it would fit into life now, I don't know. But it literally would be, "Lads, we better get on with something, because if he turns up and thinks we haven't done anything..."

In some instances, communal behaviour was occasionally contingent on the perception that others were like them. OB's coach provides an example of this,

"Yes, massively. He was good like that. He cares about his team-mates. The only time he didn't care was when they didn't try or weren't prepared. Then he'd be angry, and he'd either tell them, or if it was on a bigger scale, he'd brush them[off]."

For two participants, although they described themselves as good team players and articulated ways in which they believe they supported their team-mates, their communal behaviour appeared to be driven less by a genuine care for others and more by the understanding that within a team sport others played a vital role in their own personal

success or failure. KO provides an example in which he appears to appreciate the importance of emotional intelligence within a team sport and is driven but perhaps fails to demonstrate a genuine concern for others;

“So, what’s going to give you that tiny little bit of extra impetus? I’ve played in so many finals here where the teams are so evenly matched, and you need to find something that is going to change, is going to make you better.....What happens is you get guys who are able to get to that 8 or 9 out of 10 on their own, and then there are guys in the teams that need a little bit of help getting there.....if you can get everyone on the same day, at the same time, on the same emotional plane and the same emotional level, and yourself as leader of that, then it doesn’t matter what’s being said next door, they will not win the game, simple as that. There is only going to be one outcome.”

WS provides another example, in which his drive and desire to win and be the best was the motivation to ensure that his team-mates didn’t let the side down. "Although I spoke about myself as an individual, I was very much a team player. I knew I was ready. I was worried about everyone else. I suppose that’s the only anxiety I had, that everyone else was in the best possible place themselves. If I could help them get there, then I would."

2.4.2.3 Perfectionism. All three types of perfectionism, self-oriented, other oriented and socially prescribed perfectionism, as defined by Hewitt & Flett’s (1991) model of multidimensional perfectionism, were evident throughout the data, with all five participants demonstrating at least two dimensions of perfectionism. Self-oriented perfectionism involves self-directed perfectionistic behaviours such as setting exacting standards for oneself and compulsive strivings for perfection (Hewitt & Flett, 1991). Other oriented perfectionism involves holding others to unrealistic standards and stringently evaluating others’ behaviour (Hewitt & Flett, 1991). Finally, socially prescribed perfectionism reflects a belief that one must live up to some form of societal ideal, with others being critical of a failure to meet this

externally derived high expectation (Stoeber et al., 2015). Previous research suggests socially prescribed perfectionism is positively related with vulnerable narcissism (Stoeber et al., 2015). In line with this, the two participants who displayed traits of vulnerable narcissism also demonstrated traits of socially prescribed perfectionism. This point is illustrated by TI when he states,

"...as things went better the expectation from outside grew, which meant that the ground level rose. So, in a way, I was always dropping downwards because as I did better the expectation and requirements of what good meant was defined by the outside."

Socially prescribed perfectionism was not evident amongst any of the other participants.

All five participants demonstrated evidence of both self and other-orientated perfectionism. This comes through in KO's interview when he states,

"We all go through life, we do jobs and occasionally you have to do well at your job, and you have an appraisal and then go, 'oh well done, you did well' or 'you didn't do so well.' On a rugby field you have an appraisal every single week. In fact, training, you have an appraisal every single day, and it's about driving that culture on a daily basis, on a weekly basis."

Other-oriented perfectionists hold the belief that it is important for others to strive for perfection (Stoeber et al., 2015). When talking about KO, his coach said;

"He always reminded people about it. If someone didn't have something, someone forgets a gum shield, or someone forgets their boots or something like that, he would be on it, 'it's just not professional, it's amateur, these are the things you've got to have in place, you've got to be thinking.' You know, 'Get your game together' and that sort of stuff."

Other oriented perfectionists are highly critical of anyone who fails to meet the high expectations they hold for themselves and others (Stoeber et al., 2015). All the participants

described feeling frustrated or annoyed at seeing team-mates cut corners in training. This is highlighted by TS when he states,

"We would have an hour slot for weights, and after 20 minutes, they'd all be going out for coffee. And I'd be there, "How can you possibly be going?". I knew they were doing a different schedule, but I would look at it and go, "The rest periods add up to the same that you've just done your whole session". "I've done it". "Well you can't have lifted the heaviest and highest, can you, if you've managed to cut your rest that much". But it wouldn't stop me doing my full session. It would just make me a bit angry with them."

2.4.2.4 Obsessiveness and Obsessive Passion. Vallerand et al. (2003) developed a dualistic model of passion, in which two types of passion are proposed, harmonious passion and obsessive passion. Harmonious passion is characterised by a balanced involvement in the passionate activity in which the activity remains in harmony with other aspects of the individual's life (Vallerand et al, 2003). Obsessive passion on the other hand, is characterised by an uncontrollable and rigid engagement in the passionate activity which leads individuals to neglect other important activities (Vallerand et al., 2003). Lalande et al. (2017) found that a lack of need satisfaction within life in general, predicted obsessive passion by motivating individuals to seek need satisfaction in a different context, including a need-satisfying passionate activity. All five participants demonstrated levels of obsessiveness in relation to training and playing. Some participants openly described themselves as obsessive and appeared comfortable labelling themselves as such. TI provides an example of this,

"I think that was, the reason it was in permanent marker was because of my obsessive side and that just hammered home the fear. That just hammered home the repetitive nature of the thinking, of the image and whatever. "

Other participants however didn't use the word obsessive, but it was clear from their descriptions that they are describing obsessive behaviour. OB describes a strong internal pressure to train and contemplated whether he had a training addiction.

"But I'd train every day. And I think I probably got to – later on, I probably got to the stage where I probably had a training addiction, to a degree. I wouldn't feel comfortable if I didn't train. Yes, I would have a real – and I wouldn't train until I was unhealthy, but I would feel bad if I didn't train. In fact, training [addiction] is too strong, but I definitely wouldn't feel – I'd feel nervous if I hadn't trained, or I'd feel anxious."

Likewise, WS appears to have felt a self-imposed pressure to keep up with other players and used the word "relentless" rather than obsessive to describe similar behaviour:

"So when my wife was pregnant, she was like out timing me doing relentless reps on the local playing fields. She supported me there by doing that. No athlete or players come to you and said, "You did more than anyone else." Because who knows? But I'd have been up there."

2.4.2.5 Fear of Failure. In their dualistic model of passion, Vallerand et al. (2003) suggest that harmonious passion leads to healthy adaptation and that obsessive passion thwarts the development of healthy adaptation (Vallerand et al., 2003). More recent research however has proposed that obsessive passion can predict increases in performance and is mediated by fear of failure (Belanger et al., 2013). It is proposed that, when presented with failure information (for example negative self-talk) athletes with high levels of obsessive passion may be motivated to exert greater effort towards performance (Belanger et al., 2013). Three of the five participants talked explicitly about experiencing fear of failure. Two of them were very candid about being motivated by a fear of failure and used this term when describing their behaviour. For example, OB said, "my career was based out of the fear of failure, and it is an unhealthy way, but it is what motivated me, and it is what pushed me on." Similarly, TS

stated: "I believe my individual motivation would've been fear of failure." TI didn't use the term 'fear of failure' but provides perhaps the most extreme example in describing an intense fear and 'sense of doom' relating to failure,

"...just the basis that there was a sense of doom about losing, a sense of deep darkness associated with not achieving what you started off as wanting to but probably finished off feeling like you needed to or [were] supposed to do. My role in that was fulfilling these things and if I didn't, the sense of fear of what would happen if I didn't was way beyond extreme, to the point that it was no longer a case of, therefore that related to the nervous anxiety beforehand that made everything, very much, literally do or die....".

Another participant also didn't use the term 'fear of failure' but instead referred to a 'fear of losing' and a dislike for the associated feelings. KO said; "I think that, for me, the most successful people detest losing, and they also have a fear of losing, or a fear of the feelings of losing afterwards." The fifth participant described himself as being completely fearless in a physical sense and did not explicitly say whether he experienced, or was motivated in any way by a fear of failure.

2.4.2.6 Fearless Dominance. Three of the five participants described feeling physically fearless and, in some cases, this feeling extended to a desire and ability to physically intimidate their opponents. WS described himself as fearless. "Never in my life, of anything, would I have been fearful ". KO provides another example,

"I'm such a big believer in that you can win a game and you can lose a game before a ball has even been kicked, just with the mental and emotional intelligence that goes into preparing you and your team for the game. You know, very rarely has the outcome gone the other way. When you're playing against the very best people, you know, you've got to ask yourself the question, "If I was out front, and I've got my foot on someone's throat, am I going to let it off? No way."

TS stated that he never had the sole intention of hurting other people but was willing to do whatever it took to do his job effectively,

"But yes, there'd be some who would definitely be – it would be their forte to go around belting people, whereas mine would be belting people within the confines of trying to play the game, not my only aim is to hurt someone. My aim is to get the ball back, or to take it forward, and if someone happens to get hurt in the way then, clearly it's not my desire or aim, but it could happen."

All refer in some way to certain levels of fearlessness on the pitch however accounts of physically dominating their opponents varied between participants.

2.4.2.7 Dichotomous Thinking. Dichotomous thinking relates to the tendency to think in terms of binary options such as 'black or white', 'good or bad' and 'all or nothing' (Oshio, 2009). Whilst it has often been related to negative psychological outcomes it may also be adaptive in certain situations where quick comprehension and decision making are required (Oshio, 2009). The data suggested that all five participants had a tendency towards this kind of thinking. Some participants stated quite clearly that they saw life in black and white and admitted to being incredibly uncomfortable with grey areas. TI provides an example of this,

"That was just how I saw life. It was immensely black and white". Later he states; "It's very important to me whether it be about family, whether it be about life or dying or whether it be other half or whether it be children, you know, it's grey and then suddenly you go, "I can't do it because my life has been right-wrong, good and bad and I can't place this. Until I place it, I can't move."

WS' coach provided a similar example when talking about him, "He was as loyal to our cause and as loyal to me as any player I've ever coached." There seems to be an almost black and white view of people that they're 'either with me or against me'.

Another characteristic associated with dichotomous thinking is a desire to clarify whether things are beneficial (or not) to the individual (Oshio, 2009). Several participants displayed this tendency in relation to training practices. OB provides an example of this,

"...And I was quite an inquisitive mind, so I wasn't someone who - 'run around 10 times' 'Okay, I'll run around.' I'm like 'Why? How fast? To do [what], why? How does that fit in to what we're going to do?' So, I kind of, I didn't force them, but I made sure when they asked me to do something, they had to have a good answer for it and they always did. I wasn't trying to catch them out but that was the kind of personality I was. I wanted to know the purpose behind what we were doing, I need to know how effective and efficient. I need it."

2.4.3 Behaviour: Who They Became

2.4.3.1. Career Turning Points. Hardy et al. (2017) found that one of the factors differentiating between elite and super-elite athletes was their response to significant career turning points. Regardless of whether the turning point was positive or negative, for the majority of super-elite athletes a significant career turning point resulted in an overall increase in focus, motivation or determination, compared to a reduction in focus, motivation or determination for the majority of elite athletes experiencing similar events (Hardy et al, 2017). Consistent with this, all five participants described a significant career turning point, which increased their overall focus, motivation, or determination. Two participants experienced a positive turning point, and the remaining three participants experienced a negative turning point. All of the negative career turning points described by participants related to being told that they weren't good enough to reach the top of their sport or not being selected for a particular team. KO provided an example of this and described the impact it had on him,

".....and I remember it. It was the first sort of disappointment I'd had, really, in terms of not being picked. I thought, "[...]. that really hurts, doesn't it?" I was crying, I was really

[p....] off. Not in front of everyone, because that's not cool at all. [...] I had to really endure that disappointment. I thought, "Right, if I'm going to do this..." Part of me thought, "This is a [...] joke. I'm the best player on the pitch but the reason I haven't got in the team is because I'm not fit enough." But surely, they could've done something to help me with that. I mean, they were quite brutal about it, and that was it. So, I thought, "Right, well, actually, if that's the reason, it's not down to ability. I've got to get myself sorted out."

2.4.3.2 Importance of Sport. Two related themes arose from the data around the importance of sport. The first theme is the extent to which the outcome of matches, in particular losing, affected participants and the second refers to the sacrifices participants made, specifically within close personal relationships, to try to achieve success and avoid losing. All five participants described the lasting feeling that losing a match had on them. KO perfectly illustrates this when he states,

".....but you've lost the game, and it's horrible, and it hurts. It affects your sleep, it affects everything you're doing. It affects your mood over the next two or three days. You go down to the shop, everyone knows that you've lost. I just took it personally, took it really personally. I wasn't able to put it into a compartment where you can go, "Yes, fine, that's okay. I've lost, I'll just carry on with my life now." I lost, it affected everything that happened in my life."

TS supports this idea as he described a similar experience in relation to losing matches,

"I think sometimes losing can stay with you that bit longer. It just plays on your mind that much longer. It makes you think, into the next day, about what could've been different. How did you... What impact did you have on it? How could you have changed it?"

For all five participants the time they spent focussed on rugby, either training and playing or simply ruminating about matches, either past or future, intruded hugely on their

close personal relationships. KO described the sacrifices he made to pursue sport, "Well, you know, you're not going to see your girlfriend as much as you want to, or you're not going to hang out with your mates [....]. You've got to make sacrifices along the way “.

For some participants this position went even further, and the pursuit of sport prevented them from having close relationships with significant others altogether. OB stated, "And I didn't have anything else, I didn't have a lot of stuff going on. Even later on, I looked at people who [were] kind of like married and had kids, and was like, “No, that wouldn't work”."

2.4.3.3 Need for Success. All five participants talked about a need for success and a need to win. Some participants were very open about their need to win. For example, WS stated; “....it was all about winning. Whilst I played any other sport or any other activity, I needed to win. I wanted to win." KO takes this a step further and describes a higher purpose associated with needing to win; “We can't possibly lose this game, because it's a matter of something...It has a higher purpose, and I think sport, when you need to win, you need to find the right emotional triggers.” Hardy et al. (2017) propose that ‘super-elite’ athletes’ need for success is a conscious expression of a subconscious need to avoid failure. TI describes it like that; "That's what helped me to win was the understanding of its not okay not to win." The desire to avoid failure is likely a consequence of experiencing painful losses within foundational negative life events (Hardy et al., 2017). If losing a rugby match represents a deep emotional loss from early life, then it is unsurprising that participants described the feelings associated with losing a match in much the same way you would expect them to describe the feelings associated with a great personal and emotional loss. KO stated,

“[After a loss] there is a period of about three days when you're in [...] mourning, like someone has died, you know what I mean? It's horrible, and you've got to sort of process

that, and learn, and then get back and challenge yourself again. Conversely, the feeling of winning is brilliant, not just for you, but for everyone around you.”

For the majority of the participants there was certainly an implication that winning and losing was of momentous importance to them.

2.4.3.4 Mastery and Outcome. Consistent with Hardy et al. (2017) all five participants had a dual focus on mastery and outcome. KO’s coach highlights this when he talks about KO in this regard,

“KO undoubtedly, wanted to be the best player in the world. He absolutely thought he was. I thought he was. He, at his time, was the best [X position]. KO would have got in any world team, any team. He achieved that. Physically, he was an amazing athlete, amazing body. Equally, he just loved winning. He came into the changing room after we'd lost a game and he was absolutely nuts. He's an absolute winner.”

2.4.3.5 Difficulty Expressing Emotion. For three of the five participants expressing emotions appeared to be difficult and they struggled to discuss or describe experiences which had been highly emotional for them. For these individuals there may be greater significance in what they do not say in relation to their feelings and emotions than what they do say (Lichev et al., 2014). It is difficult to know whether omissions are deliberate (e.g., avoidant behaviour) or due to a difficulty identifying and describing feelings (e.g., alexithymia). Individuals with an avoidant attachment style protect themselves from the anticipated rejection of others by avoiding close involvement with others (Batholomew & Horowitz, 1991), which would almost certainly include divulging personal thoughts and feelings relating to their emotions. Alexithymia is a personality trait characterised by a difficulty identifying and distinguishing between feelings and describing those feelings to others (Taylor et al., 1999). The nature of alexithymia (specifically a difficulty describing feelings to others) means that detecting the presence of it through qualitative interviews may be

difficult. We identified behaviours during the interviews in three of the five participants that are consistent with observer perspectives of alexithymia (cf. Haviland et al., 2000) including behaviours that were ‘distant’ (for example a discomfort exploring feelings) and ‘rigid’ (for example being self-controlled and seeing things in ‘black and white’). Alexithymia may offer an explanation as to why these three participants, who all described experiencing anxiety before a match, continued to participate in rugby despite this. For individuals with alexithymia, sport may be one of the few areas of life in which specific and externally derived feelings, such as anxiety, are clearly identifiable and more readily interpreted (Proença Lopes et al., 2022). A growing body of research suggests that high-risk environments provide alexithymic athletes with emotion regulation benefits by allowing those individuals to experience and then master anxiety (Barlow et al., 2013; Woodman et al., 2008; Woodman et al., 2009). Research also suggests alexithymic traits are more pronounced in individuals with an insecure attachment style (Montebarocci et al., 2004; Troisi et al., 2001), such as the participants in this study.

2.4.3.6 Performance Under Pressure. All five participants successfully competed at the very highest level in rugby and therefore undoubtedly maintained high levels of performance under pressure. All participants in this study described either, or both, a counterphobic attitude and total preparation. The term counterphobic is used to describe an attitude in which a person knowingly approaches intense negative emotions, such as anxiety (Fenichel, 1939). Total preparation is where individuals are meticulous in their preparation and attend to every detail to ensure they are ready for performance (Gould, 2002 see also Hardy et al., 2017).

2.4.3.6.1 Total Preparation. Gould et al. (2002) found that the Olympic champions in their study had the ability to plan and prepare to a high level, which in turn influenced successful performance. Our data supports this, with all five participants describing some

form of total preparation. TI provided an example of how feeling unprepared increased the pressure of competition for him,

“Now, bearing in mind that kind of unprepared feeling was one that I just... It drained me of any power so when you turned up at this rugby game and suddenly, I'm looking out at the window and I'm seeing an opposition team is around and there is, probably, for a young kid there's no words to describe that feeling that's going on inside your being at that point.”

Hardy et al. (2017) found that in high-pressure competitions, ‘super-elite athletes’ were able to focus solely on mastery as an effective way of reducing the perceived pressure of competition. In line with this OB described how he dealt with the pressure of competition by ensuring that his preparation was meticulous,

“When I say anxious, I mean it was just adrenaline, it was, it became a real positive thing for me: “This is, right, this is a game. Right”. And then I became so focused that I didn’t let it distract me or, you know, and then because my preparation was quite meticulous, and I was quite, “Okay, I do this. Right, now I do that. Right, then I do this. This is how I do this. I strap this, do that. Right, yes. Good. Good to go”.

2.4.3.6.2 Counterphobic Attitude. Three of the five participants demonstrated a counterphobic attitude to competition. All three of these participants described high levels of pre-match anxiety but talked about how they continued to compete anyway. OB summed this up when he said, "I did hate competing, but I did it. TS described intense levels of anxiety and talked about how this was all forgotten as soon as the match started,

"And then, yes, the next period is just like, “Why do I bother being a rugby player? I just don’t like this,” until the moment, you can get off the bus, get in your kit, and get on the training pitch. Because getting out on the pitch, putting your kit on, that’s what you’ve trained to do so that makes life that much easier, palatable, and once the game starts it’s all over. As in, the nerves.”

TI took it a step further and suggested actually the fear itself allowed him to play well; "....deep down, I didn't know this at the time, but by [having] that horrible feeling before, that's what gave me that [ability to play well]. So therefore, I need to do more of that again...." This point is in line with research by Oudejans and Pijpers (2009) which suggest that training with anxiety has a positive effect on performance under pressure.

The remaining two participants did not acknowledge any feelings of anxiety around competition and therefore counterphobic behaviours or attitudes were not reported. When asked if he ever experienced any anxiety around matches WS said; "No. All we did is get there, let everyone get along with what they did to get themselves right and you trigger people." Similarly, KO said, "I wasn't intimidated by the stadiums or the atmosphere." It is worth noting that these two participants both described behaviours indicative of a dismissive avoidant attachment style and showed greater grandiose narcissism and less vulnerable narcissism than the other participants. It is possible that they didn't experience negative emotions, such as anxiety, before competing however it may also be possible that they were less able or less willing to discuss these types of emotions.

2.4.4 Different Profiles Leading to Similar Outcomes

As previously stated, two of the five participants displayed behaviours characteristic of grandiose narcissism and a dismissive avoidant attachment style, which is characterised by a positive self-view. In addition, two different participants displayed characteristics of vulnerable narcissism and a fearful avoidant attachment style, which is characterised by a negative self-view. Research supports the notion that there may be links between attachment and narcissism with grandiose narcissism being positively correlated with a strong sense of self-esteem and vulnerable narcissism negatively correlated with a strong sense of self-esteem (Stoeber et al., 2015). Other research has made the direct association between various styles of attachment and the two constructs of narcissism, vulnerable and grandiose,

specifically between grandiose narcissism and dismissive avoidant attachment (Rohmann et al., 2012). In addition, a recent study by Zeigler-Hill & Vrabell (2022) has linked the various aspects of narcissism with specific external contingencies of self-worth, suggesting that the vulnerable narcissist derives self-worth from pleasing others and receiving external validation (which is a contingency of self-worth also linked to fearful avoidant attachment; Crocker et al., 2006), while the grandiose narcissist derives self-worth from demonstrating superiority over others (which is a contingency of self-worth also linked to dismissive avoidant attachment, see Crocker et al., 2006).

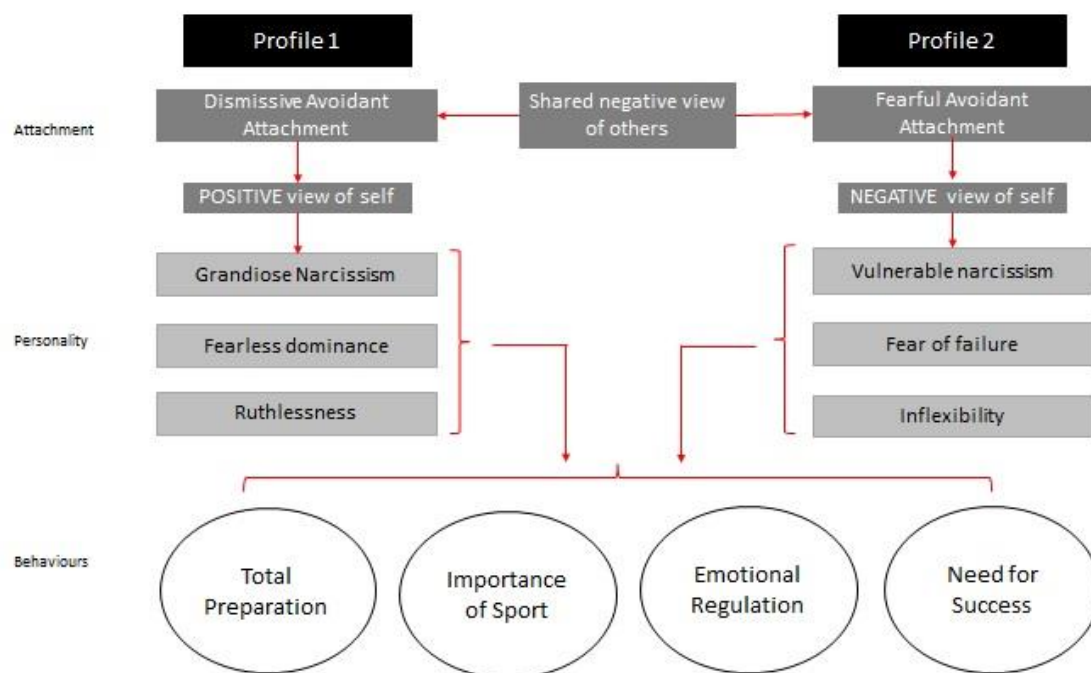
Within our data we started to identify a pattern which reflected the link between the constructs of narcissism, attachment style and contingencies of self-worth, in which we observed two distinct types of personality. Although on the surface the behaviours of all five participants appear to be very similar, they may in fact be driven by different traits, arising from differences in attachment style and the participant's associated self-view. One profile appears to be underpinned by a dismissive avoidant attachment style and the other profile appears to be underpinned by a fearful avoidant attachment style. It is important to acknowledge at this stage our small sample size and while this means that our conclusions are preliminary and it would be difficult to generalise from this to a wider athlete population, the in-depth nature of the qualitative data certainly makes this conclusion plausible. An example of these differing profiles is evident in the way participants described the importance of sport in their life. Participants who held a positive self-view, made statements such as "Well, you know, you're not going to see your girlfriend as much as you want to, or you're not going to hang out with your mates...". Whereas participants who held a negative self-view, made statements such as "And I didn't have anything else, I didn't have a lot of stuff going on. Even later on, I looked at people who [were] kind of like married and had kids, and was like, "No, that wouldn't work"." The outcome of these

statements is the same, sacrifices were made to prioritise the pursuit of excellence in rugby. However, one group were able to make, what might be described, as selfish decisions to put their rugby career first, while the other group appeared to be inflexible in their pursuit of rugby and subsequently abstained from having anything other than rugby in their life. This difference was again evident in the language used to describe their total preparation prior to matches. Participants who held a positive self-view, described their pre-match emotions in terms of “adrenaline” and used that feeling to ensure they were completely “focussed” on what they wanted. Participants who held a negative self-view used language like “anxiety” and “feelings of dread” about not having systematically completed their preparation prior to a match. Again, the outcome appears, on the surface, to be the same. Both groups ensured that no stone was left unturned in relation to their preparation for matches, however one group appear to be ruthlessly striving for success, whereas the other group appear to be systematically avoiding failure. These two profiles are further observed in participant’s experiences of fear of failure. Participants who held a negative self-view, openly described themselves as experiencing high levels of fear of failure and were subsequently driven to do their utmost to avoid failure. Whereas the participants who held a positive self-view described a dislike of the feeling of losing, or in one instance, a complete fearlessness. Finally, participants’ need for success also seems to mirror this pattern. Participants who held a positive self-view made statements such as “I need to win”, whereas participants who held a negative self-view made statements such as “it’s not ok not to win”. One clearly shows an aspiration to win, while the other shows a desire to avoid failure. This pattern of either demonstrating traits and behaviours evident of a ruthless pursuit of success or a systematic avoidance of failure appear consistently within the data. Figure 2.1 below highlights these profiles, where differing personality traits, underpinned by different avoidant attachment styles, result in similar behaviours. It is important to once again,

acknowledge the small sample size in this case and whilst we appear to have found two distinct profiles of athlete, it is conceivable that there may be other personality profiles attributed to world's best athletes (Baker, 2017).

Figure 2.1

Model of Differing Personality Profiles Leading to the Same Behaviours Associated with Excellence in Rugby.



2.5 Discussion

The aim of this study was to better understand the psychosocial factors which underpin the development of excellence in rugby. Since outstanding athletes can only truly be distinguished once they have reached the highest level of performance (Côté et al., 2005) a retrospective approach was necessary. In-depth qualitative interviews, using a two-on-one, semi-structured interview technique, were conducted with five of the Worlds' best rugby players and their nominated coaches. These interviews provided a rich data set which was then analysed, using thematic analysis, to identify common factors. Shared experiences and

traits were grouped together under the following headings, early life experiences, personality, and behaviour. Results from the analysis supported the position that participants were likely to have experienced a foundational critical negative event, which likely occurred in close temporal proximity to a positive sport related event and were raised within a family culture of striving. Participants all described a foundational negative life event and recounted positive sport related events which mirrored those described by the super-elite athletes in Hardy et al.'s (2017) study, namely, finding sport, having an influential coach, and experiencing an influential sporting pathway. In addition, they also described experiencing disciplined training environments and participating in sport with older peers. Personality traits also mirrored those found in previous research, with the participants in our study displaying traits of perfectionism, obsessiveness, and narcissism (Hardy et al., 2017; Hill & Madigan, 2017; Lopez & Santelices, 2011; MacNamara et al., 2010; Roberts & Woodman, 2017). Certain behaviours, which were revealed in the analysis, also mirror previous findings. Like the super-elite athletes in Hardy et al.'s (2017) study, all five participants described a career turning point, in some cases a positive event, in others a negative event, which increased their motivation towards their sport. Additionally, they all demonstrated a dual focus on mastery and outcome, a need for success, an ability to perform under pressure, which was underpinned by total preparation or a counterphobic attitude and placed a high importance on sport in their life, all of which is consistent with previous research (Hardy et al., 2017; Güllich et al., 2019; Hill et al., 2018; Rees et al., 2016).

Our analysis also revealed some new findings, which, to our knowledge, have not previously been documented in relation to developing excellence in sport. In relation to personality, participants demonstrated traits of dichotomous thinking. Dichotomous thinking consists of three components, preference for dichotomy, dichotomous beliefs and profit-and-loss thinking (Oshio, 2009). Preference for dichotomy is a thinking style which leads to a

preference for clarity and distinctness rather than confusion and ambiguity (Oshio, 2009). Dichotomous beliefs represent a thinking style in which everything in the world can be divided into two distinct groups (Bonfã-Araujo et al., 2022). It's not difficult to see how these thinking styles could be advantageous in sport, particularly within team sports, where a clarity around the right and wrong way to do things and well-defined roles within the team, would almost certainly be advantageous. Profit-and-loss thinking, which relates to a thinking style focused on how things might benefit or harm oneself (Oshio, 2009), was also mirrored in the way participants described their openness to new experiences, specifically within training set-ups. Nearly all the participants described having a conditional openness to new training techniques, which they would only accept provided they understood the clear benefits to themselves and to the team.

Finally, in relation to early life experiences, our analysis revealed a common experience of disruptions to parental relationship(s) and signs of insecure, specifically avoidant, attachment styles. Early parental relationships and attachment style have received little attention in athlete development literature. The use of attachment theory in sport psychology is often limited to understanding intra-team relationship dynamics (Dizdari & Seiler, 2020) and coach-athlete relationships (Davis and Jowett., 2013; Peng et al., 2020; Davis et al., 2021). A commonality amongst our participants, however, was the experience of at least one parent being unavailable, either physically and, or emotionally along with a degree of reverse parenting, known as parentification. Parentification, and the obligation this puts on the child to accommodate the emotional needs of their parent, at the expense of their own, can severely disrupt the development of secure attachment (Engelhardt, 2012). In addition, the same participants also displayed behaviours indicative of either dismissive or fearful avoidant attachment styles. Our results suggest that disruption to parental relationships and avoidant attachment may be common among the world's best rugby

players, and it would be interesting to explore whether this trait is shared by other world class athletes. As mentioned previously, the role of attachment has yet to be investigated specifically within elite athlete populations, however Thomson and Jaque (2017) lend some support to this premise. In their research into attachment and childhood adversity amongst groups of high achievers (e.g., athletes), they found a higher prevalence of dismissive attachment amongst athletes, compared to actors, dancers, and the general population. Further investigation in this area would prove useful, not only to explore the prevalence of insecure attachment amongst world class athletes but to better understand the possible benefits, at least in performance terms, that such an attachment style might hold for the athlete. The relationship between attachment and the perceptual processing of ‘threatening’ stimuli may offer a useful insight into the benefits an avoidant attachment style may have within a high-performance environment such as sport. The prerequisite for avoidance of negative stimuli is vigilant attention (Maier et al., 2007). Avoidant individuals lack confidence in the availability of a protective caregiver when faced with a threat and subsequently do not hold an internal representation of a safe haven. The individual must therefore vigilantly screen the environment for threat and react quickly to danger (Maier et al., 2007). This chronically heightened activation of the subconscious fear system creates hypervigilance and may contribute to the proficiency of avoidant individuals to evade emotional threats (Maier et al., 2007), such as the negative feelings associated with losing, and conceivably even physical threats, such as an incoming tackle from an opposing player. This hypervigilance may be triggered by the development of insecure attachment and further honed during the early life trauma experienced by participants and may go some way to explain why, along with other specific traits and behaviours outlined in the literature, avoidant individuals appear to thrive within an international rugby environment. Another plausible explanation as to the significance of attachment in the development of excellence

is the notion of external contingencies of self-worth. Where an insecure attachment style has formed and an individual holds the belief that they are either unworthy of love and, or a parental figure is unreliable and rejecting of them, they will start to draw conclusions about who they must be and what they must do, to be a person of worth (Park et al., 2006).

Without an intrinsic sense of worth individuals are motivated to prove their worth, both to themselves and others and consequently develop a contingency of self-worth around activities within which they can demonstrate competency and accomplishment (Brenan & Morris, 1997). The potential for failure within the domain upon which self-worth is contingent, poses a threat to self-esteem, and consequently effort is increased, and some individuals go to extraordinary lengths to avoid failure and achieve success (Crocker & Knight, 2005). Potential elite athletes, who have not developed an intrinsic sense of self-worth through their formative relationships, but who have positive early experiences within sport, may start to believe that their worth as a person is contingent upon their continued success as an athlete and as such go to extraordinary lengths to continue their athletic success. While both plausible explanations to the role of attachment in the development of excellence and the motivation and drive to pursue sporting excellence in the first place, we acknowledge that they are relatively speculative. Further research in this area is necessary and has the potential to hugely benefit practitioners working with athletes in an applied setting.

Our analysis revealed fearful avoidant and dismissive avoidant attachment styles as a commonality among the participants in this study, however, it should be noted that there is a third insecure attachment style, preoccupied attachment (Bartholomew & Horowitz, 1991). Within a wider athlete population, it is feasible that this may also be a common style of attachment and researchers and practitioners would almost certainly benefit from its' inclusion in future investigations of this nature.

As mentioned previously, individuals with dismissive and fearful avoidant attachment styles share a negative view of others, as unavailable or rejecting, however they differ in their own self view (Bartholomew & Horowitz, 1991). In our analysis we uncovered two distinct profiles, which appear to stem from this difference in self view. All participants achieved the same outcome of becoming the best players in the World and demonstrated a total preparation, a need for success and placed a high importance of sport in their life but are ostensibly driven by slightly different traits and core beliefs. Participants who displayed traits consistent with a dismissive avoidant attachment style, where a positive self-view is held, also demonstrated signs of narcissistic grandiosity, a selfish or even ruthless pursuit of rugby, fearlessness, and a need to win. In contrast, participants who displayed traits consistent with a fearful avoidant attachment style, where a negative self-view is held, also demonstrated signs of narcissistic vulnerability, an inflexible pursuit of rugby, a fear of failure, and a systematic avoidance of failure. We are conscious that the retrospective nature of this study precludes an assessment of causality and in addition the small sample size reduces the ability to generalise this finding to a wider athlete population. It is certainly feasible that other personality profiles may also exist amongst the population of elite athletes, particularly if a preoccupied attachment style is also considered. Nonetheless, the observation that different core traits drive similar behaviours, may be an important one, particularly within an applied setting. Understanding these nuanced differences in personality and removing the assumption that all elite players fit a particular profile, may help practitioners take a more individualised approach to understanding and supporting players. Further exploration of these profiles, and the possible existence of additional profiles within elite sport would certainly be beneficial and would provide practitioners with empirical evidence upon which to base a more personalised approach to the delivery of applied sport psychology.

The retrospective nature and small sample size of this study, limit our ability to make causal links and generalise these findings to a wider population. A prospective study with a larger sample size would be necessary to fully attribute causality between the experiences, characteristics, and behaviours observed, and the development of excellence in rugby. In addition to these limitations, further demographic limitations should be noted. All five of the participants were male and had retired from their rugby careers at the time of the interviews and played within an earlier era than those currently at the top of their game, or on the pathway to elite rugby. The primary reason for this was that the in-depth nature of the qualitative interviews we conducted necessitated that participants gave up a considerable amount of their time to participate. This kind of access to current players would be challenging, however the gender and age of the participants in this study again limits the generalisability of the findings to current players. Repetition of this study, with a current cohort of male and female players would help to validate the findings of this study within current elite rugby population. Despite these limitations this study offers an interesting insight into the psychosocial factors which are likely important to the development of excellence in rugby. Our findings offer support to existing research which highlights the importance of personality traits such as narcissism, perfectionism and obsessiveness, and behaviours such as a dual mastery and outcome focus, importance of sport, a need for success and performance under pressure, in developing excellence in sport. In addition, it also offers a new insight into the potential role of attachment in developing excellence with findings suggesting that early negative experiences, particularly disruptions to parental relationships, and the realisation of insecure attachment, coupled with a positive sport related event, may underpin the drive and development of the necessary personality traits and behaviours to achieve excellence in rugby.

Chapter 3

A Multidisciplinary Examination of Factors Influencing Progression within the RFU Development Pathway

3.1 Abstract

There is now considerable research, across multiple domains, devoted to understanding the development of sporting talent, with multidisciplinary approaches becoming increasingly common to explore the complexity of factors which underpin excellence in sport. However, to date, the understanding of factors predicting progression in rugby is lacking. Thus, the aim of these studies was to examine the factors predicting progression in rugby. We employed a multidisciplinary approach to understand the profile of players offered the opportunity to progress along the RFU development pathway, and the profile of players not afforded the same opportunity. Using pattern recognition analysis, we identified the psychosocial, demographic, and practice and training factors which differentiated between players who progressed, and players who failed to progress, at two key stages along the pathway, from U18's to U20's (Study 2) and from age grade rugby to the premiership (Study 3). Results indicated that players who progress at both stages undertook fewer hours of constraints-led practice suggesting there may currently be too much challenge and not enough support within practice at present. In addition, in Study 2, players who progressed from U18's to U20's possessed many characteristics which likely underpin consistent performance, such as mastery orientation, a commitment to training and a need to succeed, while players who failed to progress at this stage possessed many of the psychological characteristics known to underpin the development of excellence. The findings suggest that the RFU may be using current performance as an indicator of future talent, which could be problematic and result in the loss of talented players early in the pathway.

3.2 Introduction

3.2.1 Talent identification

Increasing competitiveness in most professional sports and pressure to win medals on an international stage means that governing bodies are now investing more money than ever into the identification and development of talented athletes and yet effective talent

identification (TID) remains a challenging task (Bailey & Collins, 2013). One of the main issues that persists is the lack of consensus on how talent should be defined or identified, and, as such, there is no uniformly accepted theoretical framework to guide current practice (Vaeyens et al., 2008). In addition, research continues to highlight some of the implicit biases that exists within TID programmes (Mann et al., 2017). A recent study by Furley and Memmert (2016) suggests that the abstract concept of “sport giftedness” is partly grounded in the perception of physical height amongst youth sport coaches which has the potential to influence selection decisions. This implicit bias is emphasised by the relative age effect (RAE), a well-established phenomenon in sport which highlights an area of systematic bias that exists around the identification of talented athletes (Wattie et al., 2015). In most youth sports programmes, children are divided into groups according to their date of birth, with the intention of providing equal opportunity for participation and success (Côté et al., 2005). Children born earlier in the year will have up to a whole year of maturation advantage over children born later in the year, which has the potential to lead to selection advantages, systematically excluding younger, less matured, but potentially more talented players (Côté et al., 2005). Selection advantages means that the relatively older players within a cohort are likely to receive more coaching, training and competition opportunities which are important factors associated with later sporting success (Bailey & Collins, 2013). For example, McCarthy et al., (2016) found evidence of RAE bias in the selection decisions within cricket and rugby. They investigated the initial identification, selection and conversion of talented rugby and cricket players and discovered that relatively younger players were less likely to be selected into their respective national academy but were more likely to transition into their senior national squad. This finding highlights the discord between initial talent identification and the realisation of potential and demonstrates that within this current system young talented players may be missing out on important early development opportunities. It should

be noted however that the RAE does not exist at all levels across all sports (Gibbs et al., 2012; Jones et al., 2018). Research suggests there are nuances to this effect, particularly at elite level, with inter and intra-sport differences evident (Jones et al., 2018). In addition to implicit selection biases, researchers have also highlighted issues with using current performance as an indicator of future potential (Bailey & Collins, 2013). Bailey and Collins (2013) suggest that distinguishing between determinants of performance and determinants of potential is essential as current performance is often influenced by things which have little to do with potential, such as parental income and support. In response to the growing criticism of traditional TID models, there is now a recognised need to move away from “talent spotting” and early selection or de-selection based on one-off performance testing and instead focus on offering the most appropriate development opportunities to a larger pool of young athletes (Vaeyens et al., 2008).

3.2.2 *Talent development*

The factors which optimise the development of expertise in sport have been the subject of much research, with current literature suggesting that it is likely the result of a complex interaction between genetic and developmental features (Jones et al., 2020). Several Talent Development Models, including Long-Term Athlete Development model (Balyi & Hamilton, 2004), the Differentiated Model of Giftedness & Talent (Gagné, 2009) and the Athletic Talent Development Environment model (Henriksen et al., 2010), have advanced our understanding of the potential pathways to developing excellence. One of the most predominant theories of talent development, the Developmental Model of Sport Participation (DMSP; Côté et al., 2007) challenges early prevailing theories, such as Ericsson et al.’s (1993) theory of deliberate practice, which argues elite performance requires a minimum of 10 years engagement in deliberate, dedicated practice in a single sport. This position is supported by a recent meta-analysis by MacNamara et al. (2014) which found that deliberate

practice accounted for less than 26% of the variance in performance in sport. The DMSP suggests that during their early years (5-12) children should be allowed to sample many different sports, experiencing a variety of physical, cognitive, affective, and psychosocial environments which are favourable to positive youth development and linked to longer-term sport involvement (Côté & Vierimaa, 2014). In addition, early sampling years should be characterised by high amounts of deliberate play which help to establish a range of motor and cognitive experiences that children can bring to their principal sport of choice during the specialising years (13-15) and investment years (16+).

Talent development models aim to highlight the environments and behaviours which optimise the development of sporting expertise and motivation at each level of growth (Côté et al., 2007). However, Bailey and Collins (2013) suggest that, amongst other shortcomings, there are findings within the literature which undermine the validity of most TID and TDE models. They state that firstly, a large proportion of those identified as protégés fail to realise their early promise (Bailey & Morley, 2006) and secondly, extremely talented adults rarely start out identified as highly able children (Bloom, 1985). It has been suggested that the generic nature of talent development models fails to consider the specific structure of practice required to develop expertise and the wider developmental histories of athletes who achieve success (Jones et al., 2020). As such these existing models are limited by a lack of understanding about how the microstructure of practice and important early life experiences and milestones influence the development of expertise (Jones et al., 2020).

3.2.3 *Microstructure of practice*

Although studies over recent decades have provided considerable information about the dynamics of athlete development, our understanding is still very general and there is a need for increased attention on the microstructure of athlete training (Hüttermann et al., 2014). Since Schmidt's (1975) schema theory of motor learning, numerous studies have

tested the variability of practice theory which suggests that a varied practice schedule may facilitate skill acquisition (Jones et al., 2020; Kerr & Booth, 1978; Lee et al., 2013). Most recently, a study by Jones et al. (2020), investigating the factors which differentiated between elite and super-elite cricketers, found that super-elite batsman undertook larger volumes of skills-based practice, that was both more random and more varied in nature. In line with Guadagnoli and Lee's (2004) challenge point framework, Jones et al. suggest that optimising challenge at both a psychological and technical level may facilitate expert performance. This notion is further reinforced by the constraints-led (CLA) perspective, a recognised theory in motor learning and control which helps to shift the perspective of coaches and practitioners so that they might organise practice to optimise learning. Introduced originally by Newell (1986) the CLA approach offers challenge to athletes in training through constraints on the performer, their environment, or the task (Davids et al., 2003). These constraints limit the expression of form and favour some emergent features of behaviour over others leading to the development of reliable and functional movement patterns which facilitate learning and performance (Davids et al. 2003).

In addition, the specificity of practice principle, which states that practice conditions closely matching the more challenging conditions of competitive performance result in optimal learning (Henry, 1968; Rothwell et al., 2022) has also been shown to extend to the realm of competition anxiety. Lawrence et al., (2014) demonstrated that performance in anxiety conditions was greater following practice with anxiety, where exposure to anxiety occurred in the latter half of acquisition, suggesting that indeed both technical and psychological challenge should be optimised to facilitate expert performance. However, whilst it is likely that ensuring the structure of practice to optimise learning is central to developing expertise, there is also a need to recognise the importance of an individual's psychological capacity to learn and develop (MacNamara & Collins, 2011).

3.2.4 *Psychosocial Factors*

There is now extensive research which validates the role of psychological characteristics in the development of excellence in sport (e.g., Collins & MacNamara, 2012; Gould, 2002; Gould et al., 2010; Hardy et al., 2017), which are further supported by the results from Study 1, with much of the recent literature recognising psychological factors as a key determinant of talent development (Hill et al., 2018). Psychological factors such as self-confidence, attentional focussing (Gould et al., 1981), goal setting, imagery (Orlick & Partington, 1988), coping with adversity and achievement motivation (Smith et al., 1995) have all been found to be advantageous in developing excellence and associated with peak performance. However, there is also a need to consider the influence of more subtle individual differences, such as personality constructs (Hill et al., 2018).

There are now numerous studies measuring the direct effects of personality on performance. These studies have explored the influence of narcissism (Woodman et al. 2011; Roberts et al., 2012; Manley et al., 2018), perfectionism (Appleton et al., 2010; Curran et al., 2014; Gould et al., 2002; Hill et al., 2010; Oliveira et al., 2015; Rasquinha et al., 2014; Roberts et al., 2013), obsessiveness (Vallerand et al., 2008), and alexithymia (Roberts & Woodman, 2017; Woodman et al., 2008), to name but a few traits, on various performance outcomes. Further, studies have also explored the effects of personality dimensions on training behaviours associated with sporting success (Woodman et al., 2010). More recently the literature has expanded to explore the impact of early life experiences on the development pathways of athletes (Fletcher, 2018; Hardy et al., 2017; John et al., 2019; Savage et al., 2017) with findings suggesting that early life experiences may underpin the development of some of the necessary personality traits and behaviours to achieve excellence.

3.2.5 The Need for A Multi-disciplinary Approach

In their review of the literature, across multiple domains, devoted to understanding the development of sporting talent, Rees et al., (2016) highlight the complex interactions that exist across domains and stress the importance of research acknowledging and embracing this complexity. Multidisciplinary approaches to investigating the factors which underpin athletic success are now becoming more common (Doherty et al., 2018; Gulbin et al., 2013; Güllich et al., 2019; Jones et al., 2020; Lovell et al., 2017; Tribolet et al., 2018), however at present no other study has researched the critical determinants of performance in rugby players using a multidisciplinary approach. Therefore, in this study we employed pattern recognition analysis to explore the multidisciplinary factors, specifically psychosocial, demographic, and practice and training factors, which determine progression along the RFU's development pathway. Our aim was to provide the RFU with an insight into the profile of players being offered opportunities to progress along the pathway and the profile of players who are missing out on these early development opportunities and potentially derailing from the system. We achieved this through two studies, presented below. Study 2 investigated the multi-disciplinary factors which differentiated between players progressing from U18's to U20's and players who failed to progress at this point in the pathway. Study 3 investigated the multi-disciplinary factors which differentiated between players progressing from the pathway to achieve five or more caps for their senior premiership side and those who failed to achieve five or more caps. We expected that this approach would identify the psychosocial, demographic and training precursors to expertise in rugby, most predictive of progression through the pathway.

3.3 Method

3.3.1 *Participants*

Participants were male rugby players ($n = 60$), from 13 different rugby clubs, who had all been selected to attend England U18 training camps during the 2018/19 season.

3.3.2 *Measures*

3.3.2.1 Psychosocial Factors. We used the Athlete Psychosocial Survey (Dunn et al., 2019) to measure constructs of early life experiences, personality, and behaviours. Overall, 45 constructs were measured. Details of the constructs and items for each, can be found in Appendix B.

3.3.2.2 Demographic Factors. We used a demographic and developmental sporting activities questionnaire to obtain information about education, sports played, family information, developmental milestones in sport, volumes of intrinsic and extrinsic feedback, and volumes of deliberate practice and play. Overall, 56 constructs were measured. Details of the questionnaire can be found in Appendix C

3.3.2.3 Practice and Training Factors. We collected information on the nature of practice and training activities via an interview schedule exploring information about structure of practice, how information is conveyed to players, context specificity, anxiety specificity, focus of attention, constraints-led and prescriptive training. Overall, 42 constructs were measured. Details of the interview schedule can be found in Appendix D

3.3.3 *Procedure*

Following institutional ethical approval participants were recruited by the Rugby Football Union from players attending 2018/19 U18 and U20 training camps. Once informed consent had been obtained, participants were invited to complete the Athlete Formulation Development Survey and the demographic and developmental sporting activities questionnaire. At the point of data collection, all participants were contracted to a

Premiership rugby academy. We obtained practice and training data via in-person interviews with participants' academy coaches to understand the intention, rather than the interpretation, of training practices undertaken by participants during an average week. In depth interviews with coaches lasted approximately two hours.

3.3.4 Data Analysis

Analysis of the data took place during the end of 2020 and beginning of 2021, at which time the RFU provided a range of data revealing the progression of participating players over the preceding two years. To understand the factors which influenced progression along the pathway at this stage, participants were split into two classes: players who had gone on to receive an England U20 cap and players who had not received an England U20 cap. Sixteen participants from the original sample of 60 went on to receive an England U20 cap and were classed as having 'progressed'. Forty-four participants were eligible but did not receive an England U20 cap and were therefore classed as having 'failed to progress'. As the U20 Rugby World Cup in 2020 was cancelled (because of the COVID-19 pandemic), participants from the 'failed to progress' group, yet were eligible for this Tournament, were removed from the study as it is not known whether they would have received an U20 cap had this Tournament gone ahead. Furthermore, only participants with complete data sets were included in each analysis, participants with missing data were removed from the sample for that analysis.

3.3.5 Analytical Strategy

We used pattern recognition analysis to determine the most important discriminatory features between the two groups (progressed and failed to progress). Pattern recognition analysis was initially developed in bioinformatics to solve the problem of classifying objects, based upon their features (Hastie, et al., 2009) and is being increasingly applied within the sport sciences (Jones, et al., 2020). These types of analyses use computational power to

iteratively analyse many features to find which ones best differentiate between two different classes of object (Güllich, et al., 2019). In the present study, the features were the 143 psychosocial, demographic and practice and training characteristics recorded from our sample of players, who either progressed from U18s to U20s or failed to progress. These two groups (progressed and failed to progress) constitute the classes of object that we wished to distinguish between.

Typically, pattern recognition analysis comprises three stages; feature selection, classification, and recursive feature elimination (for a detailed explanation of these processes see Güllich, et al., 2019). *Feature selection* identifies the features which best discriminate between the two classes (progressed and failed to progress). Pattern recognition requires a robust method of feature selection where, as is the case here, the data set is extremely “wide”, meaning there are considerably more features than there are objects (in this case players, cf. Jones et al., 2020). The methods we employed have been successfully used for wide data sets in previous, similar studies (Güllich, et al., 2019, Jones, et al., 2020). We used four feature selection algorithms: Fast Based Correlation Filter (FCBF; Yu & Liu, 2003), Correlation Attribute Evaluator (CAE; Bouckaert et al., 2018), Relief-f (Kira & Rendell, 1992), and Support Vector Machine - Recursive Feature Elimination (SVM-RFE; Guyon et al., 2002). These four feature selection algorithms work in very different ways, consequently the more times a feature is selected by different algorithms, the greater confidence can be placed in that feature’s predictive power. As such, we discarded features that were not selected or only selected by one feature selection algorithm. We then created feature subsets consisting of features selected by at least two feature selection algorithms (2s), features selected by at least three feature selection algorithms (3s) and features selected by all four feature selection algorithms (4s).

Classification is the analysis of a specified subset of features, with the aim of evaluating the predictive performance of that subset in discriminating between classes, in this case progressed and failed to progress. We used the following classification algorithms: Naïve Bayes (NB; John & Langley, 1995), Sequential Minimal Optimization (SMO; Platt, 1998), Instance Based Learning (IBk; Aha et al., 1991), and J48 Decision Tree (J48; Quinlan, 1993). Classification accuracy is determined by the percentage of players who were correctly assigned to either having progressed or failed to progress from England U18s to England U20s. The more consistent the results between the classification algorithms for a feature subset, the more confidence we can place in the predictive power of that subset.

Recursive feature elimination, also known as final classification or fitting is the process by which feature subsets with potentially higher classification accuracies are sought. Recursive feature elimination is often applied to subsets which consist of many features, where fewer features are likely to offer an optimal solution (Jones, et al. 2020). To complete this process, we took each feature subset in turn and examined the normalised SMO weight provided by the SMO classifier and removed the feature with the lowest weight before re-running the four classifiers on the reduced feature subset. This process continued until an optimal solution was reached.

We performed all analyses using Waikato Environment for Knowledge Analysis (WEKA), a comprehensive collection of machine learning algorithms widely used in pattern recognition analysis and machine learning (Frank et al. 2009). The protocol used in both feature selection and classification was the leave-one-out cross validation method (LOO), which was dictated by the small amount of data available. The LOO method used in the present study was adopted from Güllich et al. (2019) and is outlined in detail in their study. In essence this cross-validation method allows the same data set to be used for both training and testing purposes and mitigates the risk of overfitting that this may cause, resulting in a more

realistic prediction of the classification function on unseen data (Kuncheva & Rodriguez, 2018). Nonetheless it is important to state that the classification accuracy may remain somewhat optimistically biased since the object set aside for testing has been “seen” at some stage during the training phase, when feature selection was carried out (Güllich et al. 2019). Had we had a larger sample and therefore more data, separate training and testing data sets would have been used. Following the procedure of Güllich et al., (2019) we used equal group sizes for all analyses. Since participants were already matched on sport, gender, and age, where one group was larger than the other, participants from the larger group were selected at random to match the number of participants in the smaller group. Each analysis consisted of the following number of participants, summary analysis, $n = 20$ (10 in each group), psychosocial analysis, $n = 32$ (16 in each group), demographic analysis, $n = 24$ (12 in each group) and practice and training analysis, $n = 28$ (14 in each group). Prior to analysis we standardised all data by position (forwards and backs), to remove the potential effects of any positional differences.

3.4 Results

3.4.1 Summary Analysis

The first stage of our analysis was to run the pattern recognition protocol on all the measured features (across psychosocial, demographic and practice and training) to understand the collective discriminative power of the selected subset of features, as a multidisciplinary model. The top 20 features selected by each feature selection algorithm, were used to create feature subsets. As outlined above, we created the following feature subsets; 2s (features selected by at least two of the feature selection algorithms), 3s (features selected by at least 3 of the algorithms) and 4s (features selected by all four algorithms). Recursive feature selection was carried out but did not improve the classification accuracies.

Classification accuracies, for the original feature subsets are categorised below in Table 3.1, (following the same protocol as Güllich et al. 2019), as poor, modest, good, or very good.

Table 3.1

Classification accuracy for the most important discriminatory features between England U18 players who progressed to receive an England U20 and those who failed to progress based on the following algorithms: (i) Naïve Bayes (NB), (ii) Sequential Minimal Optimization (SMO), (iii) Instance Based Learning (IBk) and (iv) J48 Decision Tree (J48).

Feature subsets and classification accuracy		Classification Accuracy				Rating
		i	ii	iii	iv	
Master (123 features)						
2s	20 features	90%	90%	80%	35%	very good
3s	14 features	95%	90%	80%	35%	very good
4s	7 features	85%	75%	70%	50%	Good

The 2s and 3s subsets (in which features were selected by two or more algorithms, or three or more algorithms respectively) both had a very good classification accuracy. We selected the 2s subset to differentiate between the two classes (progressed and failed to progress) as this subset offered the most differentiating features and subsequently the greatest amount of information about the profile of players who progressed at this stage and those who failed to progress.

The results from the comparison of the progressed and failed to progress groups, show that players who progressed possessed the following characteristics and experienced the following life events and training practices:

1. <i>Greater</i> obsessiveness.
2. <i>Lower</i> neuroticism.
3. <i>Greater</i> mastery focus.
4. <i>Greater</i> commitment to training.
5. Placed a <i>greater</i> importance on sport.

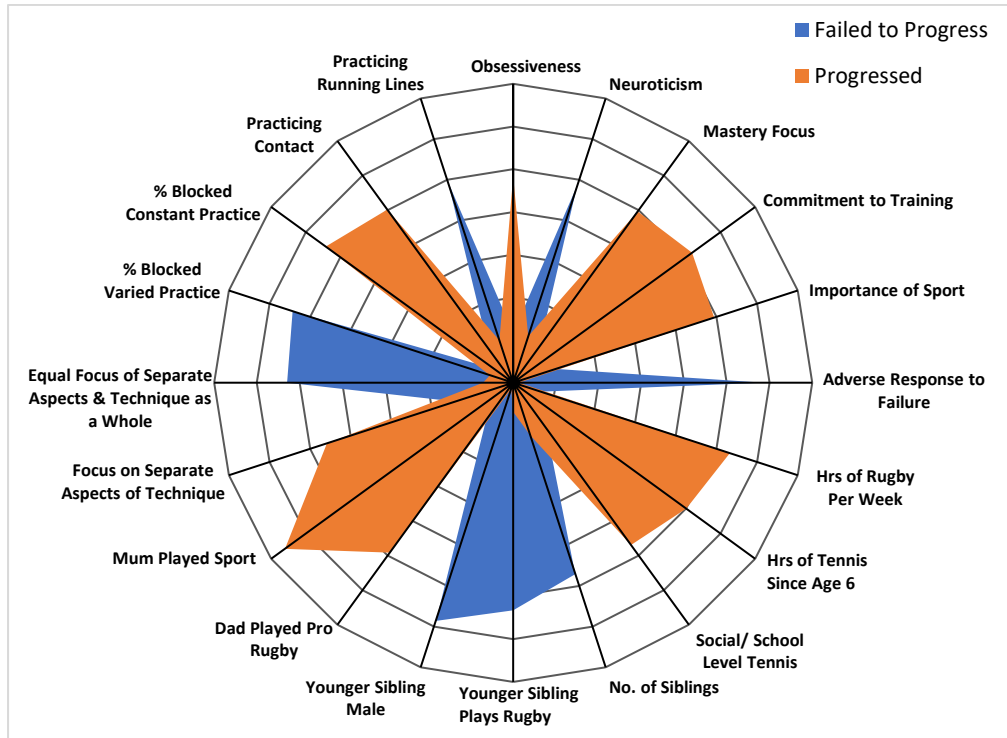
6. <i>Less</i> adverse response to failure.
7. Played <i>more</i> hours of rugby per week.
8. Played <i>more</i> hours of tennis since the age of 6.
9. Highest level of tennis achieved <i>more</i> likely to be school/ social level.
10. Had <i>fewer</i> siblings.
11. <i>Less</i> likely to have a rugby playing younger sibling.
12. <i>Less</i> likely to have a younger brother.
13. <i>More</i> likely their father played professional level rugby.
14. <i>More</i> likely their mother played sport.
15. <i>Greater</i> focus on individual aspects of technique when learning new skills in practice.
16. <i>Less</i> likely to have an equal focus on individual elements and technique as a whole, when learning new skills in practice.
17. <i>Less</i> blocked varied practice.
18. <i>More</i> blocked constant practice.
19. <i>More</i> likely to practice contact.
20. <i>Less</i> likely to practice running lines.

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.1.

Figure 3.1

Summary Model Discriminating Between Players who Progressed from U18's to U20's and Players who failed to Progress at This Stage.



3.4.2 Section Analysis

The next stage of our analysis was to run the pattern recognition protocol on each of the disciplinary measures separately (psychosocial, demographic, and practice and training), to understand their distinct discriminate power using the same protocol as for the summary analysis. Following recursive feature elimination, the analyses identified classification accuracies, for each subset, which we categorized, (following the same protocol as Güllich et al. 2019), as poor, modest, good, or very good. The classification accuracies, for each subset, within each disciplinary area are shown in Table 3.2 below.

Table 3.2

Classification accuracy for the most important discriminatory features between England U18 players who progressed to receive an England U20 and those who failed to progress based on the following algorithms: (i) Naïve Bayes (NB), (ii) Sequential Minimal Optimization (SMO), (iii) Instance Based Learning (IBk) and (iv) J48 Decision Tree (J48).

Feature subsets and classification accuracy	Classification Accuracy				Rating
	i	ii	iii	iv	
Psychosocial (35 features)					
2s 18 features	70%	70%	58%	48%	modest
3s 10 features	64%	82%	70%	45%	modest
4s 3 features	67%	76%	67%	48%	modest
Demographic (47 features)					
2s 18 features	84%	76%	60%	36%	Good
3s 11 features	80%	76%	68%	48%	Good
4s 2 features	76%	68%	76%	60%	modest
Practice and Training (41 features)					
2s 13 features	63%	60%	43%	57%	modest/poor
3s 4 features	60%	50%	30%	57%	Poor
4s 2 features	70%	50%	40%	70%	modest

It is worth noting that in almost all the analyses, the J48 classification algorithm offered classification accuracies that were consistently lower than the other algorithms. This is likely because this algorithm uses a simple decision tree and is less able to deal with complex interactions (Rokach & Maimon, 2009). Due to the multifaceted nature of our data set, this algorithm may not provide the most accurate reflection of the predictive capacity of each subset of features. For the purposes of this section and the discussion section therefore we have chosen to focus on the classification accuracies provided by the NB, SMO and IBK algorithms. In addition, in all three analyses, classification accuracies for each subset were comparably rated. We therefore selected the 2s subset in each analysis to differentiate between the two classes (progressed and failed to progress) as in each case this offered the most differentiating features and subsequently the greatest amount of information about the profile of players who progressed at this stage and those who failed to progress.

3.4.2.1 Final Classification Model: Psychosocial. The results from the comparison of the progressed and failed to progress groups, show that the players who progressed had the following psychosocial characteristics and early life experiences:

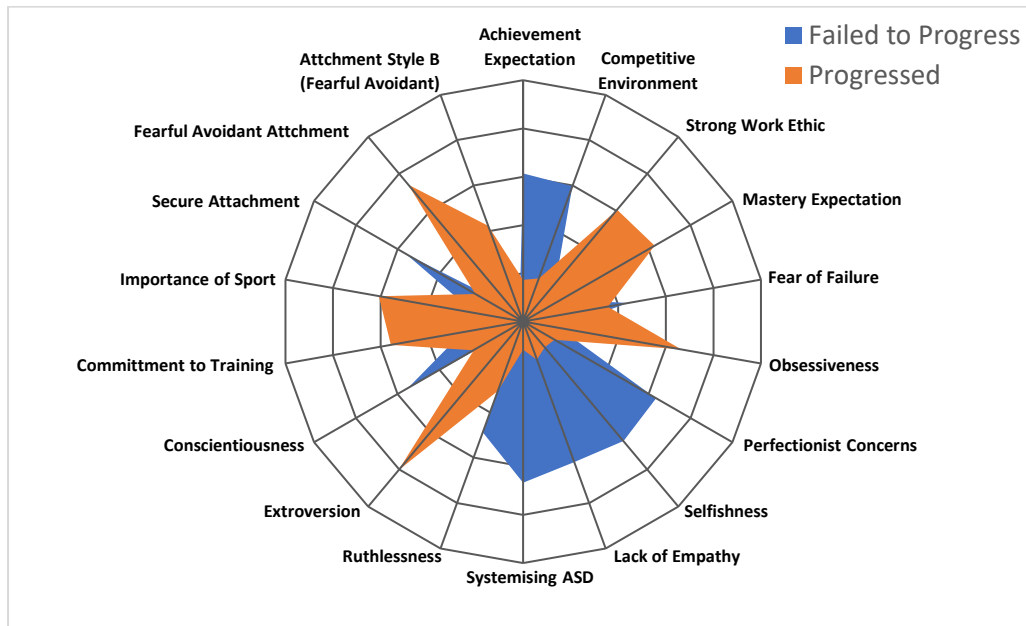
1. <i>Less</i> likely to have experienced a family environment where success and achievement were expected.
2. <i>Less</i> likely to have experienced a competitive family environment.
3. <i>More</i> likely family had a strong work ethic.
4. <i>More</i> likely to have experienced a family environment where mastery was expected.
5. <i>Lower</i> fear of failure.
6. <i>Greater</i> obsessiveness.
7. <i>Lower</i> perfectionistic concerns.
8. <i>Lower</i> selfishness.
9. <i>Greater</i> empathy.
10. <i>Lower</i> systemising.
11. <i>Lower</i> ruthlessness.
12. <i>Greater</i> extraversion.
13. <i>Lower</i> conscientiousness.
14. <i>Greater</i> commitment to training.
15. Placed a <i>greater</i> importance on sport.
16. Scored <i>lower</i> on secure attachment style.
17. Scored <i>higher</i> on fearful avoidant attachment style.
18. <i>More</i> likely to have attachment style B (fearful avoidant)

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.2.

Figure 3.2

Psychosocial Model Discriminating Between Players who Progressed from U18's to U20's and Players who failed to Progress at This Stage.



Attachment style was measured in two different ways by the Athlete Psychosocial Survey. Firstly, participants were asked to rate each attachment style on a Likert scale from 1 to 7 with 1 being 'not at all like me' and 7 being 'very much like me'. In addition, participants were also asked to select the one attachment styles which they felt most represented them. Both measures of fearful avoidant attachment style are listed in this subset as discriminating between groups which means that not only did players who progressed rate highly on fearful avoidance, they were also more likely to select it as being most representative of their attachment style.

3.4.2.2 Final Classification Model: Demographic. The results from the comparison of the progressed and failed to progress groups show that players who progressed had the following demographic characteristics and experiences:

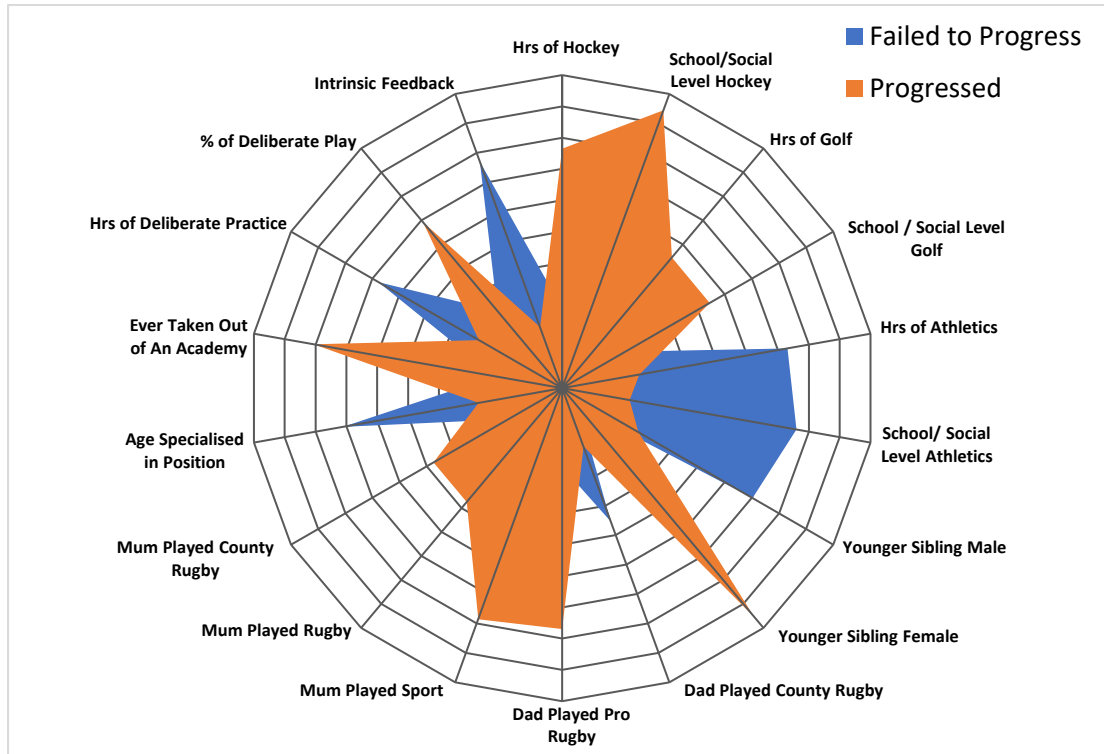
1.	Played <i>more</i> hours of hockey from the age of 6 to present.
2.	<i>More</i> likely to have played school/ social level hockey.
3.	Played <i>more</i> hours of golf from the age of 6.
4.	<i>More</i> likely to have played school/social level golf.
5.	Played <i>less</i> hours of athletics since the age of 6.
6.	<i>Less</i> likely to have competed at school/ social level athletics.
7.	<i>Less</i> likely to have a younger brother.
8.	<i>More</i> likely to have a younger sister.
9.	<i>Less</i> likely their father played county/ regional level rugby.
10.	<i>More</i> likely their father played professional level rugby.
11.	<i>More</i> likely their mother played sport.
12.	<i>More</i> likely their mother played rugby.
13.	<i>More</i> likely their mother played county/ regional level rugby.
14.	<i>Younger</i> when they specialised in their position.
15.	<i>More</i> likely to have been taken out/ dropped from a rugby Academy at some stage.
16.	<i>Less</i> current hours of deliberate practice.
17.	<i>Greater</i> percentage of current deliberate play.
18.	<i>Less</i> likely to utilise intrinsic feedback.

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.3.

Figure 3.3

Demographic Model Differentiating Between Players who Progressed from U18's to U20's and Players who failed to Progress at This Stage.



3.4.2.3 Final Classification Model: Practice and Training. The results from the comparison between the progressed and failed to progress groups show that players who progressed experienced the following training practices at their rugby academy:

1. Demonstration used <i>less</i> often.
2. <i>Greater</i> amount of context specificity of practice.
3. <i>Lower</i> difficulty rating of context specificity.
4. Pressure <i>less</i> likely to be induced in practice through negative team match play consequences.
5. Pressure <i>less</i> likely to be induced in practice through positive team match play consequences.
6. Pressure <i>less</i> likely to be induced in practice through time constraints.
7. <i>Lower</i> percentage of constraints-based practice.
8. <i>Lower</i> amount of constraints-based practice.
9. <i>Greater</i> percentage of random practice which was varied.

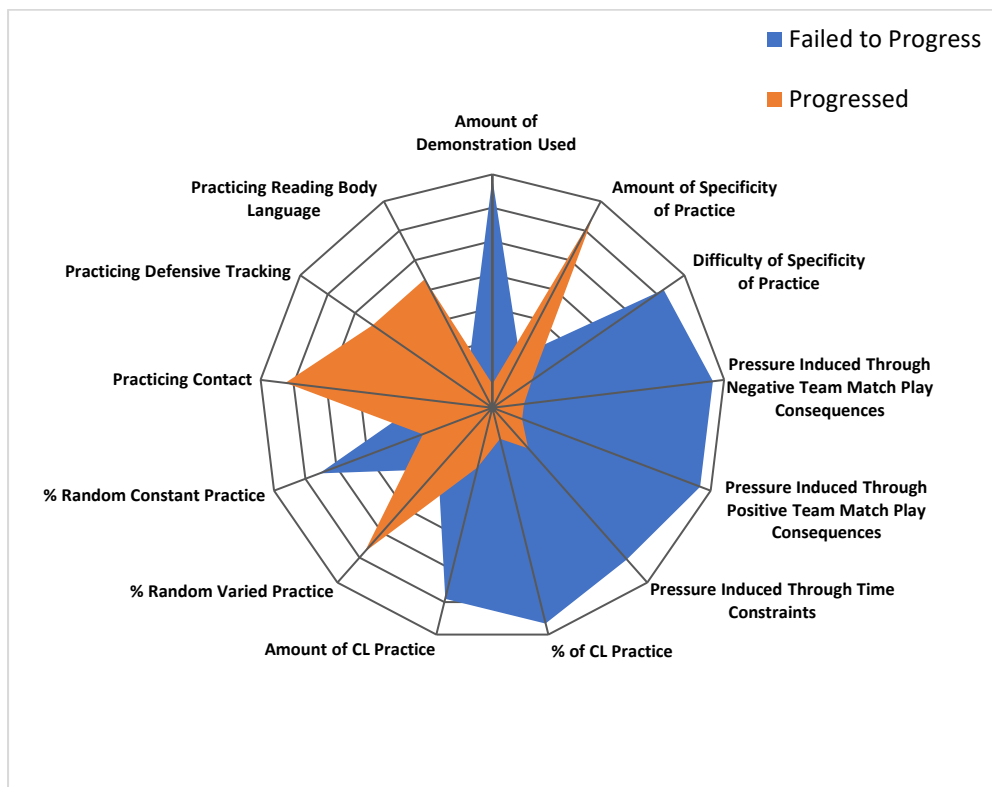
10. Lower percentage of random practice which was constant.
11. More likely to practice contact.
12. More likely to practice defensive tracking.
13. More likely to practice reading opponents body language.

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.4.

Figure 3.4

Practice and Training Model Differentiating Between Players who Progressed from U18's to U20's and Players who failed to Progress at This Stage.



3.5 Discussion

The aim of this study was to examine the multi-disciplinary factors which influence progression along the RFU developmental pathway from U18's to U20's. Progression from U18s to U20s is just the first step in the pathway towards high level success in rugby and there are many other experiences which may influence a player's journey along, or

derailment from the pathway. It is important to state that these analyses do not aim to provide the RFU with a view on who is likely to reach the pinnacle of athletic success and who isn't, but rather provide them with an insight into the profile of player they choose to promote at this early stage, alongside the profile of player they choose not to promote and subsequently lose from the pathway at this stage. With this in mind, we do not believe these findings offer either support or counter-support to existing findings on the characteristics of highly successful athletes. Instead, they provide the RFU with the opportunity to assess whether players who are de-selected at this stage of the pathway, based primarily on their performance, possess any of the necessary characteristics to develop excellence and further inform their selection processes.

The classification accuracies for the summary analysis are higher than for each separate section analyses, suggesting that we should not look to any one single disciplinary area to effectively differentiate between players who are likely to progress and players who are not. Instead, we should look at the whole picture, rather than just a single domain. This is consistent with the notion that talent development is influenced by a complex and interacting set of characteristics and experiences (Hardy et al. 2017). Having said that, each section analysis provides some useful insights for practitioners and allows us to gain further insight into these specific disciplinary domains that the summary analysis alone may not provide. For this reason, each section analysis will be discussed in turn, and we will conclude with a discussion on the summary analysis.

3.5.1 *Psychosocial Factors*

Players who progress at this stage of the pathway scored higher on fearful avoidant attachment style and lower on a secure attachment style. This information on attachment style is relevant when considered in the context of the findings from Study 1, which indicated that an avoidant attachment style is common amongst super-elite players. The role of attachment

in athletic performance remains under-researched however there is some preliminary data which suggests that there may be a prevalence of avoidant attachment amongst high achievers, including athletes (Thomson & Jaques, 2017). Avoidant individuals tend to protect themselves from disappointment by avoiding close personal relationships and maintaining a sense of counter-dependence and invulnerability (Bartholomew & Horowitz, 1991).

Understanding how avoidant attachment might influence the relationships these players have with other team members will almost certainly help to ensure they are provided with appropriate support to build close personal bonds with other team members and coaching staff, and successfully navigate the challenges of the development pathway.

Players who progressed at this stage were less likely to have experienced a competitive family environment but instead experienced a family environment where hard work and mastery were encouraged over an expectation of achievement and success. They also scored higher on other factors which may also be a prerequisite to a superior training discipline, specifically, commitment to training, a need to succeed, obsessiveness and importance of sport, although it is worth noting that they scored lower on conscientiousness. Alongside these factors, they demonstrated the likelihood of enhanced psychological wellbeing in that they scored lower on fear of failure and perfectionistic concerns, and demonstrated more communal traits, with low ruthlessness and greater empathy and extraversion, than players who failed to progress. Similar psychosocial factors such as mastery orientation, discipline, psychological well-being, perceptions of team cohesion and positive peer experiences are amongst the factors which have been found to underpin consistently high levels of tactical and technical performance in football (Gledhill et al. 2017). When deciding whether a player should progress from an academy to a senior team, performing to a consistently high standard is highly rated by coaches and is positively associated with career progression to senior elite level in football (Gledhill et al. 2017).

Players who are progressing through the RFU pathway at this stage possess many of the psychosocial characteristics which are likely to underpin consistently high levels of performance, which in turn is likely to account for their progression.

Whilst turning out consistently high levels of performance is an important factor in developing excellence, this alone may not be enough. Personality factors such as fear of failure, perfectionism, and ruthlessness have all been found to differentiate between elite and super-elite athletes (Hardy et al. 2017). These traits were significantly higher in the group that did not progress from England U18s to U20s. In addition, players who failed to progress also scored higher on systemising ASD, a dimension of which is black and white thinking, which was shown to be a commonality amongst the world's best rugby players in the previous study. Taken together, these findings suggests that players who possess some of the necessary psychological attributes to develop excellence, may not be being offered opportunities to progress within the pathway at this stage. While these players are unlikely to fall out of the system completely, they may be missing important early developmental opportunities, which could further facilitate the realisation of their full potential. These findings suggest a Type II error may be evident in relation to progression (cf. Baker et al., 2018), where high potential athletes are being lost from the pathway. Similarly, players who are progressing at this stage, who are more likely to be a consistent performer and score lower on potentially more challenging personality traits, such as narcissism may represent the occurrence of a Type I error in relation to development (Baker et al., 2018) where high performing, but relatively low potential athletes are being kept in the pathway at the exclusion of other higher potential athletes.

3.5.2 Demographic Factors

The demographic results revealed that participants who progressed at this stage of the pathway played more hours of other sports such as hockey and golf which, like rugby,

involve a degree of hand-eye coordination, and fewer hours of sports which, traditionally don't involve the same degree of hand-eye coordination, such as athletics. In addition, they were more likely to have played these other sports to a school or social level, rather than a county or regional level, suggesting their involvement in these sports was less formal and more akin to deliberate play than deliberate practice. This finding is consistent with the DMSP (Côté et al., 2007) which suggests that through sampling various other sports and engaging in deliberate play, junior athletes experience essential building blocks for self-regulated investment in elite sport during adolescence and adulthood (Côté et al., 2007). Although the DMSP suggests that during specialising (13-15yrs) and investment years (16+) the balance of practice should move towards a greater amount of deliberate practice (Côté et al., 2007), our findings reveal that players who progressed at this stage, currently completed less deliberate practice, and a greater percentage of deliberate play in rugby suggesting that a sustained involvement in less structured rugby practice may continue to be beneficial even at this stage in development.

Results also revealed that participants whose parents played rugby to a high level were more likely to progress at this stage of the pathway. There are many possible explanations for this finding. First, this finding might reflect a degree of unconscious bias towards players whose parent(s) have played professional rugby. Research suggests that the best way to challenge unconscious bias is to create diverse selection panels and environments (Marino et al. 2020). The RFU already use what they call a 'many eyes, many times, many environments' approach. Put simply, they ask coaches to ensure that in making selections, players are viewed by different coaching staff, on many occasions and in a variety of diverse environments. If implemented correctly and consistently, this process should help to negate the effects of unconscious bias. Second, it is plausible that players whose parents have played rugby to a professional level benefit from superior technical and or tactical coaching

from an early age. Once players are within a professional environment however and benefitting from the expertise of coaches at this high level, this early advantage may start to diminish. A third possibility is that parents who played rugby to a high level possess greater ‘sport parenting expertise’. Sport parenting expertise is vital to the growth of psychosocial attributes necessary to facilitate talent development (Harwood & Knight, 2015). A parent high in sport parenting expertise can demonstrate a range of competencies, including, amongst others, selecting appropriate sporting opportunities, managing the emotional demands of competition, fostering healthy relationships with other stakeholders, and managing organisational and developmental demands associated with sport participation (Harwood & Knight, 2015). Having played rugby to a high level themselves, the parents of players who progressed, may have already developed these types of competencies, which ultimately benefit their rugby playing child. To ensure that players whose parents did not play rugby professionally are not disadvantaged, the parents of these players may need additional direction and resources to help them best support their child.

3.5.3 Practice and Training Factors

The practice and training analysis returned the least favourable classification accuracies, suggesting that there is little variation in terms of training practices between those who progress to U20s and those who don’t. Despite the modest classification accuracies one notable factor which differentiated the two groups was constraints-led (CLA) training, with players who progressed spending less time on this type of practice than players who failed to progress. This finding is somewhat surprising given the extent of empirical evidence espousing the positive effect of this type of challenging practice on skill acquisition (Clark et al., 2019). Numerous studies suggest challenge and setbacks early in the development pathway may be necessary obstacles which athletes must overcome to develop the coping skills and resilience required to thrive within an elite performance environment (Collins &

MacNamara, 2012; Van Yperen, 2009). Whilst there is mention of the fact that support through these early challenges will help to optimise development, the over-riding message appears to be that highly supported young athletes are less likely to succeed at senior level (Collins & MacNamara, 2016; cf. Howells & Fletcher, 2015). In contrast to this however, research within high performance environments, outside of the sporting domain, suggests that effective person-centred learning and development is based on achieving the right balance between support, which is appropriate to the individual, alongside sufficient challenge to progress their performance (Day, 2020). Whilst a certain amount of challenge within a CLA framework is undoubtedly beneficial to players within the pathway, it is possible that the level of challenge offered via CLA approaches is not in balance with the level of support offered (both during training and in the pathway environment more globally). This finding suggests challenge coupled with the appropriate level of support, as opposed to just challenge alone, may be important to developing excellence in sport, and specifically rugby. An example of where the balance of challenge and support appears to be working well is around context specificity. Players who progressed, experienced greater amounts of context specificity, however the difficulty level of that context specificity was rated lower than those who failed to progress. The theory of challenge and threat states in athletes (TCTSA; Meijen et al., 2020) suggests that in a challenge state the perceived resources are sufficient to deal with the demands of the situation, whereas in a threat state the demands outweigh the perceived resources. Creating a training environment which reflects the stress of a match scenario, whilst not making it so difficult that the challenge overwhelms the player's perceived resources and support, appears to be beneficial to players at this level.

3.5.4 Summary Factors

The summary analysis was largely consistent with the individual section analyses in that the psychological and demographic characteristics important to progression are those

which underpin consistent performance and a commitment to training. Within this analysis players who progressed scored highly on obsessiveness, mastery focus, commitment to training and importance of sport, and lower on neuroticism and an adverse response to failure, which are all factors that likely contribute to consistent performance. They also demonstrated a commitment to training in that they undertook more hours of rugby per week and were potentially advantaged by the fact they were more likely to have a sport playing parent, including a father who played rugby to a professional level. These findings offer additional support to the notion that the RFU may be using current performance as an indicator of future potential and choosing to prioritise players who demonstrate commitment, dedication, and consistency over players with the psychological capacity and greater potential to develop excellence.

In addition to this transition there are also later transitions within the development pathway which also provide opportunities for some players to progress and a risk to others that they may derail. One such transition is from the pathway into senior premiership sides and an additional investigation into the factors which influence progression at this stage would provide some useful additional insights. As such we explored the influence of psychosocial, practice and training, and demographic factors on this stage of progression in Study 3.

Study 3

3.6 Method

3.6.1 Participants

Participants were male rugby players ($n=103$), from 13 different rugby clubs, who had been selected to attend England U18 and England U20 training camps during the 2018/19 season.

3.6.2 Measures and Procedure

Data for this study was collected at the same time as data for Study 2, using the same measures and procedure.

3.6.3 Data Analysis

Analysis of the data took place in late 2020/ early 2021, at which time the RFU provided a range of data revealing the progression of participants over the preceding two years. To understand the factors which influenced progression along the pathway at this stage, participants were split into two classes; these being players who had gone on to receive five or more caps for their Premiership club senior team and players who had received less than five caps for their Premiership club senior team. At the time of analysis, 20 participants from the original sample of 103 had received five or more caps for their club's senior team and were classed as having "progressed". Eighty-three participants from the original sample of 103 had received fewer than five caps for their club's senior team and were classed as having "failed to progress". Only participants with complete data sets were included in each analysis, participants with missing data were removed from the sample for that analysis.

3.6.4 Analytical Strategy

We followed the same protocol for the pattern recognition analysis for this study, as outlined in Study 2 above. Equal group sizes were used for all analyses, where one group was larger than the other, participants from the larger group were selected at random to equal the

number of participants in the smaller group (Güllich et al. 2019). Each analysis consisted of the following number of participants, summary analysis, $n = 30$ (15 in each group), psychosocial analysis, $n = 36$ (18 in each group), demographic analysis, $n = 36$ (18 in each group) and practice and training analysis, $n = 34$ (17 in each group).

3.7 Results

3.7.1 Summary Analysis

The first stage of our analysis was to run the pattern recognition protocol on all the measured features (across psychosocial, demographic and practice and training) to understand the collective discriminative power of the selected subset of features, as a multidisciplinary model. The top 20 features selected by each feature selection algorithm, were used to create feature subsets. The following feature subsets were created; 2s (features selected by at least 2 of the feature selection algorithms), 3s (features selected by at least 3 of the algorithms) and 4s (features selected by all four algorithms). Recursive feature selection was carried out but did not substantially improve the classification accuracies. Classification accuracies, for the original feature subsets are categorized below in Table 3.3, (following the same protocol as Güllich et al. 2019), as poor, modest, good, or very good.

Table 3.3

Classification accuracy for the most important discriminatory features between England pathway players who now have five or more Premiership caps and those who have less than five, based on the following algorithms: (i) Naïve Bayes (NB), (ii) Sequential Minimal Optimization (SMO), (iii) Instance Based Learning (IBk) and (iv) J48 Decision Tree (J48).

Feature subsets and classification accuracy		Classification Accuracy				Rating
		I	ii	iii	iv	
Master (123 features)						
2s	18 features	87%	77%	67%	57%	Good
3s	12 features	90%	87%	67%	67%	very good
4s	6 features	87%	87%	80%	63%	Good

Despite the classification accuracy of the 3s subset (in which features were selected by three or more algorithms) being “very good” compared to the “good” classification accuracy of the 2s subset (in which features were selected by two or more algorithms) we did not feel that the improvement was sufficient to justify selecting a smaller subset of features. As such we selected the 2s subset to differentiate between the two classes (progressed and failed to progress) as this subset offered the most differentiating features and subsequently the greatest amount of information about the profile of players who progressed at this stage and those who failed to progress. This risk with a more stringent strategy (i.e., using the 3s subset, in which features were selected by three or more algorithms) is that some features that contain important information are not selected resulting in a sub-optimal fit because all the relevant information has not been used (Güllich et al., 2019). This risk is justified where the recursive feature selection results in substantially better classification accuracies, however in this case it would have resulted in a reduced subset of only 12 features (as opposed to 18) with only marginally improved classification accuracies.

The results from the comparison of the progressed and failed to progress groups, show that the players who progressed possessed the following characteristics and experienced the following life events and training practices:

1. <i>Lower empathy</i>
2. Played <i>more</i> hours of football from age 6
3. Played <i>more</i> hours of cricket from age 6
4. Experienced <i>less</i> deliberate practice between the ages of 6 and 12.
5. Experienced <i>more</i> deliberate play between the ages of 6 and 12.
6. <i>Less</i> likely to have been taken out/dropped from an Academy.
7. Spent <i>more</i> time in training practicing physical skills.
8. <i>Greater</i> amount of verbal presentation used in training.
9. <i>Greater</i> amount of context specificity of practice.
10. <i>Greater</i> amount of anxiety specificity of practice.

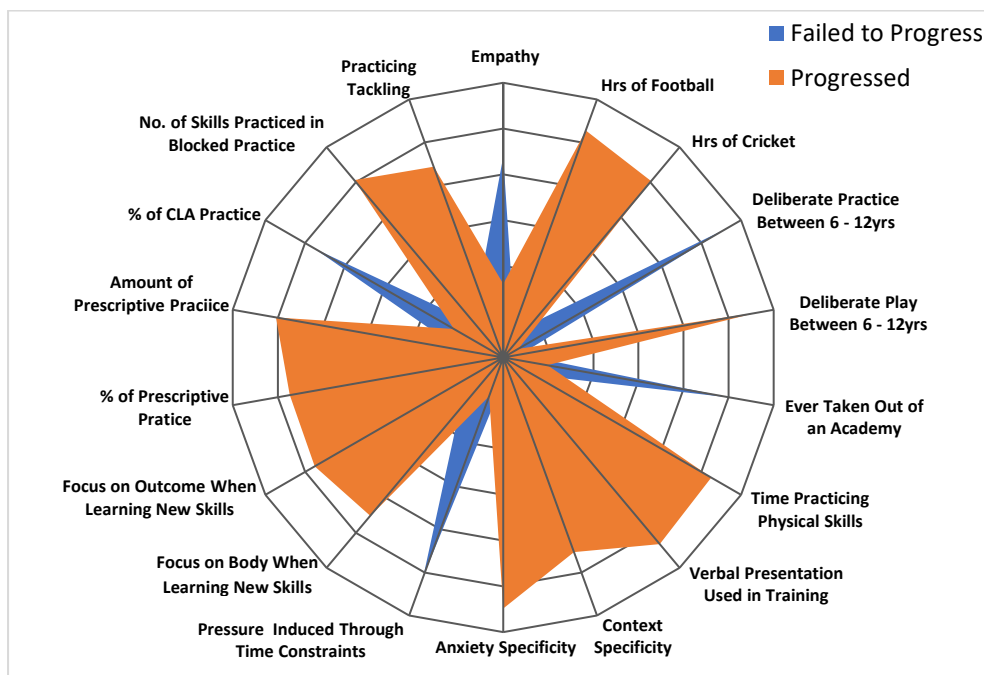
11. Pressure <i>less</i> likely to be induced in practice through time constraints.
12. <i>More</i> time spent focussing on the body when learning new skills.
13. <i>More</i> time spent focussing on the outcome when learning new skills.
14. <i>Greater</i> percentage of prescriptive practice.
15. <i>Greater</i> amount of prescriptive practice.
16. <i>Lower</i> percentage of constraints-based practice.
17. <i>More</i> skills practiced in blocked practice.
18. <i>More</i> likely to practice tackling.

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.5.

Figure 3.5

Summary Model Differentiating Between Players who Progressed to Receive Five or More Senior Premiership Caps and Players who failed to Progress and Receive Five Senior Premiership Caps.



3.7.2 Section Analysis

The next stage of our analysis was to run the pattern recognition protocol on each of the disciplinary measures (psychosocial, demographic, and practice and training) separately,

to understand the distinct discriminate power of each following the same protocol as for the summary analysis. Following recursive feature elimination, the analysis identified classification accuracies for each subset which we categorised, (following the same protocol as Güllich et al. 2019), as poor, modest, good, or very good. The classification accuracies, for each subset, within each disciplinary area are shown in Table 3.4 below.

Table 3.4

Classification accuracy for the most important discriminatory features between England pathway players who now have five or more Premiership caps and those who have less than five, based on the following algorithms: (i) Naïve Bayes (NB), (ii) Sequential Minimal Optimization (SMO), (iii) Instance Based Learning (IBk) and (iv) J48 Decision Tree (J48).

Feature subsets and classification accuracy		Classification Accuracy				Rating
		I	Ii	iii	iv	
Psychosocial (35 features)						
2s	16 features	78%	69%	67%	75%	moderate
3s	10 features	81%	81%	67%	75%	Good
4s	4 features	69%	67%	61%	81%	moderate
Demographic (47 features)						
2s	15 features	78%	83%	64%	67%	Good
3s	9 features	83%	81%	81%	64%	Good
4s	5 features	86%	83%	69%	64%	Good
Practice and Training (41 features)						
2s	14 features	74%	65%	44%	32%	Poor
3s	8 features	68%	59%	44%	27%	Poor

It is worth noting that once again, the J48 algorithm offered classification accuracies which were consistently lower than the other algorithms. For the purposes of the results and discussion sections therefore we have chosen to focus on the classification accuracies provided by the NB, SMO and IBK algorithms. In addition, in all three analyses, classification accuracies for each subset were comparably rated. We therefore selected the 2s subset in each analysis to differentiate between the two classes (progressed and failed to

progress) as in each case this offered the most differentiating features and subsequently the greatest amount of information about the profile of players who progressed at this stage and those who failed to progress.

3.7.2.1 Final Classification Model: Psychosocial. The results from the comparison between the progressed and failed to progress groups show that players who progressed had the following psychosocial characteristics and early life experiences:

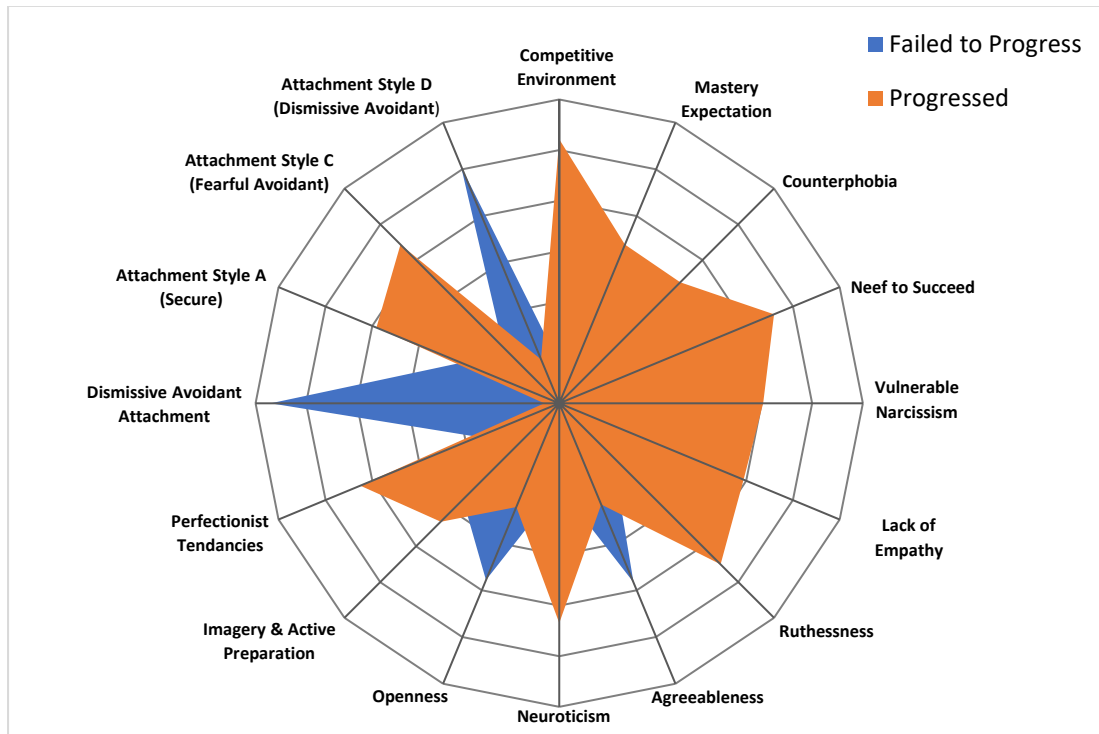
1. <i>More</i> likely experienced a competitive family environment.
2. <i>More</i> likely experienced a family environment where mastery was expected.
3. <i>Greater</i> counterphobia.
4. <i>Greater</i> need to succeed.
5. <i>Greater</i> vulnerable narcissism.
6. <i>Lower</i> empathy.
7. <i>Greater</i> ruthlessness.
8. <i>Less</i> agreeableness.
9. <i>Greater</i> neuroticism.
10. <i>Less</i> openness.
11. <i>More</i> likely to engage in imagery and active preparation.
12. <i>Greater</i> perfectionist tendencies.
13. Scored <i>lower</i> on a dismissive avoidant attachment style.
14. <i>More</i> likely to have attachment style A (secure attachment).
15. <i>More</i> likely to have attachment style C (anxious preoccupied).
16. <i>Less</i> likely to have attachment style D (dismissive avoidant).

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.6.

Figure 3.6

Psychosocial Model Differentiating Between Players who Progressed to Receive Five or More Senior Premiership Caps and Players who failed to Progress and Receive Five Senior Premiership Caps.



3.7.2.2 Final Classification Model: Demographic. The results from the comparison between the progressed and failed to progress groups show that players who progressed had the following demographic characteristics and experiences:

1. Played <i>more</i> hours of football from the age of six.
2. <i>More</i> likely to have played school/ social level in football.
3. Played <i>less</i> hours of golf from the age of six.
4. <i>Less</i> likely to have played social/ school level golf
5. <i>Less</i> likely to have competed at county/ regional level in swimming.
6. Played <i>less</i> hours of athletics since the age of six.
7. <i>Less</i> likely to have competed at county/ regional level in athletics.
8. <i>Less</i> likely to have a younger brother.
9. <i>Less</i> likely their father played rugby at county/ regional level.

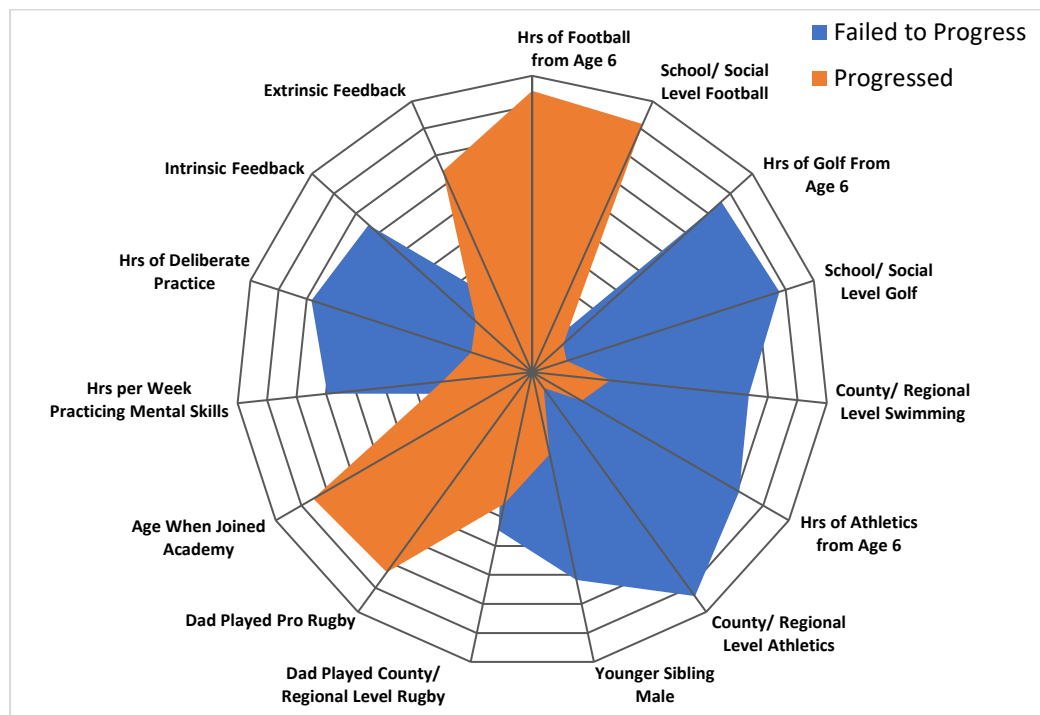
10. <i>More likely their father played rugby at a professional level.</i>
11. <i>Older when joined a professional rugby academy.</i>
12. <i>Less hours per week practicing mental skills.</i>
13. <i>Less hours per week of deliberate practice.</i>
14. <i>Less likely to utilise intrinsic feedback.</i>
15. <i>More likely to utilise extrinsic feedback.</i>

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.7.

Figure 3.7

Demographic Model Differentiating Between Players who Progressed to Receive Five or More Senior Premiership Caps and Players who failed to Progress and Receive Five Senior Premiership Caps.



3.7.2.3 Final Classification Model: Practice and Training. The results from the comparison between the progressed and failed to progress groups show that players who progressed experienced the following training practices at their rugby academy:

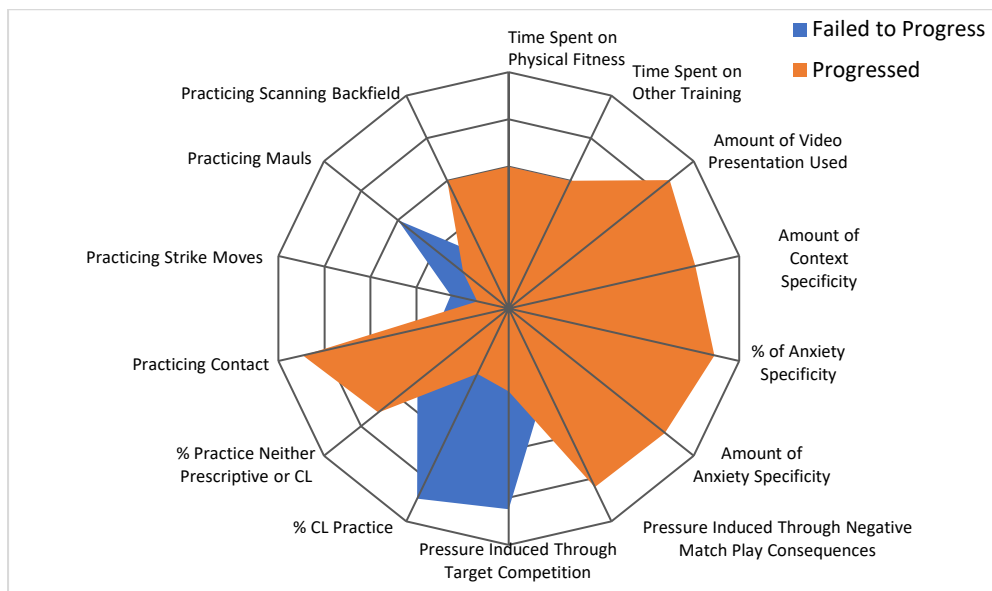
1. <i>Greater</i> amount of time spent on physical fitness.
2. <i>Greater</i> amount of time spent on any other training.
3. Video presentation used <i>more</i> often.
4. <i>Greater</i> amount of context specificity of practice.
5. <i>Greater</i> percentage of anxiety specificity.
6. <i>Greater</i> amount of anxiety specificity.
7. Pressure <i>more</i> likely to be induced through negative team match play consequences.
8. Pressure <i>less</i> likely to be induced through target competition.
9. <i>Lower</i> percentage of constraints-based practice.
10. <i>Greater</i> percentage of practice which is neither prescriptive or constraints-based.
11. <i>More</i> likely to practice contact.
12. <i>Less</i> likely to practice strike moves.
13. <i>Less</i> likely to practice mauls.
14. <i>More</i> likely to practice scanning backfield.

A radar plot, using standardised data, for this feature subset is shown below in Figure

3.8.

Figure 3.8

Practice and Training Model Differentiating Between Players who Progressed to Receive Five or More Senior Premiership Caps and Players who failed to Progress and Receive Five Senior Premiership Caps.



3.8 Discussion

The aim of this study was to investigate the multi-disciplinary factors which influence progression from the RFU development pathway into senior premiership sides. As in the previous study, these analyses do not aim to differentiate between ‘elite’ and ‘super-elite’ players. Progression from the RFU pathway into senior premiership teams is one of the early steps along the pathway and there are many other experiences which may influence a player’s journey towards, or derailment from, developing excellence. Again, the aim of this study was not to provide the RFU with a view on who might reach this pinnacle and who might not, but rather to offer an insight into the profile of player being provided with frequent early opportunities to play within senior premiership sides and those who have had few or no opportunities to make this progression so far.

As was the case in the previous study, the classification accuracies for the summary analysis are higher than for each separate section analyses highlighting the complexity of factors which underpin the development of excellence across domains. However, once again each section analysis provides some useful insights for practitioners and allows us to gain further understanding of these specific disciplinary factors which the summary analysis alone may not provide. For this reason, each section analysis is discussed in turn, and we will conclude with a discussion on the summary analysis.

3.8.1 Psychosocial Factors

The psychosocial findings from this analysis are consistent with findings from Study 1 in this thesis as players who progressed at this stage scored higher on vulnerable narcissism and a lack of empathy, which were both traits found to be a commonality amongst the World's best players interviewed in the first study. They also scored higher on some of the same traits displayed by the 'super-elite' athletes in Hardy et al.'s (2017) Great British medallist study, specifically competitive family environment, mastery expectation, counterphobia, need to succeed and ruthlessness. The group who progressed at this stage also demonstrated significantly higher scores on both imagery and active preparation, and perfectionistic tendencies, which are categorised as psychological characteristics of developing excellence and thought to underpin effective development in sport (Hill et al. 2018). In addition, consistent with findings from Steca et al.'s (2018) research into associations between 'Big 5' personality traits and athletic success, players who progressed also scored higher on neuroticism and lower on agreeableness and openness. The findings provide additional support to the existing literature which suggests that traits, which may be perceived as maladaptive in some domains, notably narcissism, perfectionism, lack of empathy and ruthlessness are important to the development of excellence in rugby (Curran et al., 2014; Hardy et al., 2017; Roberts et al., 2013; Roberts & Woodman., 2017). In addition,

the findings which demonstrate that players who progressed experienced a competitive family environment with a mastery expectation, provides additional support to the existing literature which states that early developmental experiences and parental influence are important to developing excellence (Fletcher et al., 2018; Hardy et al., 2017). It would appear that the players progressing at this stage, possess many of the psychosocial traits which underpin the development of excellence, and it may be reasonable to assume therefore that these traits helped to facilitate their progression through the RFU's development pathway and into senior Premiership teams.

One finding, that perhaps requires deeper investigation, however, relates to the measures of attachment. The attachment items in the Athlete Formulation Development Survey are based on Bartholomew and Horowitz's (1991) four group model of attachment. In this model the authors suggest that interactions with others result in the development of positive or negative mental models of the self (as either worthy or unworthy of love) and others (as either trustworthy and available or unreliable and rejecting). When crossed these two dimensions produce the four attachment classifications, secure, anxious preoccupied, fearful avoidant, and dismissive avoidant. The findings relating to attachment in Study 1, suggest that players who reach the pinnacle of 'World's best', are more likely to display characteristics consistent with one of the two avoidant attachment styles, dismissive or fearful avoidant. In this study however, the group who progressed scored higher on a secure and anxious preoccupied attachment style and lower on a dismissive avoidant attachment style. Secure and anxious preoccupied attachment share a positive mental model of others, and individuals with these attachment styles rate positively on a capacity to rely on other people, emotional expressiveness, the use of others as a secure base and closeness within personal relationships (Bartholomew & Horowitz 1991). Conversely individuals with an avoidant attachment style, either fearful or dismissive, rate negatively on these same measures

(Bartholomew & Horowitz, 1991). One possible explanation for the finding around attachment in this study is that players who can effectively communicate their emotions, integrate well within a team, and form close personal and trustful bonds with peers and coaching staff, may be viewed more favourably by coaching staff when thinking about selection. This explanation is also in line with research which has shown that securely attached individuals are happier and cope more effectively with life stresses, which in turn is linked to greater achievement in a variety of domains (Peterson & Park, 2007). However as mentioned above, this finding is in direct contrast to the findings in Study 1 and while secure and preoccupied attachment styles may be associated with increased opportunities for progression in this case, they should not necessarily be viewed as more advantageous in relation to maximising potential. Currently no causal relationship has been established between attachment style and talent development and we don't yet fully understand whether attachment style is an important component in the development of excellence in sport. Further research exploring the relationship between attachment and the development of excellence would certainly be useful.

3.8.2 *Demographic Factors*

Results from the demographic analysis show that players who progressed from the pathway to the Premiership were taking part in fewer hours of golf, athletics and swimming and more hours of football, from the age of 6 years. Although the DMSP suggests that early sampling of multiple sports is advantageous in terms of skill development and longer-term involvement in sport (Côté & Vierimaa, 2014), it would appear the players who progressed at this point in the pathway have benefitted from focussing on fewer team sports, such as football, rather than a larger overall number of sports, including individual sports, such as golf, athletics, and swimming. This apparent lack of sampling at a younger age suggests that the route to progression at this stage in the pathway may be one of early specialisation as

opposed to early sampling. However, a recent study by Staub et al. (2020) suggests that within-sport diversification at a young age is also associated with later success. One of the main advantages of diversification is the chance of sampling in various sports, although it remains questionable whether skills obtained from sampling in sports with uncommon environmental conditions, such as swimming, transfers to other sports with very different environmental conditions (Staub et al. 2020). It may be that diversifying within sport or across sports which share similar environmental and physical conditions, such as rugby and football, may prove beneficial for a performer (Staub et al., 2020).

As was the case with participants in the previous study, players who progressed at this stage in the pathway were also more likely to have a father who played professional rugby, reinforcing the idea that there appears to be an advantage, at least within this stage of the pathway, to having a parent who played rugby to a high level. To the best of our knowledge the current literature has not investigated whether the children of elite or professional athletes are more or less likely to succeed in sport themselves. As stated earlier this finding may be due to the fact that parents who played rugby themselves have a higher level of sport parenting expertise. A parent high in sport parenting expertise can demonstrate a range of competencies, including, amongst others, selecting appropriate sporting opportunities, managing the emotional demands of competition, fostering healthy relationships with other stakeholders, and managing organisational and developmental demands associated with sport participation (Harwood & Knight, 2015), all of which are likely to be beneficial to their sport playing child.

Finally, players who progressed at this stage were less likely to utilise intrinsic feedback and more likely to utilise extrinsic feedback, suggesting that, in line with Guadagnoli and Lee's (2004) challenge point framework, players were not relying on their own internal feedback to sense whether a movement or pattern of play had been effective, but

instead looked to external feedback and validation from coaches to guide their training. This result may add further weight to the notion that there is currently too much challenge and not enough support in practice as instead of sensing themselves whether their actions have been effective, players are looking for external feedback for validation of their performance.

3.8.3 Practice and Training Factors

As in the previous study, the practice and training factors returned the least favourable classification accuracies suggesting once again that differences in practice and training are less likely to differentiate between players who progress and those who don't at this stage in the pathway. Despite this, an interesting pattern appears to emerge, which supports the practice and training findings from the previous study. As was the case in the previous study, players who progressed at this stage in the pathway undertook less CLA practice and more prescriptive practice. Once again, this finding is counter to what we might expect and suggests that too much challenge might start to become counterproductive to performance. Without the appropriate resources available to deal with this level of difficulty players may perceive training as a threat as opposed to a challenge (Meijen et al., 2020). In addition, findings around the specificity of practice also appear to mirror those from the previous study. Players who progressed at this stage of the pathway undertook a greater amount of both context specificity of practice and anxiety specificity of practice, suggesting that in this area of practice that the balance between challenge and support appears to be working well and facilitating performance.

Finally, players who progressed at this stage in the pathway spent more time per week on physical fitness than players who failed to progress suggesting that superior physical fitness is likely to be an advantage at this stage. In addition, players who progressed spent more time in practice which didn't include physical fitness or skills training, suggesting that areas such as analysis, tactical sessions, or an increased understanding of the importance of

other aspects of sport, such as nutrition, are also important to progression at this stage. This finding seems to fit with the DMSP as players at this stage are in the investment years (16+) and having already acquired the necessary skills to perform to a high level, they are now also demonstrating a commitment to improving all aspects of their performance (Côté et al., 2007).

3.8.4 *Summary Factors*

Despite the practice and training analysis yielding the lowest classification accuracies, 16 of the 18 features included in the summary analysis were practice and training factors. In addition, the features selected in this analysis largely support the findings from the earlier practice and training section analysis. Results revealed that players who progressed undertook a greater amount of specificity of practice and anxiety specificity of practice, a smaller amount of CLA practice and a greater amount of prescriptive practice. In line with earlier results this finding suggests that the larger volume of CLA practice may be presenting too much challenge for players, whilst the level of challenge in relation to specificity of practice appears to support performance. In addition, and consistent with the DMSP (Côté et al., 2007) players who progressed experienced greater amounts of deliberate play and lower amounts of deliberate practice, between the ages of 6 and 12. Also of note is the finding, which mirrors the demographic section findings of both this and the previous study, which demonstrated that players who progressed were more likely to play football and cricket from the age of 6. This finding supports the notion that players who progressed experienced early diversification across sports which share similar environmental and physical conditions.

3.9 General Discussion

3.9.1 *Implications*

The psychosocial findings demonstrate that players who possess characteristics which underpin consistent performance, and who are able to develop close personal relationships

with other players and coaching staff, may be more likely to progress from U18's to U20's than players who possess the psychological characteristics important to developing excellence. These findings may be an indication that the RFU is using current performance as a predictor of future potential and selecting players based predominantly on their performance abilities alone and giving little consideration to the factors which may be indicative of the psychological capacity and potential to develop excellence. Using current performance as an indicator of future potential may be restrictive and creates a potential risk to coaches in that high potential but underperforming athletes could be lost from the system, while over-performing but low potential players remain in (Baker et al., 2018). With this in mind, and in view of the empirical support for the importance of psychological characteristics and personality on the development of excellence in sport, the RFU may wish to redefine its metrics around 'potential' and consider the inclusion of psychological characteristics within their selection criteria to ensure that players with the greatest potential are not lost at an early stage from the development pathway.

Taken together the findings from these two studies also appear to support the idea that early diversification across sports which share similar environmental and physical conditions, appears to be an important factor in progressing through the RFU's development pathway. In addition, players across both studies were advantaged by the fact that their parents played sport to a high level and in particular that their father played rugby to a professional level. Whether a rugby playing parent offers a genuine lasting advantage to players or whether this represents an implicit bias of some sort will be important issue for the RFU to consider. Running this analysis again after a longer period has lapsed may help to answer this question. However, in the short term the RFU should ensure they put processes in place to reduce any unconscious bias and provide additional resources to players whose parents did not play sport

to a high level and subsequently don't have high levels of sport parent expertise, to address any imbalance.

Another key finding was the discovery that, somewhat surprisingly players who progressed at both stages within the pathway undertook less CLA training than players who failed to progress. This finding suggests that there may be an optimal level of challenge that is being surpassed for some individuals. For players to perceive the level of difficulty within practice as a challenge as opposed to a threat, they also need to perceive that they have the necessary resources and support to overcome that challenge and it may be that certain players require more support than is currently available. The idea that certain players may benefit from additional support is reinforced by the findings across both studies which revealed players who progressed are more likely to utilise extrinsic feedback than intrinsic feedback, suggesting that instead of sensing themselves whether their actions had been effective, they look to external feedback for support and validation of their performance. It may also be interesting to consider whether there are individual differences in relation to CLA training and whether certain personality traits make CLA training more effective for some individuals and less effective for others. For example, someone high in ASD systemising, which is characterised by being highly systematic and having a propensity to seek pattern, may find CLA practice, which lacks predictability and pattern, extremely challenging. Moving forward, considering how to appropriately balance the demands and support associated with CLA approaches seems key. Practically, the RFU may wish to consider whether players within the pathway are currently being presented with too much challenge, within specific training practices and the environment in general, and whether this challenge is balanced with the right level of support.

It is important to note the strengths and limitations to these studies. Previous studies in this domain using machine learning techniques to analyse data have relied on in-depth

interviews to collect data (Güllich et al., 2017; Jones et al., 2018, 2020), which places a considerable time burden on participants and limits the overall sample size. In this study we used quantitative methods and collected psychosocial and demographic data from participants and their practice and training data from coaches. The advantage of this approach was that we had multiple sources of data, as opposed to relying on a single source, and a reduced overall burden on each participant which allowed us to collect data from all players attending the U18 and U20 training camps in the 2018/2019 season. There were however several factors which reduced the original sample size. In Study 2 the fact that the U20 World Cup in 2020 had been cancelled meant that eligible players who might have been given the opportunity to progress and receive an U20 cap at this tournament, were denied the opportunity and subsequently removed from the analysis. In Study 3 the small sample size was due to the relatively short period of time between collecting the data and running the analysis, which meant players didn't have a substantially long period of time in which to "progress" and earn first team caps for their premiership club, or indeed fail to earn these caps. Had the period between data collection and analysis been longer our sample sizes may have been slightly larger as there would have been more matches for players to obtain premiership caps. In addition, over a longer period there may have been other measures of progression available, such as gaining international caps and over an even longer period potentially the number of international caps. Despite these limitations these studies provide several important findings which could help to inform coaching practices within the RFU development pathway.

Chapter 4

Study 4: Investigating the Influence of Individual Differences on the Effects of Constraints-Led Practice on Progression Through the RFU Development Pathway: An Exploratory Study.

4.1 Abstract

Previous research into the benefits of constraints-led (CLA) training has so far overlooked the influence of individual differences. The purpose of this study was to explore the influence of avoidant attachment styles (dismissive and fearful) and autistic spectrum (ASD) traits (systemising and empathy) on the effects of CLA practice on progression through the RFU Development pathway. Regression analyses revealed that increases in the percentage of CLA practice were associated with greater decreases in the likelihood of progression when dismissive avoidant attachment was high than when it was low. Conversely, increases in CLA practice predicted a greater increase in the likelihood of progression when fearful avoidant attachment was high, as opposed to when it was low. There were no effects found for systemising in relation to progression. Finally, analyses revealed that lower levels of CLA practice were associated with an increase in the likelihood of progression when empathy was high. Findings provide initial support for the suggestion that not all individuals will benefit from CLA practice to the same extent and provide support to the notion that individual differences may influence the effects of certain training protocols on performance.

4.2 Prologue

The results from Studies 2 and 3 provide insight into factors which differentiated between players who progressed through the RFU Development pathway, at two key stages, and those who failed to progress. The rich and varied data collected provides the RFU with a comprehensive profile of players who are currently being promoted through the pathway from U18's to U20's and those who are not, along with the profile of players being provided with early opportunities to play in the Premiership, and those who are not. By the very nature of the analysis, the feature subsets which discriminate between the groups are indicative of interactions between the variables measured. However, these analyses do not offer any insight into the precise nature of any interactions or exactly how certain factors might interact

with one another independently to influence performance. As suggested in the previous chapter, there is a need to better understand individual differences in relation to training practices and how certain personality factors might interact with practice and training protocols to influence performance. Indeed, one surprising finding from the previous studies was that players who progressed at both stages were engaging in less constraints-led (CLA) practice than players who failed to progress, a result that stands in contrast to much of the literature. Therefore, in the current pilot study we substantively re-examined the CLA practice data collected in Studies 2 and 3 using different analytical techniques and explored how various individual difference variables potentially influenced the impact of CLA practice on progression.

4.3 Introduction

The positive effect of a CLA approach on skill acquisition has been widely advocated (Clack et al., 2018; Davids et al., 2003; Davids et al., 2008; Moy et al., 2020) and one might assume that engaging in a large volume of CLA training would only impact performance positively. Davids et al. (2003) describe constraints as boundaries which limit the expression of form, and favour some emergent features of behaviour over others, leading to the development of reliable and functional movement patterns which facilitate learning and performance. Introduced originally by Newell (1986), constraints have been classified into three distinct categories; Organistic constraints, which refer to the characteristics of individual performers, environmental constraints, which refer to the physical environment of the performer and tasks constraints, which are usually specific to the performance, such as rules, equipment, surface, boundary markings etc. (Davids et al., 2008). In a CLA approach, where there is an emphasis on discovery learning, problem solving behaviours are enhanced as learners are required to actively engage in their own learning rather than just passively receive information (Davids et. al, 2003). Performers are discouraged from developing

optimal movement patterns but instead encouraged to attune to relevant perceptual variables required to perform a specific task which ultimately improves their ability to cope with inherent performance variability (Davids et al., 2008). Despite CLA theory acknowledging psychological factors amongst the different interacting aspects which make up the human system (Davids et al., 2008), research so far has failed to explore the impact of individual differences on the effects of CLA training on performance. One possible explanation for this is that, to date, most performance orientated sport-science has had a single disciplinary focus, in part due to a lack of unifying theory required to integrate the various sub-disciplines (Glazier, 2017). Factors which influence motor learning have been investigated predominantly from an information processing perspective and subsequently viewed as motivationally neutral (Wulf & Lewthwaite, 2016). Wulf and Lewthwaite (2016) suggest however that the view of humans as processors of neutral information does not capture the variety of influences on motor performance and as such, they proposed the optimal theory of motor learning to incorporate motivation and attentional influences within the motor learning sphere. They propose that motivational influences such as internal thoughts and processes can initiate or alter the direction and intensity of motor behaviour (Wulf & Lewthwaite, 2016). Given that psychological constructs such as personality and attachment will undoubtedly shape an individual's internal thoughts and cognitive mechanisms (Batholomew and Horowitz, 1991; Heritage et al., 2018) we wished to explore their potential to influence the effectiveness of CLA approaches to performance. The purpose of this study was to explore the influence of two such constructs, ASD traits (systemising and empathy) and avoidant attachment (fearful and dismissive). Studies 1, 2 and 3 in the previous chapters offer insight into the psychological factors which are common among elite rugby players, with both ASD traits and avoidant attachment being among those factors. In the following sections we

set the rationale behind the selection of these specific constructs and their potential to influence the effects of CLA practice on performance.

4.3.1 *Avoidant Attachment*

Attachment systems are thought to have evolved to maintain proximity between infants and their caretakers under conditions of threat or danger (Bowlby, 1973) and function continuously to provide the child with sense of security (Ainsworth, 1978). Bartholomew and Horowitz (1991) proposed a four-group model of attachment in which they suggest that interactions with others (e.g., primary caregivers) result in the development of positive or negative mental models of the self (as either worthy or unworthy of love) and others (as either trustworthy and available or unreliable and rejecting). When crossed these two dimensions produce four attachment classifications: Secure attachment, (positive self and other models), preoccupied attachment (negative self-model and positive other model), dismissive avoidant attachment (positive self-model, negative other model), and fearful avoidant attachment (negative self and other models). Dismissive avoidant individuals protect themselves against disappointment by avoiding close personal relationships and maintaining a sense of counter-dependence and invulnerability. Likewise fearful avoidant individuals avoid close personal relationships to protect themselves against, what they perceive to be, inevitable rejection from others (Bartholomew & Horowitz, 1991).

Research has established clear links between attachment security and self-esteem with dismissive avoidant and securely attached individuals (who share a positive self-view) being shown to be high in global self-esteem (Bartholomew & Horowitz, 1991). However, Brennan & Morris (1997) reasoned that although dismissive and securely attached individuals share a positive view of self, the differences in their view of others ought to mean the source of self-esteem also differs. They found that securely attached individuals, who hold a positive view of others, derive self-esteem from positive regard of other people and subsequently self-

esteem is based primarily on self-liking (Brenan & Morris, 1997). Dismissive avoidant individuals on the other hand, who hold a negative view of others, and lack warm, close associations with others, learn to compensate and derive self-esteem from their abilities and accomplishments with self-esteem subsequently based on self-competence (Brenan & Morris, 1997). In the context of CLA approaches to training and progression, individuals with a dismissive avoidant attachment style, who are looking to derive self-esteem by demonstrating their skills and competencies in certain activities, may find CLA approaches challenging. In an environment where exploratory learning, trial and error, and mistake making are experienced frequently and where opportunities to demonstrate competency may be limited (hallmarks of the CLA approach), the dismissive individual may struggle to derive sufficient self-esteem to fully benefit from the learnings. Thus, environments where CLA approaches to training are promoted may hamper the development (and subsequent progression) of individuals with a dismissive attachment style. We therefore hypothesised that (high levels of) CLA practice would have a negative effect on the likelihood of progression when dismissive avoidant attachment was high.

In contrast to the potentially negative effects of CLA practice for those with a dismissive avoidant attachment style, individuals with a fearful avoidant attachment style may benefit from CLA approaches to learning. Fearful avoidant attachment is related to lower self-esteem, and as such individuals high in this attachment style might feel they have nothing to lose and may subsequently be more open to the benefits of this type of training. We therefore hypothesised that (high levels of) CLA practice would have a positive effect on the likelihood of progression when fearful avoidant attachment was high.

4.3.2 *Autistic Spectrum Disorder*

The empathising-systemising theory of autistic spectrum disorder (ASD), proposed by Baron-Cohen (2009), suggests that there are two factors (empathy and systemising) needed to

explain the social and non-social features of ASD. Empathy refers to and explains the social and communication difficulties, such as (below average) emotional response to another person's state of mind, while systemising refers to and explains the superior non-social features, such as (above average) attention to detail (Baron Cohen, 2009). It is straightforward to understand why individuals who score highly on both or either of these facets of ASD might thrive within a high-performance environment. A lack of empathy may enable players to be more ruthless in taking opportunities presented to them in training and performance environments, while being highly systematic and able to identify patterns easily, may give players an advantage in a tactically complex sport like rugby.

Whilst potentially important to overall progression and achievement, it is also conceivable that these traits might negate any beneficial effects of CLA practice on performance. As previously stated, within a CLA environment, learners are discouraged from developing optimal movement patterns through repeated drills and instead encouraged to develop the necessary skills to identify functional action based on, often subtle, contextual factors (Davids et al., 2008). This type of environment lacks predictability and pattern and requires players to be highly responsive. As such it may present more of a challenge for an individual high in systemising ASD. We therefore hypothesised (high levels of) CLA training would have a negative effect on progression when systemising ASD was high. It is somewhat less clear how an individual high in empathy ASD (a lack of empathy) might fair within a CLA environment. However, when functional action is dependent on the actions and behaviours of other players (either opponents or teammates) this may pose a particular challenge for individuals who struggle to read body language cues or to imagine another person's thoughts or feelings. We therefore hypothesised that (high levels of) CLA training would have a negative effect on progression when empathy ASD (a lack of empathy) was high.

4.3.3 Summary and Hypotheses

To summarise, in this exploratory study we examined how different aspects of attachment and ASD influenced the effectiveness of CLA training on rugby progression using the data from Studies 2 and 3. Based on the previous section we had four hypotheses: First, we expected increases in CLA practice to have a negative effect on the likelihood of progression when dismissive avoidant attachment was high but not low. Second, we hypothesised that increases in CLA practice would have a positive effect on the likelihood of progression when fearful avoidant attachment was high but not low. Third, we expected systemising ASD to moderate the effects of CLA practice on progression such that increases in CLA practice would have a negative effect on the likelihood of progression when systemising ASD was high. Finally, in Hypothesis 4, we expected that greater levels of CLA practice would have a positive effect on the likelihood of progression when individuals scored high in empathy (i.e., scored low in the empathy ASD construct which reflects an absence of empathy).

4.4 Method

4.4.1 Participants

Participants for this study were the same participants as for Studies 2 and 3; male rugby players ($n = 103$) from all 13 Premiership rugby academies, who had been selected to attend England U18 and England U20 training camps during the 2018/19 season.

4.4.2 Procedure

In this study we used the attachment, systemising ASD, and empathy ASD data that we collected for Studies 2 and 3. Prior to running the analyses, we scanned the data for any missing values, and cases where values were missing were removed. We then standardised data separately for forwards and backs, to remove the potential effects of any positional differences. As noted in the previous chapter, we measured CLA practice as the percentage of

overall practice which took a CLA approach (hereafter referred to as percentage of CLA practice). To test Hypotheses 2 (Fearful avoidant, $n = 31$) and 3 (systemising ASD, $n = 31$) we used the fearful attachment scores and systemising ASD scores from Study 2 in the previous chapter, where progression, and lack of progression were defined as U18s players who went on to receive an U20s cap or failed to receive an U20s cap. As the U20 Rugby World Cup in 2020 was cancelled, participants who were eligible for this tournament but otherwise hadn't received an U20 cap, were removed from the study as it is not known whether they would have received an U20 cap had this tournament gone ahead. To test Hypothesis 1 (dismissive avoidant, $n = 91$) and 4 (empathy ASD, $n = 94$) we used the dismissive avoidant and empathy scores from Study 3 in the previous chapter, where progression, and lack of progression were defined as players who had either gone on to receive 5 or more caps for their Premiership club at the time of analysis or who had received less than 5 caps.

4.4.3 Analytical Strategy

Given the interactive nature of our hypotheses, we based our analytical strategy on Gaudreau's (2012) guidelines for exploring interaction and main effects only models in regression. For each hypothesis, we first performed moderated logistic binary regression to establish whether the interaction between CLA training and each of the moderator variables (dismissive avoidant attachment, fearful avoidant attachment, systemising ASD, and empathy ASD) was statistically significant. We followed up significant interactions with tests of simple slopes. In the absence of a significant interaction, following Gaudreau's (2012) suggestions, we removed the interaction term, and then ran binary logistic regression models that included only the two main effects (i.e., CLA training and the relevant moderator variable). We then plotted predicted likelihood values for each combination of the variables. As Gaudreau (2012) notes, such an approach is appropriate to test hypotheses of this nature

because it allows predicted values of varying combinations of the independent variables (low-low, low-high, high-low etc.) to be calculated, therefore providing researchers with good evidence as to whether their hypotheses can be supported or not.

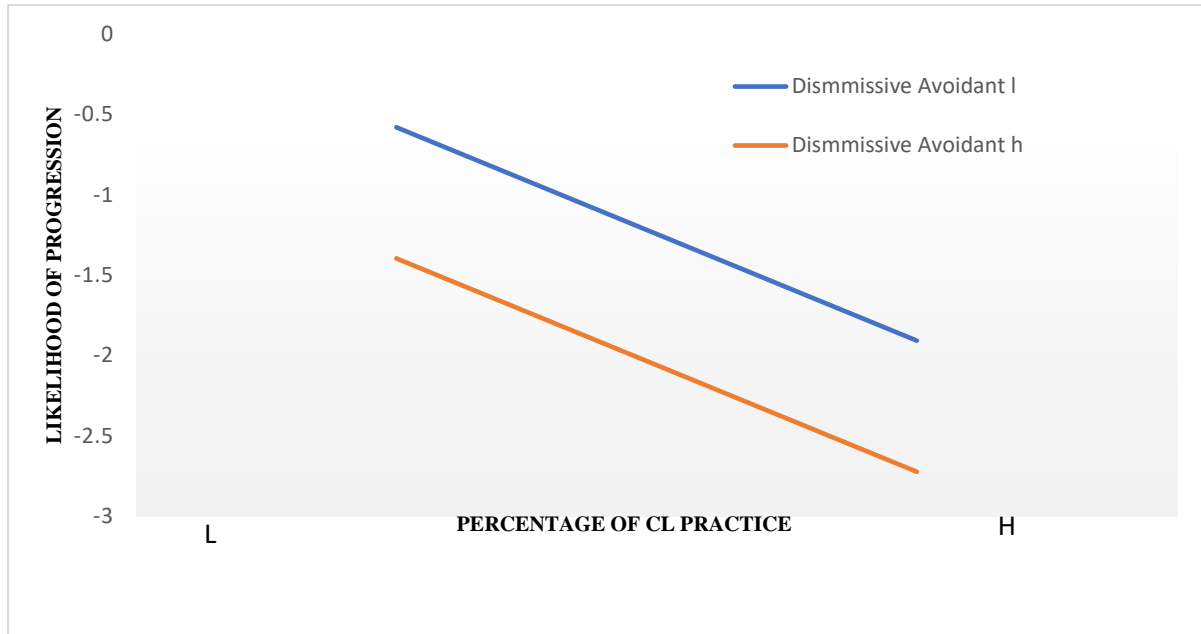
4.5 Results

4.5.1 Hypothesis 1: Interaction Between Dismissive Avoidant Attachment Style and Percentage of CLA Practice on Progression.

Moderated logistic regression revealed a non-significant interaction between dismissive avoidant attachment style and percentage of CLA practice on likelihood of progression ($B = 0.22, p = 0.52$). We reanalysed the data using the main effects only model, as per Gaudreau's (2012) guidelines, which revealed a significant effect for percentage of CLA practice ($B = -0.664, OR = 0.52, p = 0.025$) but not for dismissive avoidant attachment style ($B = -0.408, OR = 0.67, p = 0.184$). The predicted values for likelihood of progression provided support for our hypothesis (see Figure 4.1). High levels of CLA practice were associated with a greater decrease in the likelihood of progression when dismissive avoidant attachment was high than when dismissive avoidant attachment was low.

Figure 4.1

Combined Effects of Dismissive Avoidant Attachment and Percentage of CLA Practice on Progression.

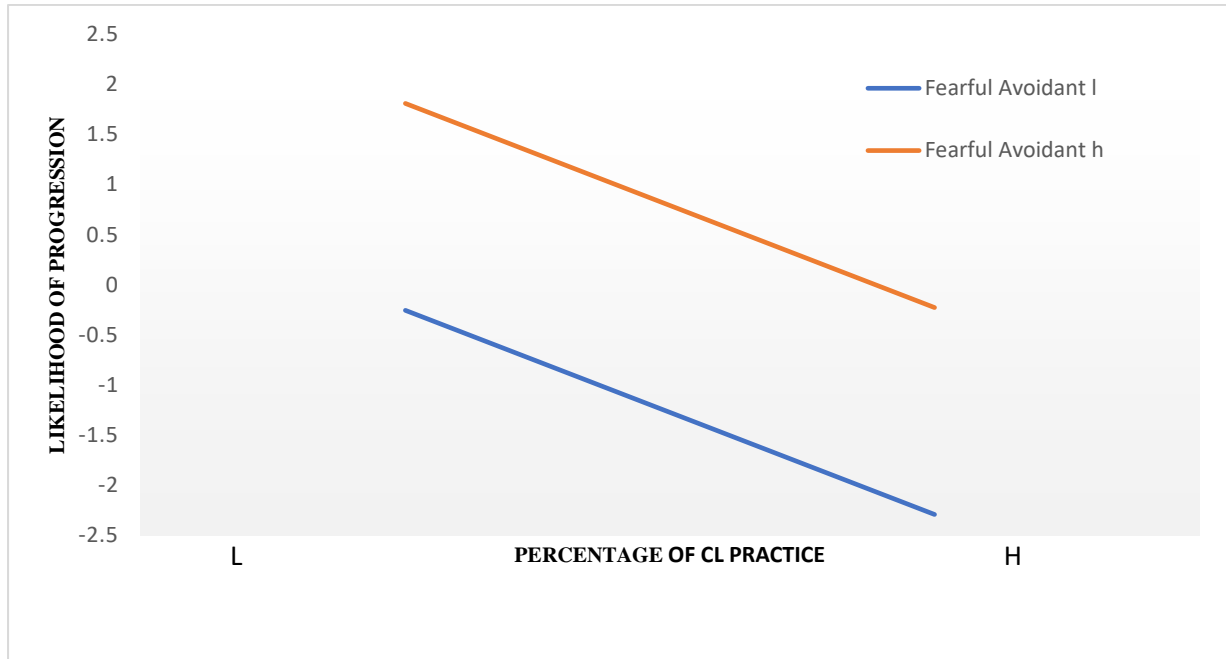


4.5.2 Hypothesis 2: Interaction Between Fearful Avoidant Attachment Style and Percentage of CLA Practice on Progression.

Moderated logistic regression revealed a non-significant interaction between fearful avoidant attachment style and percentage of CLA practice on likelihood of progression ($B = -0.06, p = 0.92$). We reanalysed the data using a main-effects only model, which revealed significant main effects for percentage of CLA practice ($B = -1.02, OR = 0.36, p = 0.030$) and for fearful avoidant attachment style ($B = 1.03, OR = 2.8, p = 0.04$). The predicted values of likelihood of progression show partial support for our hypothesis (see Figure 4.2). High levels of CLA practice were associated with a decrease in the likelihood of progression (as opposed to an increase as hypothesised) when fearful avoidant attachment was high. However, there was an even greater decrease in the likelihood of progression when fearful avoidant attachment was low.

Figure 4.2

Combined Effects of Fearful Avoidant Attachment and Percentage of CLA Practice on Progression.



4.5.3 Hypothesis 3: Interaction Between Systemising ASD and Percentage of CLA Practice on Progression.

Moderated logistic regression revealed a non-significant interaction between systemising ASD and percentage of CLA practice on the likelihood of progression ($B = 0.032$, $p = 0.94$). We reanalysed the data using the main effects only model, which revealed non-significant main effects for percentage of CLA practice ($B = -0.59$, $OR = 0.56$, $p = 0.15$) and systemising ASD ($B = -0.47$, $OR = 0.62$, $p = 0.26$).

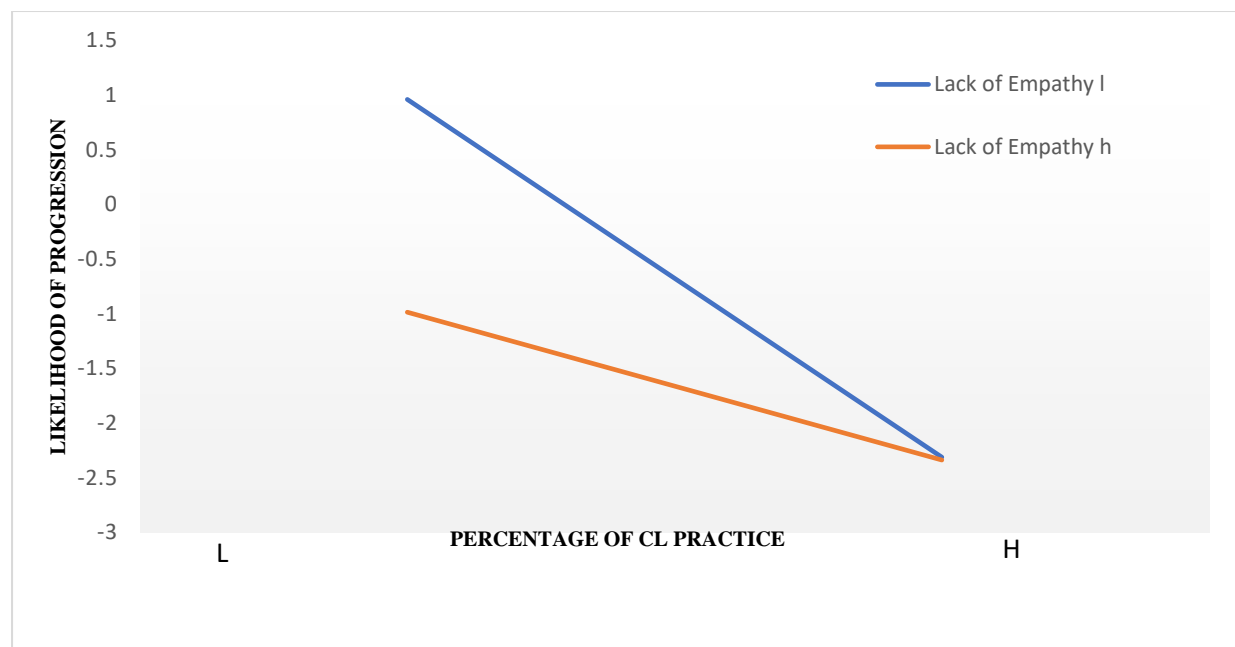
4.5.4 Hypothesis 4: Interaction Between Empathy ASD (lack of empathy) and Percentage of CLA Practice on Progression.

Moderated logistic regression revealed a non-significant interaction between empathy ASD and percentage of CLA practice on progression ($B = 0.05$, $p = 0.87$). We reanalysed the data using the main effects only model, which revealed a significant main effect for percentage of CLA practice ($B = -0.68$, $OR = 0.51$, $p = 0.02$) and a non-significant main

effect for empathising ($B = -0.01$, $OR = 0.99$, $p = 0.96$). The predicted values of progression offer partial support to our hypothesis (see Figure 4.3). High levels of CLA practice were associated with a decrease in the likelihood of progression regardless of whether empathy ASD was high or low. However, such an effect appeared to be attenuated somewhat when empathy ASD (lack of empathy) was low (i.e., when individuals were high in empathy).

Figure 4.3

Combined Effects of Empathy ASD (lack of empathy) and Percentage of CLA Practice on Progression.



4.6 Discussion

The purpose of this exploratory study was to investigate the interactive effects of psychological constructs, specifically avoidant attachment (dismissive and fearful avoidant), and ASD traits (systemising and empathy), and the percentage of CLA practice on the likelihood of progression through the RFU development pathway. Although, statistically speaking, we failed to obtain interactions, the findings offer some support for the hypotheses. In Hypothesis 1 we expected that high levels of CLA practice would have a negative effect on the likelihood of progression when dismissive avoidant attachment was high. Our findings

supported this hypothesis as high levels of CLA practice were associated with less of a likelihood of progression when dismissive avoidant attachment was high than when dismissive avoidant attachment was low. For our second hypothesis, we expected high levels of CLA practice to have a positive effect on the likelihood of progression when fearful avoidant attachment was high. Our findings also offer partial support for this hypothesis as although high levels of CLA practice were associated with a decrease in the likelihood of progression when fearful avoidant attachment was high (rather than an increase as hypothesised) this decrease was substantially lower than when fearful avoidant attachment was low. Therefore, although fearful avoidant attachment was not associated with increases in the likelihood of progression, it does appear to somewhat buffer the negative effects of large volumes of CLA practice on the likelihood of progression. The contrasting effects of dismissive and fearful avoidant attachment in this context could be explained by differing contingencies of self-worth and the subsequent effect on self-regulation. Successful self-regulation has been defined as a willingness to exert effort towards one's most important goals whilst taking setbacks and failure as an opportunity to learn and develop new strategies to achieving those goals (Crocker et al., 2006). It is easy to see how effective self-regulation would be important within a CLA environment, however Crocker et al. (2006) suggest that self-regulation is likely to falter when individuals experience failure or setbacks within a domain upon which their self-worth is contingent, causing them to avoid or abandon goals when they are unsure of success. Research suggests that dismissive avoidant individuals are more likely to base their self-worth on activities contingent on demonstrating skill and competency (Brenan & Morris, 1997) and are less likely to acknowledge any personal weakness which might expose their flaws and make them vulnerable to rejection from others (Park et al., 2006). As such, within a CLA environment, where there are few opportunities to demonstrate self-competency and where mistake making is experienced frequently, the

dismissive individual may be less likely to demonstrate effective self-regulation, losing motivation to persist with mastering this type of practice, or even attempting to avoid it completely. In contrast, research suggests that fearful avoidant individuals, who have been found to have lower global self-esteem (Brenan & Morris, 1997) are more likely to base their self-worth on interpersonal contingent domains which depend on others reaction and feedback, such as the approval of others and physical appearance (Park et al., 2006). Subsequently within a CL environment where praise from coaches is more likely to be directed towards effort by players than competency, a fearful avoidant individual may be motivated to invest considerable effort and persistence in CLA activities to gain the approval of others and enhance their self-esteem, and as a result demonstrate effective self-regulation. As such they may be more likely to obtain greater learnings and benefit from CLA practice than an individual high in dismissive avoidant attachment.

Hypothesis 3 stated that high levels of CLA practice would have a negative effect on the likelihood of progression when systemising ASD was high, however we did not find an interaction between systemising ASD and percentage of CLA practice in relation to progression. The rationale behind this hypothesis seems reasonable in that a CLA environment discourages the development of optimal movement patterns through repeated drills, and instead encourages the development of the necessary skills to identify functional action based on, often subtle, contextual factors (Davids et al., 2008). This type of environment lacks predictability and pattern and requires players to be highly responsive and as such it may present more of a challenge for an individual high in systemising ASD. The lack of interaction between systemising ASD and percentage of CLA practice could be due to the small sample size or a result of the independent variables being measured by only two items. The Athlete Psychosocial Survey measures many psychosocial constructs (33 in total) relevant to the high-performance environment but overcomes the issue of excessive

questionnaire length due to its short form nature (Langham-Walsh, 2021). In Studies 2 and 3, where the data were collected and where we investigated the psychosocial factors influencing progression through the RFU development pathway, it was appropriate to use such a measure to ensure that all relevant constructs were included. However, for this more focussed re-analysis of the systemising ASD data a longer form measure of this specific construct, such as the Systemizing Quotient-Revised (SQ-R) questionnaire (Wheelwright et al., 2006) may have allowed us to capture a more complete picture regarding the effects of ASD in this context. Repeating this analysis using a more detailed measure to fully explore the influence of systemising ASD on the effects of CLA practice on performance may therefore worthwhile.

Finally, in Hypothesis 4 we expected that increases in CLA practice would have a positive effect on the likelihood of progression when empathy ASD (lack of empathy) was low. Again, our findings offered partial support for this hypothesis; despite revealing that high levels of CLA practice were associated with a decrease in the likelihood of progression regardless of whether empathy ASD was high or low, this effect was somewhat attenuated when empathy ASD (a lack of empathy) was low (i.e., when individuals were high in empathy). Within many sports, in particular team sports, it is necessary for athletes to step into their opponent's shoes and imagine their thoughts and emotions to predict their actions and respond correctly in a dynamic environment (Budnik-Przybylska, 2021). Individuals high in empathy, who are adept at reading body language cues or imagining another person's thoughts or feelings may experience greater benefit from environments in which functional action is dependent on the behaviours of other players (either opponents or teammates), such as a CLA environment. Research also suggests that athletes who score highly on the components of empathy which focus on other people's experience (empathetic concern and perspective taking) have a greater use of imagery within sport (Budnik-Przybylska, 2021).

Imagery is a well-established effective psychological tool which has been used in multiple sports to modify thoughts and emotions and enhance performance (Budnik-Przybylska, 2021). A greater use of imagery may potentially explain how empathy attenuates the negative effects of large volumes of CLA practice on progression.

Taken together these findings offer preliminary evidence which support the notion that not all individuals benefit equally from CLA practice. The idea that personality may interact with an environmental factor (such as CLA practice) to predict an outcome is perhaps new for this domain of research, however this approach has been explored in other areas of psychology. For example, narcissism has been found to moderate the effects of different motivational climates on effort in training (Roberts et al., 2014) and has also been found to moderate the relationship between psychological skills on performance (Roberts et al., 2013). Future research in skill acquisition and learning may benefit from considering the influence of personality on the effects of certain training protocols on performance. Additionally these findings, along with the findings from Studies 2 and 3 in the previous chapter, (which revealed that players who progressed engaged in less CLA training than those who failed to progress), point to the idea that, somewhat counter to popular belief and current practice, there may be an optimal level of CLA practice, which if exceeded, could result in a decrease in the likelihood of progression, regardless of individual traits or characteristics. As mentioned in the previous chapter research suggests that challenge may help facilitate the development of the skills and resilience required to thrive within an elite performance environment and while there is mention of the fact that support through these early challenges will help to optimise development, the over-riding message appears to be that highly supported young athletes are less likely to succeed at senior level (Collins & MacNamara, 2012). However, research within high performance environments, outside of the sporting domain, suggests that effective person-centred learning and development is based on

achieving the right balance between support, which is appropriate to the individual, alongside sufficient challenge to progress their performance (Day, 2020). Whilst a certain amount of challenge within a constraints-led framework is surely beneficial to players within the pathway, it is possible that the level of challenge offered via constraints-based approaches is not in balance with the level of support offered (both during training and in the pathway environment more globally). Thus, moving forward, considering how to appropriately balance the demands and support associated with CLA approaches, and how this might differ for everyone, seems key.

There are several limitations of this study, primarily the relatively small sample size, and as such the findings should be interpreted cautiously. However, our findings open the door for further investigation within larger populations, which may prove insightful and offer further understanding to practitioners. In addition, this study uses two different measures of progression to explore the efficacy of CLA approaches, however a more direct measure of performance, which is more proximal to the principles of CLA training, and which focuses on the quality of skill learning or in game decision making, may provide greater insight. Despite these limitations the findings from this study have some applied implications for practitioners and suggest that not all individuals will benefit in the same way from CLA practice. It may be useful for coaches to consider the individual being coached and the implications of personal factors, such as attachment style and personality more closely to ensure that the efficacy of coaching practices is maximised. In addition, this research offers credibility to the notion that individual differences have an influence on the effects of certain training protocols on performance in sport and further research in this area is indeed warranted.

Chapter 5: General Discussion

This chapter includes several sections, in the first section I provide a summary of the findings from the thesis and the second section covers the major theoretical implications that emanate from the thesis. Although the specific implications of the studies have already been discussed in the respective chapters, the second section covers five main issues that appear most relevant when considering the thesis as a whole. In the next section I cover the applied implications and then provide the strengths and weaknesses of the research programme. The chapter finishes with coverage of future research directions and a conclusion to the thesis.

5.1 Summary

The aim of this thesis was to explore the multi-disciplinary factors which contribute to the development of excellence in rugby and progression through the RFU development pathway. In Study 1 (Chapter 2) we investigated the psychosocial factors which contributed to the development of excellence in rugby. In-depth qualitative interviews with five former world's best international rugby players revealed that negative early life events coupled with a positive sport experience and career turning point, obsessiveness, perfectionism and narcissism, a dual mastery and outcome focus, importance of sport, a need for success, and performance under pressure, appear to be important to the development of excellence in rugby. In addition, factors which had not already been revealed in previous research in other sports, namely dichotomous thinking, self and team focus, and avoidant attachment were also found to be commonalities among participants. Two distinct personality profiles emerged, one underpinned by a dismissive avoidant attachment style and the other underpinned by a fearful avoidant attachment style. The findings suggested that early negative experiences, particularly disruptions to parental relationships, and the realisation of insecure attachment, coupled with a positive sport related event, may underpin the drive and development of the necessary personality traits and behaviours to achieve excellence in rugby and offer support

to the notion that attachment may be an important factor in the development of excellence in sport.

In Chapter 3 we investigated the multidisciplinary factors influencing progression through the RFU development pathway from U18's to U20's (Study 2) and from the pathway to the Premiership (Study 3). Using pattern recognition analysis, we identified the psychosocial, demographic, and practice and training factors which differentiated between players who progressed, and players who failed to progress, at these two key stages along the pathway. Results indicated that players who progressed at both stages undertook fewer hours of constraints-led (CLA) practice suggesting there may currently be too much challenge and not enough support within CLA practice at present. In addition, players who progressed from U18's to U20's possessed many characteristics which likely underpin consistent performance, such as mastery orientation, a commitment to training and a need to succeed, while players who failed to progress at this stage scored higher on many of the psychological characteristics known to underpin the development of excellence. The findings suggest that the RFU may be using current performance as an indicator of future potential, which could be problematic and result in the loss of talented players early in the pathway.

The findings from Chapter 3 relating to CLA practice and progression is rather in contrast with much of the existing literature and was used to inform the final study in this thesis. The use of CLA practice in sport is greatly advocated and widely accepted to enhance skill acquisition and performance, however research into the benefits of CLA training has so far overlooked the influence of individual differences. Thus, the purpose of Study 4 was to explore the influence of avoidant attachment styles (dismissive and fearful) and ASD traits (systemising and empathy) on the effects of CLA practice on progression through the RFU development pathway. Regression analyses revealed that increases in the percentage of CLA practice were associated with greater decreases in the likelihood of progression when

dismissive avoidant attachment was high than when it was low. Conversely, increases in CLA practice predicted a greater increase in the likelihood of progression when fearful avoidant attachment was high, as opposed to when it was low. There were no effects found for systemising in relation to progression. Finally, analyses revealed that lower levels of CLA practice were associated with an increase in the likelihood of progression when empathy was high. Findings provide initial support for the suggestion that not all individuals will benefit from CLA practice to the same extent and provide support to the notion that individual differences may influence the effects of certain training protocols on performance.

5.2 Major Implications

5.2.1 The Role of Attachment in Developing Excellence

The role of attachment in the development of excellence in sport has so far not been investigated and as such it is not yet known whether attachment plays a role in an athletes' journey to reaching the pinnacle of success in sport. However, results from Study 1 suggest that avoidant attachment may be common amongst the world's best rugby players and this attachment style, coupled with a positive sport related event, may underpin the drive and motivation to achieve extraordinary levels of success in rugby. Our findings are in line with previous research by Thomson and Jaque (2017) which found that amongst groups of high achievers (e.g., athletes), there was a higher prevalence of dismissive attachment amongst athletes, compared to actors, dancers, and the general population. The development of a positive internal working model of oneself and others (secure attachment) facilitates the development of an innate sense of self-worth (Batholomew & Horowitz, 1991; Bylsma et al. 1997). However, when the development of secure attachment is disrupted, so too is the development of innate self-worth and as such self-worth may become contingent upon demonstrating skill and competency within a particular domain and subsequently increases an individual's motivation to achieve success in that domain (Crocker & Knight, 2005). It is

conceivable that the motivation to derive a sense of self-worth, which was otherwise lacking due to disruptions in parental relationships and the development of an insecure attachment style, may fuel the drive to pursue mastery and outstanding achievement within a domain where the individual has already acquired some sense of worth (Gogarty & Williamson, 2009; cf. Hardy et al., 2017). In the case of the participants in Study 1, their early positive sport experiences may have resulted in their self-worth becoming contingent upon continued success in sport and as such they went to extraordinary lengths to avoid failure and achieve success in rugby. In addition, attachment may also underpin the development of the necessary characteristics to achieve excellence in sport, notably narcissism, perfectionism, and obsessiveness. These traits were all commonalities amongst the participants in Study 1 and have all been associated with disruptions and distress within early parental relationships, including parental invalidation, parental criticism, high parental expectations, and an authoritarian parenting style (Flett et al., 2002; Huxley & Bizumic, 2016; Timpano et al., 2010). A further noteworthy finding from Study 1 was that there appeared to be two distinct profiles of player, both of whom displayed similar behaviours, (an unrelenting pursuit of success in rugby), but appeared to be driven by different traits which were underpinned by different avoidant attachment styles. Participants who displayed traits consistent with a dismissive avoidant attachment style, where a positive self-view is held, demonstrated signs of narcissistic grandiosity, a selfish or even ruthless pursuit of excellence, fearlessness, and an obsessive need to win. In contrast, participants who displayed traits consistent with a fearful avoidant attachment style, where a negative self-view is held, demonstrated signs of narcissistic vulnerability, an inflexible pursuit of perfection, a fear of failure, and a systematic, often obsessive, avoidance of failure. These findings suggest that attachment is very likely important to the development of excellence and that differences in the type of

insecure attachment style may be linked to nuanced differences in the traits which underpin success.

5.2.2 *Multidimensional Nature of Developing Excellence*

Collectively the findings from the thesis highlight the multifaceted nature of developing excellence in sport. Multiple psychosocial, demographic and practice and training factors emerge in this research as being important to the development of excellence in rugby union and influence progression through the RFU's development pathway. This multidisciplinary perspective is highlighted in Studies 2 and 3 where the pattern recognition classification accuracies in both studies were higher for the summary analyses than for the individual domain analyses, suggesting that one should not look to a single disciplinary area to effectively differentiate between players who progressed and players who did not.

Consistent with the notion that talent development is influenced by a complex and interacting set of characteristics and experiences (Hardy et al., 2017; Phillips et al., 2010) these findings steer us to instead look beyond physical attributes and skills and examine the whole person, when considering the factors which might influence development in sport. Although Study 1 focussed solely on the psychosocial factors important to the development of excellence, the results highlight the importance of considering multiple psychological factors, including, personality, behaviour, and early life experiences. In addition, Study 4 offers preliminary evidence which suggests that it may also be important to consider the interaction between various personal and, practice and training, factors when exploring the development of talent and progression through sport pathways.

5.2.3 *Confusing Current Performance with Future Potential*

Players who progressed from U18's to U20's possessed many of the psychosocial characteristics which are likely to underpin consistently high levels of performance, which in turn is likely to account for their progression. Players who progressed at this stage scored

higher on factors which may be a prerequisite to a superior training discipline; specifically, commitment to training, a need to succeed, obsessiveness and importance of sport. In addition, they demonstrated the likelihood of enhanced psychological wellbeing in that they scored lower on fear of failure and perfectionistic concerns, and demonstrated more communal traits, with low ruthlessness and greater empathy and extraversion, than players who failed to progress. This finding is in line with Gledhill et al.'s., (2017) study which identified similar psychosocial factors such as mastery orientation, discipline, psychological well-being, perceptions of team cohesion and positive peer experiences amongst the factors found to underpin consistently high levels of tactical and technical performance in football. When deciding whether a player should progress from an academy to a senior team, performing to a consistently high standard is highly rated by coaches and is positively associated with career progression to senior elite level in football (Gledhill et al. 2017). Whilst turning out consistently high levels of performance is an important factor in developing excellence, this alone may not be enough. Personality factors such as fear of failure, perfectionism, and ruthlessness have all been found to differentiate between elite and super-elite athletes (Hardy et al. 2017). Interestingly these traits were significantly higher in the group who did not progress from England U18s to U20s in Study 2. In addition, players who failed to progress also scored higher on systemising ASD, a dimension of which is black and white thinking, which was shown to be a commonality amongst the world's best rugby players in Study 1. Taken together, these findings suggests that players who possess some of the necessary psychological attributes to develop excellence, may not currently be afforded the opportunity to progress within the pathway at this stage. These findings may indicate a Type II error (false negative) as highlighted in Baker et al.'s (2018) risk matrix, where high potential athletes are lost from the pathway due to current underperformance. Similarly, players who are progressing at this stage, who are more likely to be a consistent performer

but who score lower on certain personality traits which have been shown to be important to the development of excellence, such as narcissism, may represent a Type I error (false positive) in which currently high performing, but relatively low potential athletes are being kept in the pathway. It is possible that players being given the opportunity to progress is because of their coach-athlete relationship. Players who progressed at this stage scored highly on commitment to training, need to succeed, importance of sport, had higher levels of empathy and extroversion, lower levels of ruthlessness and are less likely to have an avoidant attachment style. As such they are likely to present themselves to coaches as dedicated, hardworking and be relatively easy to get along with and to coach. By contrast, players failed to progress at this stage scored highly on narcissism, ruthlessness, perfectionism, fear of failure, black and white thinking, lower on empathy and extroversion and were more likely to have an avoidant attachment style. As such these players are likely to be much more difficult to build relationships with and potentially more challenging to coach. It is possible therefore that players who are easy to coach and build good relationships with coaches are more likely to receive the opportunity to progress through the pathway than more challenging, but potentially more talented players.

5.2.4 Levels of Challenge and Support

Results from Studies 2 and 3 suggest that levels of challenge within the RFU's development pathway, may currently be too high, or exceed the levels of support required for players to effectively meet the challenge being presented. Findings from Study 2 demonstrated that although players who progressed at this early stage in the pathway (from U18's to U20's) undertook more context specificity training, the difficulty rating for this type of training was rated lower than the context specificity training undertaken by players who failed to progress. By contrast findings from Study 3 demonstrated that players who progressed at this later stage of the pathway (from pathway to Premiership) engaged in a

greater amount of context and anxiety specificity training. Taken together these findings indicate that younger players, transitioning earlier in the pathway from U18's to U20's thrive on a less challenging type of training, and that older, more experienced players transitioning later in the pathway are perhaps better able to cope with a greater amount of challenge in training.

In addition, players who progressed at both stages of the pathway engaged in less CLA training than players who failed to progress. This finding contrasts with much of the current literature which widely espouses the benefits of this type of training (Clark et al., 2019). The positive effect of CLA training on skill acquisition has been widely advocated and one might assume therefore that the greater amount of CLA training the greater the benefit to performance. Our findings however, consistent across both Study's 2 and 3, demonstrate that within the RFU's development pathway, large volumes of CLA practice appear to hinder progression. There are several plausible explanations for this effect. First, there may be an optimal level of challenge within this type of training, which if surpassed, may become detrimental to performance. It may also be the case that the current level of challenge within CLA training is too great for this stage in a player's development. Guadagnoli and Lee (2004) suggest that functional task difficulty reflects how challenging a task is relative to the skill level of the individual performing it. This high level of challenge is perhaps unsurprising as numerous studies suggest challenge and setbacks early in the development pathway may be necessary obstacles which athletes must overcome to develop the coping skills and resilience required to thrive within an elite performance environment (Collins & MacNamara, 2012; Van Yperen, 2009). Whilst there is mention of the fact that support through these early challenges will help to optimise development, the over-riding message appears to be that highly supported young athletes are less likely to succeed at senior level (Collins & MacNamara, 2012). In contrast to this however, research within high performance

environments, outside of the sporting domain, suggests that effective person-centred learning and development is based on achieving the right balance between support, which is appropriate to the individual, alongside sufficient challenge to progress their performance (Day, 2020). Whilst a certain amount of challenge within a CLA framework is undoubtedly beneficial to players within the pathway, it is possible that the current level of challenge offered via CLA approaches is not in balance with the level of support offered (both during training and in the pathway environment more globally) which may be accounting for its somewhat negative effects on progression.

5.2.5 Influence of Individual Differences on the Effects of Training Protocols on Performance

There is now a growing body of literature which suggests that not all practice is equal and has highlighted the importance of considering the microstructure of practice in relation to athlete development and skill acquisition (Low et al., 2013). However, to date, the influence of individual differences on the effectiveness of various training protocols has so far been overlooked. Within Study 4 we investigated the influence of personal factors, specifically ASD traits (systemising and empathy) and avoidant attachment (fearful and dismissive) on the effectiveness of CLA training. Our findings provide initial support to the suggestion that not all individuals benefit from CLA practice to the same extent and that individual differences may influence the effects of certain training protocols on performance. We hypothesised that a CLA training environment may present more of a challenge for individuals who are high in the systemising trait of ASD and individuals who have a dismissive avoidant attachment style. CLA practice lacks predictability and pattern and requires players to be highly responsive, which may present a real difficulty for an individual high in systemising ASD who seeks patterns and likes to learn through repetition. In addition, because of the unpredictability of CLA practice it is likely more difficult for individuals to

demonstrate superior skill and competency in these environments than in those that are highly structured. Research suggests that dismissive avoidant individuals are more likely to base their self-worth on activities contingent on demonstrating skill and competency (Brenan & Morris, 1997) meaning it may be more difficult for them to thrive within a CLA environment where the opportunity to demonstrate competency is minimal. Whilst our findings do not provide conclusive evidence of the influence of individual differences on the effectiveness of CLA training, they certainly offer preliminary support to this notion, and further research exploring the effects of individual differences on the effectiveness of CLA training and other training protocols would be beneficial.

5.3 Applied Implications

5.3.1 *Multidisciplinary Approach*

Although multidimensional approaches for TID have been advocated for some time (Abbot et al., 2005; Vaeyens et al., 2008) most clubs and associations still rely predominantly on subjective data from coach assessments. The focus for most coaches is largely on skill and performance and there is little consideration of the psychological characteristics which players possess, that may help to facilitate their development to the highest levels of sport. Incorporating psychological and demographic factors, alongside skill and performance, into selection processes would give the RFU a more holistic view of each individual player. In addition, understanding the early life experiences of each player, (to the extent that player is comfortable to share), may help coaching staff to better understand their players and the factors which underpin their motivation and drive to succeed. Understanding players early life experiences, their attachment style, and contingencies of self-worth, may also offer an insight into the areas in which certain players may be vulnerable and require additional psychological support to allow them to fully thrive within the pathway. Our findings are in line with existing research in which multiple interacting constraints have been shown to

shape the development of expert performance (Phillips et al., 2010). Although the RFU already employ a multidisciplinary team (MDT) within each of their pathway teams, this expertise is used primarily to support the players already selected into the pathway squads. Instead of relying solely on performance indicators when making selections, coaches could perhaps consider how they might draw upon the expertise of their MDT when thinking about selections and make more collaborative decisions about which players to select or retain and which players to drop from the pathway.

5.3.2 Distinguishing Between Current Performance and Future Potential

Our results suggest that the RFU may be using current performance as an indicator of future potential. Thus, another benefit of not relying solely on performance measures but incorporating multidisciplinary indicators of talent into selection processes is that it assists the process of identifying high potential players who may be currently under-performing. To make the distinction between current performance and future potential, it is important that the RFU look for ways to educate coaches on what talent looks like. Educating coaches on how they might start to identify the behaviours and traits associated with talent, from a multidisciplinary perspective, so that they are not left to rely solely on performance or physiological indicators, is an important consideration for the RFU to take forward.

5.3.3 Individualised Approaches to Talent Development

Another significant learning from this research is the importance of taking an individualised approach within talent development programmes and understanding the whole player, rather than looking at performance outcomes separately from the person. Our findings indicate that not all players will benefit equally from all types of training, and so understanding which players are likely to benefit from various approaches to training and which players may need additional support, or a different approach at times, is a key issue for coaches to overcome to ensure that players are given the opportunity to maximise their

potential. Whilst our findings in this respect are preliminary they are consistent with other research in a similar area. For example, Arthur et al. (2011) found that narcissism moderated the effects of transformational leader behaviours on leader inspired extra effort in youth athletes. While additional research is needed to fully understand how various personality traits and training protocols interact with one another to influence performance, the take-away message for the RFU is that CLA training may not benefit all individuals equally. With this understanding coaches may be better able to identify players who require additional support to fully benefit from this approach to training.

5.3.4 Balancing Challenge and Support in Training

While the benefits of challenge on the development of expert performance have been advocated (Jones et al., 2020) our results indicate that at present there may be too much challenge in the RFU development pathway and insufficient support for players to effectively meet that challenge. Challenge alone, without the appropriate level of support, may mean that certain training protocols either cease to be beneficial to players, or worse, become detrimental to performance as opposed to enhancing it. The RFU may wish to consider the amount of challenge being presented to players and the difficulty level of that challenge in relation to the ability level and developmental stage of each player. In addition, they might also consider the amount of support offered to players to effectively meet and ultimately overcome challenges with confidence. Support can be offered in various ways, for example providing players with greater opportunity to reflect on and review performances and training sessions, working collaboratively with other players so that they benefit from collective input and ideas, or offering increased access to support staff, such as the team psychologist or team manager, to discuss and process failures and setbacks and develop an effective strategy to move forward.

5.3.5 The Influence of Avoidant Attachment in High Performance

This thesis offers support to the notion that attachment plays an important role in the development of excellence in sport and that an avoidant attachment style may be common amongst some of the best players in rugby. Whilst an avoidant attachment style may be advantageous in terms of developing the necessary psychological traits which underpin outstanding achievement in sport and underpin the drive and motivation to pursue excellence in the first place, there may be some challenges to this type of attachment style, which the RFU should be aware of. Being avoidant within personal relationships may make it challenging for players to develop close bonds with coaches and peers. Therefore, supporting such players and ensuring they feel safe and supported within team environments is essential for them to thrive. In addition, those with an avoidant attachment style are more likely to have a sense of self-worth which is contingent on their success and their ability to demonstrate superior performance. Failure in domains of contingent self-worth can be particularly difficult and can momentarily lower feelings of self-worth (Crocker & Knight, 2005) meaning that periods of poor performance or negative feedback in relation to performance, may be very difficult for players with an avoidant attachment style to deal with. Considering how to support these players during and after setbacks will be vital to their development. In addition, retirement from rugby, the activity upon which their self-worth was dependant, may also be particularly challenging for this type of player. Whilst organisations such as the Rugby Players Association (RPA) in rugby and similar organisations in other sports, provide excellent support to retiring players, understanding the role of attachment and how self-worth for some players is contingent on their participation and success in sport, may further enhance the existing support given to retiring players and help to identify when specialist support might also be needed.

5.4 Strengths and Limitations

5.4.1 *Strengths*

There are many strengths to this thesis. Notably, to our knowledge, it is the first multidisciplinary investigation into the development of excellence in rugby union, taking a mixed methods approach and utilising both in-depth qualitative enquiry and the superior predictive values of machine learning techniques. The in-depth nature of the qualitative interviews in Study 1, along with the participation of rugby players who had been amongst the best players in the world, provided a rich source of data and a unique insight into the factors important to achieving success at the highest level in this sport. In addition, previous TID and TD research has predominantly used cross-sectional designs, which can lead to the risk of prematurely applying causality to the findings (Johnston et al., 2018). In Studies 2 and 3 we utilised a longitudinal design instead, allowing us to make a more reliable causal link between the psychosocial, demographic and practice factors measured, and their influence on progression, or lack of progression, through the RFU development pathway. The use of state-of-the-art statistical techniques in these studies also allowed this research to overcome the limitations of the traditional linear analytical approaches often applied to research of this nature. Finally, the congruence between the qualitative and quantitative findings in this research also supports the generalisation of the findings from this thesis to a wider elite athlete population.

5.4.2 *Limitations*

However, the thesis is not without its' limitations, and in Study 1 it is worth noting that there was no comparison group. Due to the amount of time required to interview each participant and then analyse their data, the inclusion of a comparison group would have compromised either the length of interview or reduced the overall sample size. Having a comparison group, however, would have allowed us to identify not only the factors which

were commonalities amongst the best players in the world, and therefore likely important to their success, but also the factors which differentiated between those who achieved the highest level of success and those who did not. Had time and resources allowed, the inclusion of a comparison group, which did not compromise either the length of the interview or the overall sample size, would have offered additional insights and further enhanced the findings. Additionally, this study relied on retrospective methods, which makes attributing causality problematic. Despite this limitation the findings from Study 1 offer some interesting insights and provide support for the inclusion of many of the psychological factors measured in Studies 2 and 3, which were prospective in nature and as such, allow causality to be attributed more easily.

An additional limitation relates to Studies 2 and 3. While both studies were multidisciplinary in nature and measured multiple psychological, demographic and practice and training factors, we did not measure any physiological or physical performance data. We captured just under 15,000 data points (143 variables, $n = 103$) during England U18 and U20 training camps. However, due to the short period of time players were in camp, administering physical tests would not have been practical and would likely have been at the expense of other essential team practice. Including this type of data in future research however would further enhance the multidimensional nature of the findings and offer insights into the role of physiological and factors in the progression of players at various stages throughout the pathway. In addition, having physical performance data would potentially have offered greater insight into the findings which suggest that the RFU may be using current performance as an indicator of future potential and provided a clearer understanding of which exact performance measures could be influencing selection decisions in relation to progression through the pathway. Somewhat related to this, it may also have been beneficial to have looked at relative age effects in this study. As mentioned previously, the relatively

short opportunity to collect data meant that we were limited in what we could collect, however, understanding whether relative age was important to progression, would have offered the RFU further insight around another potential selection bias. Finally due to restrictions around data protection, we did not have access to any injury data and as such we were unable to account for the effects of injury on progression. Had we had access to injury data we would have been able to remove the potential effects of injury which would have further strengthened the results.

Despite these studies being longitudinal, we are aware that only a relatively short period of time had passed between the point of initial data capture and the point of analysis. This short timeframe limited the progression outcomes we could use to define the groups in each analysis. Had we had a longer timeframe available more clearly defined progression outcomes could have been used, for example, players who obtained a senior international cap versus players who did not, or over an even longer period, players who received 30, 40, or even 50 plus senior international caps versus players who received no senior international caps. As we have previously mentioned, the findings from Studies 2 and 3 do not offer an insight into the factors which differentiate between players who are likely to reach the pinnacle of success and those who aren't. Should there be the opportunity to re-analyse this data set after a longer period had passed, we would be able to identify the factors which differentiate between players who achieve outstanding success in rugby and those who don't. Despite this limitation however, the current findings provide an important insight for the RFU as to which players they are choosing to promote and provide early opportunities too and which players are potentially missing out on these valuable early developmental opportunities.

A final limitation of this thesis relates to the data used in Study 4. As mentioned previously the ASD and attachment data from Studies 2 and 3 were reanalysed in Study 4 to

investigate the influence of these personal factors on the effectiveness of CLA practice on progression. The Athlete Psychosocial Survey measures many psychosocial constructs (33 in total) relevant to the high-performance environment but overcomes the issue of excessive questionnaire length due to its short form nature (Langham-Walsh, 2021). In Studies 2 and 3, where the data were collected and where we investigated the many psychosocial factors which may influence progression through the RFU development pathway, it was appropriate to use such a measure to ensure that all relevant constructs were included. However, for this more focussed re-analysis a longer form measure, (for the ASD data in particular), such as the Systemizing Quotient-Revised (SQ-R) questionnaire (Wheelwright et al., 2006) may have allowed us to capture a more complete picture regarding the effects of these traits in this context. Similarly, this study used a relatively crude measure of CLA training and the exact drills in each CLA practice session is likely to have varied somewhat between clubs. Repeating this analysis using more detailed measures to fully explore the influence of ASD traits and avoidant attachment on the effects of CLA practice on performance may therefore be worthwhile. In addition, this study used two different measures of progression to explore the efficacy of CLA approaches, however a more direct measure of performance, which is more proximal to the principles of CLA training, and which focuses on the quality of skill learning or in game decision making, may provide greater insight into the influence of individual differences on the effectiveness of CLA practice on performance.

5.5 Future Research Directions

The directions for future research have previously been outlined within the discussion sections of each proceeding empirical chapter. However, for the sake of completeness they are summarised again here. First, further investigation into the role of attachment in the development of excellence in sport would prove to be extremely insightful. There would be enormous value in exploring the prevalence of insecure attachment amongst elite sport

populations and this work would provide a starting point for investigating the potential advantages and disadvantage of this type of attachment to developing excellence in sport. Increased knowledge and understanding of the potential challenges players with this type of attachment might face within an elite sport environment, would help to ensure these players are appropriately supported. We have previously suggested that external contingencies of self-worth, derived from a disruption in parental relationships and subsequent development of insecure attachment, may underpin the drive and motivation in some athletes to pursue excellence. However, these are merely hypotheses and empirical evidence is needed to fully understand the role of attachment in outstanding achievement and the potential links between attachment, contingencies of self-worth and the development of excellence in sport. Additionally, research into the role of contingencies of self-worth in achieving sporting success would have a direct applied implication, as players whose self-worth is contingent upon their success in sport may be particularly vulnerable to mental health issues when experiencing periods of poor performance, deselection, critical feedback, and retirement. Understanding how self-worth may be linked to performance in this regard may lead to further insights on how to best support athletes through these challenging periods.

A second area for future research is the influence of individual differences on the efficacy of various training practices. Study 4 in this thesis provides preliminary evidence which justifies a further exploration of the role of individual differences on the effectiveness of CLA training on performance. The CLA approach to training has been popularised over recent years and is widely used in sporting pathways, including the RFU development pathway. However, research into the possible interaction between CLA training and individual differences and the effects this might have on the efficacy of this type of training has yet to be carried out. It is therefore not yet known whether this approach to training, and indeed other approaches to training, have a universally positive effect and whether all

individuals benefit equally. Further research in this area would offer the RFU, and other NGB's, an insight into the profile of player who might benefit the most from specific approaches to training and the profile of player who might benefit the least, allowing coaches to take a more individualised approach to training.

Finally, as noted earlier in the chapter, there is a need to utilise a multidisciplinary approach to identify the long-term influences on progression and development in sport. Re-analysing the existing data collected for Studies 2 and 3 after a longer period of time had passed, would allow us to identify the multidimensional factors which differentiate between players who transitioned through the RFU development pathway and reached the pinnacle of success in rugby, becoming a regular senior England team player, and those who also transitioned through the pathway but failed to maximise their potential. This would provide the RFU with clarity around what talent looks like early in the rugby pathway and which factors, traits and behaviours are indicators of talent and future potential.

5.6 Reflections

My PhD journey has been significantly influenced by both my own personal circumstances and by the nature of working with an external stakeholder. We felt therefore it was necessary and appropriate to reflect on that journey and highlight some of the personal and professional factors which have shaped the direction and timeline of the preceding work.

A personal factor, which has undoubtedly had the biggest impact on the timeline of this project, is the fact that I had two children during the research stage of this project. As such the work was paused, on two occasions, while I went on maternity leave. Almost immediately after I returned to work following my second maternity leave, the Covid-19 pandemic hit, and we went into lockdown. As it was not possible to continue working with two young children at home, the project was paused for a third time, on this occasion for a couple of months, until lockdown was lifted. Although these periods of absence have

extended the original timeline of the project, I was fully supported by the RFU and by my supervisor, both while on leave and when returning to work. This support has been essential in allowing me to complete this work, and in enabling us to realise the full potential of this project.

An inevitable issue when collaborating with an external stakeholder, particularly on an extended project such as this, is that there is always the possibility of personnel changes within the stakeholder organisation. Throughout the duration of this project there have been multiple changes in personnel at the RFU all of whom have placed different levels of importance on research in general and on this specific project. The individuals from the RFU who initiated this project were no longer in post when I returned from my first maternity leave and the individuals who had inherited the project, placed less value and importance on it than their predecessors had. Subsequently we went through a challenging phase, where the stakeholder was less engaged than they had previously been but still wanted to receive value from the research. They had different questions they wanted to try to answer and as such the design of studies 3 and 4 reflected this, specifically their desire to understand what factors influenced progression through the RFU pathway and why some players, who had previously been identified as talented, might derail. However, there were further personnel changes just prior to and post my second maternity leave and the individuals who came in to the RFU at this time have remained in post throughout the remainder of this project. These individuals have been engaged in the project from the outset and have demonstrated the value they place on the research by implementing the findings into the RFU's pathway coaching practices. A Talent Development Framework and Pathway Coach Development Programme have both recently been created to educate players and coaches and are informed by the findings of the research in this project. While the project has endured some more challenging periods, we have been extremely fortunate to have maintained a good working relationship with the RFU

throughout and have ended the project with individuals who are keen to fully utilise the findings within their organisation.

5.7 Conclusion

In conclusion the research in this thesis advocates a multidisciplinary and individualised approach to talent development. Understanding the whole athlete and identifying the multidimensional factors which influence the development of excellence in sport, allows coaches and practitioners to better differentiate between athletes with talent and long-term potential from athletes who simply demonstrate early high performance. In addition, this thesis highlights some of the psychological factors and early life experiences, which might fuel the drive and motivation to achieve extraordinary levels of success, but which may also leave athletes vulnerable to poor mental health outcomes during periods of setback or failure. Taking a person-centred approach aids all athletes in their journey through the development pathway and enables coaches to balance levels of challenge and support for everyone, ensuring that all players are given the opportunity to maximise their potential and obtain the most benefit from current training practices.

Finally, this thesis adds substantially to the current body of expertise development literature and advances our understanding of the importance of psychosocial factors and early life experiences in developing excellence in sport and the potential influence of individual differences on the effectiveness of training protocols. The discussion of these findings within the RFU and the on-going dissemination to RFU development pathway coaches and premierships academy coaches, has already begun to shape coaching practices and offers a valuable resource in continuing to improve the efficacy of the talent development pathway within rugby union.

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Appendix A: Psychosocial Semi-Structured Interview Schedule



Understanding the Development Biographies of World's Best Rugby Players

Interview Schedule for Personality and Psychology Section

CODE: _____

WELCOME:

For this part of the study, I'd like you to speak freely about your journey to reaching your peak in your sport. I have some general and specific questions, but I make no assumptions about you and your sports career/history. People in all walks of life reach elite levels of performance through very different pathways and with very different experiences. In other words, there's really no right or wrong way – certainly, we don't have any consistent evidence of one right or wrong way. I want to know about your story in your own words.

NOTE: *Re-iterate confidentiality and non-disclosures*

One of the challenges of working with a small and high-profile sample of participants is ensuring participants' anonymity is preserved. Some elements of your life and career may have been publicised in the past and can make maintaining anonymity more challenging. We have considered this issue and various ways of overcoming this challenge, at great length and intend to work closely with you to reach the highest levels of confidentiality possible. You have already read and signed the confidentiality and consent agreements prior to this meeting, which outline our process for maintaining confidentiality and anonymity. I would however like to reiterate that you will be given opportunities, throughout the process, to review the information you have provided and raise any concerns you may have. Should sensitive information arise from this interview we'll work with you to decide if and how this information is used and your informed consent will be sought at each stage of the process.

I'd like to introduce [James Bickley], who will be conducting the interview with me. James is the Clinical Director at a company called Changing Minds. Changing Minds specialise in providing psychological support within elite performance environments and they are working with us on this research. Having a second pair of eyes and ears in the room helps to make sure that we don't miss anything in the interview,

Are there any questions you'd like to ask me about this before we proceed?

START OF INTERVIEW

In your previous interview, we discussed your practice history, as well as your competition and training loads/volumes. This part of the interview is different. Here, we'd like to find out more about you as a person, what made you, and where your competitive excellence came from. We're interested in your story, everything that might have had an influence, from your early childhood, through junior development, and on to your competitive peak.

THEMES

Although I'd like you to speak freely, I will make reference to four stages during your development as a rugby player: 1) Early exposure to sport and rugby, 2) age group rugby, 3) professional rugby and 4) International rugby. At the same time, I should point out that I have six themes which I want to make sure we address at some point during the interview. You need not worry about those themes – it's my job to make sure each gets covered. I will, however, be placing these six themes out in front of me to help me, and I will be asking some specific questions. Please don't let this distract you. This will help me keep a record, because I'm sure you will be telling me a lot and I want to be sure I don't miss anything.

The six themes are:

(1) Critical Developmental Experiences

Some feel it's both the positive *and* negative events in our lives that really shape who we become - some events may have been particularly important.

(2) Relationship with Rugby

Here I'm getting at what your reasons were for pursuing rugby specifically rather than other sports, what particular aspects of the game did you most enjoy. Additionally, I'm interested in your (a) motivation to train, (b) motivation to compete, (c) motivation to win versus motivation to not lose and (d) motivation to reach the highest level of performance possible.

(3) Pressure Zone and Emotional Regulation

Athletes can experience all sorts of heightened emotions in elite-level sport. We're interested in those aspects here. In competition, some clearly enjoy pressure, whereas others see it as a necessary evil, and some feel compulsively drawn towards it. We make no assumptions, and there's certainly no evidence to suggest that any one attitude is better than another.

(4) Personality

Here I'm interested in whether some of your personality traits and characteristics have underpinned the sportsperson you became. It used to be assumed, without evidence, that certain traits were "good" and other traits were "bad". Again, I make no assumptions - there is no evidence that any one particular personality trait is better or worse for reaching elite levels in sport. I start from the standpoint that all traits can be helpful and unhelpful

(5) Relationships with family and coaches

Here, I'm interested in your relationships with your family (e.g., parent(s), sibling(s)), as well as with your coaches, mentors, and peers. Additionally, I am interested in your relationship with your teammates throughout your career and whether you fulfilled specific roles within the teams you played for (beyond your playing position, obviously).

(6) Career Turning Points

Here I'm interested in significant events which you feel shaped your career and your aspirations within rugby. Any injuries or illnesses which may have caused set-backs or motivated you further. Any obstacles you overcame and how you went about overcoming them, plus any particularly inspirational experiences you had and how they affected you.

NOTE: Recount the athlete's biographical information (e.g., basic demographics, performance data, family background - via on-line searches, RFU data, autobiographies, etc.) that we already hold about him/her and ask whether these are a true reflection of the facts. Potentially now (or later) check up at a superficial level on family, siblings, etc. Ask whether there was any rivalry, whether they would fight, how that panned out, etc.

May I just check over some facts?

Theme 1: Critical Developmental Experiences

Questions/points

Family background

So, let's start right from the beginning. Please speak freely, and I will weave in questions, where appropriate.

Note: Interviewer 2 will observe any disconnect between the emotions displayed and the emotionality of the event being spoken about

Early Family Situation

- Could you start by helping me to get oriented to your early family situation, what your childhood and family background were like? For example, where you were born, whether you moved around much, what your parents did at various times for a living?
- Could you tell me about the earliest childhood memories you can recall?
- Could you tell me a bit more about how things were between your parents during childhood? How did that impact on you?

Family Culture

- What was the culture like within your family? What sort of things were important to you as a family and what values were encouraged by your parents? For example, some families value quality time together above everything else, others encourage hard work and reward achievement, what was this like within your family?
- What did a typical day look like in your family as you were growing up?
- How were disagreements resolved at home? This might be disagreements between your parents, between you and a parent or between you and a sibling?

Relationship with parents (Attachment)

- I wonder if you could tell me to which parent did you feel closest and why? Could you tell me a little bit about why this feeling wasn't the same with your other parent?
- When you were upset as a child who would you go to?
- Were your parents always around, both physically and mentally/emotionally? In previous work we have done, some athletes have commented on having parents who were absent (e.g., working away, emotionally absent), while others have described having two parents who were always available. Did you have any experience of one or more parent being absent at any period in your life? How do you think this might have affected you?
- What is the first time you remember being separated from your parents? How did you respond? Can you remember how your parents responded?
- Are there any other incidents in which you were separated from your parents, which stand out in your mind?

Approach to Parenting

- What was your parents' approach to discipline? For example, some parents are very regimented, whereas others let more or less anything go by. Could you tell me a little about what your parents did in this regard?
- How independent were you encouraged to be as a child? What did this look like?

Relationship with siblings

- Could I just check on the details of your siblings? You have one brother who is older/two younger sisters etc. Is this right?
- Could you tell me whether you experienced sibling rivalry growing up, and if so, what this looked like? For example, how competitive were you when playing games with your siblings, were you equally competitive as each other, how much did you compete for your parent's attention, can you recall occasions when you were jealous of one another?
- How did your parents deal with any sibling rivalry?
- Some people have very "present" parents, whereas others have parents who are far less involved in their lives and sport and allow their children to just get on with them. What was it like for you and your siblings?
- How did your parents go about supporting you and your siblings? Was it the same or different for each sibling??

- How did the relationship between your parents and your sibling(s) compare with your own relationship with your parents?

Relationships with extended family/ other significant relationships

- What were your other relationships with other family members like for example extended family or family friends?
- How important were these relationships to you at the time? What was the impact of these relationships on you growing up?

Impact of family background

- Can you tell me how you think your family background affected your development as a person and rugby player?

NOTE: Some of this may come out earlier in the above so won't need to be replicated here)

- If you were to think through all these times, what would you say most contributed to your achieving your level of success? For example, certain athletes suggest that coming from a specific family background really influenced their desire to succeed in sport. That might be...

NOTE: Prompt if necessary: A perceived under-privileged background, particularly supportive parents/family a single parent family, deaths of significant people or being inspired by the sporting achievements of a parent or older sibling...

Other Childhood Experiences

- Can you tell me about any significant childhood experiences which stand out as being particularly positive.

Prompt: For example: Having a particularly positive experience at school, an inspirational teacher or coach, living in a particular area, access to sport and facilities, etc.

- We've spoken about various aspects of your childhood. Before we move on, I'd like to ask you specifically about certain types of developmental experiences that can link with the desire to participate in certain sports. Some of the experiences we ask about may seem very sensitive and private to you, or you may be unsure as to why we are asking them, as you may not feel they are particularly relevant. We are simply trying to get as comprehensive an understanding of you and your childhood experiences as we can. With this in mind we are interested in whether you ever experienced:
 - Feeling different to others in terms of your physical size (feeling bigger/dominant or smaller/inadequate).

- Feeling different to others in terms of your development (for example, learning difficulties such as dyslexia, finding it difficult to concentrate during classes at school, struggling with school)
- A fear of being physically hurt, threatened with violence or witnessing violence to people close to you
- Being bullied or receiving verbal abuse
- **NOTE**: Push questions to physical abuse (Interviewer 2)
- Feelings of fear and anxiety, for example, some people find everyday life to be a difficult, confusing and overwhelming experience.
- Or anything else that you feel might be relevant.
- If you experienced any of these what, if anything, did you do about them?
 - **PROMPT**: Could use an example of running away or standing up to bullies here, or something else where we provide a running away/confronting example – such as struggling with school so disengaging vs getting extra help)
- TO what extent, if any, did these experiences influence you??

Initial experiences with sport

We're going to talk about your relationship with rugby later on but I'm just interested in your early experiences of sport in general for now.

- What were your early experiences of sport? What sports did you play and how were you introduced to them?
- What made you take up sport? Can you tell me about the first time you played sport? What did you like or dislike?
- How did your experience of sport as a child compare with that of your siblings'?
- How did your experience of sport as a child compare with your experience of other activities and events at that time?
- How did playing sport make you feel? Can you give me an example of a time when playing sport elicited particularly strong feelings in you?

Transitions from junior, through senior, to reaching your peak.

- What were the major obstacles, if any? For example, non-selection, de-selection, injury, illness, lack of financial support, lack of parental support etc.
- *Note: will likely be important to relate back to things that people have said earlier. It is entirely possible that this question gets dealt with at an earlier stage of the interview so might not need dealing with here (both interviewers to be aware of this)*
- Were there things that might have derailed your progression, but somehow you kept going?

- What mental characteristics or traits do you have, which you feel allowed you keep going and deal with setbacks? How and when did you develop these characteristics/ traits?

Theme 2: Relationship with Rugby

Questions/points

Significance of Rugby

- We've studied lots of Super-Elite athletes from various individual sports and some Olympic team sports, but have never previously interviewed Super-Elite rugby players. We're particularly interested in what it is that you like most about your sport
 - Note: some prompts that may be useful, although we must not lead them (teamwork, physicality, physically dominating someone, finding space and being creative, having a routine/being structured, having an important role within a team, being valued, the values of the sport, parental involvement, friendships)
- What is it about rugby in particular that you like, as opposed to other sports?

In the previous athletes we have studied, some have commented that their sport was their entire life, and they pursued it above everything else. However others have commented on being able to integrate their sport into their life so as to be able to perform at a high level yet without it taking over. In the next few questions we are interested in your views on these sorts of issues

- To what extent is/was rugby your entire life? For instance, to what extent (if at all) does/did it come first before other aspects of your life such as:
 - Relationships with loving partners, friends,
 - Nights out, alternate career, money, education, etc.
- How able were you to integrate rugby into your life?
- Can you give an example of a time when you had to give something up in order to pursue rugby?
- Have you ever put yourself in a compromising position by choosing rugby first? If so could you tell me a little bit about this?
- How do you think others viewed you in regards to your pursuit of rugby? How would they view you now?

The Training Environment

- Could you tell me what your training environment was like at each of the four stages of your development (early exposure, age group, professional, international)? What was similar about the training environment across these stages and what was different?

Prompt: How supportive was this environment, how much pressure did you experience, was there any rivalry/ internal competition?

- How often were you exposed to training with more advanced players (e.g. better or more senior players) when you were a junior? How did you find this opportunity to train with seniors?
- Some athletes describe having high levels of influence over their training environment, others talk about being told what to do, and some talk about a mix between the two. We are not making any assumptions as to what the “best” level of influence is. How much influence over the training environment did you have?
 - Note: If not picked up above: would you say that this influence was consistent across levels or did it change. If it did change could you tell me a bit about the differences across levels?
- What was it about the training environment that you feel worked best for you? Could you tell me a little bit about why you believe this to be the case?
- What was the worst aspect of the training environment? Again can you expand on why? Just so that we fully understand your perspective?
- Some athletes love the structure that being a performer provides (because there is a routine/pattern/habit to training), whereas others do not and prefer to be more flexible. How did/do you feel about this?

Motivation to train

People can be motivated to do things for all types of reasons. Some people do things because they simply enjoy them, others do them because they feel they are important and they want to get better at them, and others need pushing to do things, do things to avoid guilt, or obtain rewards (like winning, wanting to be the best). There is not one right or wrong motivation. Its also possible to be motivated by more than one factor at the same time.

- In regards to training, how would you describe your motivation? Can you provide some examples?
Prompt: Were you the sort of person who is first to arrive at training or the sort of person who needs to be pushed to train hard? Were you pushed by a coach/s or teammates? How? What did that look like in real terms?
- How intense was your motivation to train? For example, was training something that “could not be missed” or were you more laid back about it
- Some athletes describe themselves as obsessed; others say they were more balanced in their relationship with rugby. Again there is no right or wrong approach here. How do you relate to these two positions if at all?
- Were you always committed to doing what was necessary to reach the highest level or did something change that led you to become more or less committed? If so, what tipped the balance?
- How was your motivation to train different/similar to your competitive peers? Did you train more/harder than your competitive peers?

- In general, looking back on your career, how would people describe you in relation to training?

Motivation to compete

- As I mentioned earlier, motivation for doing things can be very varied. How would you describe your motivation to compete?

Prompt: Was the focus on mastering your own performance and/or to win matches? Was one more important to you, or was it both?

- Was your motivation to compete always like this? When you were a child, were you like that with your brother/sister? How fiercely did you need to win?

Experience of winning and losing?

- What was the balance of winning/losing in your career – did you win more or lose more, and how did this shape the athlete you became?
- What was your motivation to compete and how did it change from junior to senior competitive years?
- Were there earlier experiences of success and failure that helped to drive you to the levels you attained? If so, could you tell me a little more about them?
- How did you deal with losing? To what extent would you go to, to avoid losing?
- Which had the greatest (emotional) impact on you: winning or losing? How? Can you give me an example?

PROMPT: winning – feelings of calmness that stay with you for a while, intense excitement/ joy/ happiness. Losing – intense anger/ frustration/ disappointment, no emotion (we lost so nothing to feel/ think about).

- What were your emotions like after competing? Were they the same if you'd won or lost? Some athletes describe a sense that they have dominated or controlled their fear, other athletes describe experiencing feelings of well-being, peace, calmness or an emotional silence: The internal gremlin, voices, doubts etc. are quiet for a period of time. How do you relate to these two positions?
- How would others perceive you and your need/desire to win?

NOTE: Interviewer must be sure to use throughout this theme as a prompt: "You've said xxxxx. How would other people (e.g., partner, coach, parent, sibling, etc.) describe you?"

Theme 3: Pressure Zone and Emotional Regulation.

Questions/points

Type of emotions experienced

- I'd like to ask you a bit about the lead-up to an International match now. Can you talk me through your pre-match preparation, from a few days before, to the start, during, and after the match itself? Can you explain what you were feeling, what you were thinking at that point (e.g., self-doubt, going to toilet, sweating, etc.)?
- Were you anxious before a match? What were you most anxious about?
 Prompt: Losing, looking bad, letting the coach down, physicality of the game (making the first hit, being the subject of the first hit, seriously hurting someone) etc.?
- Did you ever experience intense anxiety before a match? If so, how did you respond to this and did you find it helpful or unhelpful? For example, some people find that anxiety can cause them to choke, or underperform whereas others thrive on it and it can actually help improve their performance? How do you relate to these two positions (you might be closer to one end than the other or maybe somewhere in the middle, you might have experienced both in different situations)?
- You said that you found this anxiety helpful/unhelpful, did this differ depending on the match or situation? If so, could you provide some examples of when you found anxiety to be helpful and when you found it to be unhelpful?
- What other emotions did you experience around matches and competition? How did these emotions affect you?

The (emotional) pressure of competition & rugby

- Did you enjoy the emotional intensity of competition or did you consider it a 'necessary evil'?
- Athletes often talk about competition in many different ways. For example, some athletes talk about needing to compete, that the intense emotion of competition is like a magnet: which they are compulsively drawn towards, others describe competition more as a desire (something they want to do). For some the emotional pressure of competition is a necessary evil, something they learn to endure. What were your feelings toward competition?

Prompt: do you feel that competition was more of a need or desire for you? If so, what makes you think that? If you describe both needs and desires was one ever stronger than the other, or were both equally as strong? Can you provide me with some examples?

- If anxious before competing, why do you think you still did it so much? I only ask what seems an odd question, because, generally in life, most people would consider emotions like anxiety to be really unpleasant and do their best to avoid them. Most people if they are afraid of something will move away from it. So if I put a snake on the table a person with a phobia of snakes

would move away. However, some people feel compelled to go toward the very thing they are afraid of. So despite being afraid of the snake they'd move toward it – even pick it up – to prove they can master that fear Does that line of thinking resonate with any of your experiences in rugby or everyday life? Can I have an example?

NOTE: use analogies of tiger trapped in corner, or running away from something, or feeling like you can't move forward or away (frozen to the spot) if needed here to help

- As discussed, rugby has a physical component to it that is absent from other sports (like sprinting). Some have described rugby as the modern equivalent of war. How would you relate to that description? What was your emotional experience pre-match specifically in relation to the physical component of the game?
- What were your feelings towards your opponent, for example some players talk about the desire to get a hit in first on their opposite number others talk about the desire to find space to avoid being tackled? What was your experience of this?

Emotional intensity of competition

- We've talked about competition being an intense emotional experience. Did you find that high level competition was the most emotionally intense experience you have ever had? Is there anything outside your sport that gave you this sort of emotional intensity (e.g., birth of a child, death of a loved one)? It's quite normal to answer yes or no to this sort of question, we make no assumptions here about what is a better answer so please don't worry about providing a response that you think you should.
- How would other people perceive you in this regard?
- In relation to the emotional intensity of competition, was it important for you to get in that place?
 - How alive did you feel when you were competing at a high level? ?

How self-aware do you think you were in those moments? How did that compare with other aspects of your life? What words would you use to describe this experience? **NOTE:** Prompt - I ask these questions, because some get lots of emotional experience within loving relationships and would not feel the need to do anything that creates more emotion. Others feel there is something missing / lacking in relationships with other people that they can only get in a setting that provides strong emotions. Where do you sit on this?

Emotional bluntness

Experiencing emotions

- Not having strong emotional responses in sport could be helpful. For example, some people might feel that it would be an advantage not to experience

intense emotions before a big game. What was your experience in relation to the intensity of your emotions before a game?

- How connected do you feel to yourself and the world before and during matches and competition?
- Some athletes talk about 'zoning out', detaching themselves, or having an ability to compartmentalise situations in order to be able to deal with them better? Can you relate to this at all and can you give some examples of this in relation to rugby?

Regulating emotions

- Some people do experience intense emotions in high pressure situations but are able to regulate their emotions, for example some rock climbers are able to regulate their feelings of fear, which minimises their physical response to that feeling: their palms don't sweat and their legs don't shake. How able were you to regulate your emotions before a game?
- Where there particular techniques you used to help regulate your emotions or was this something which was just automatic?

Identifying emotions

- Everyone experiences emotions differently. Some people experience very specific/clear and intense emotions that they are able to differentiate between. Others experience a generalised feeling of intense emotion and they can't quite work out exactly what emotion it is. How able were/are you to differentiate between various emotions?
- Are there emotions which you find more difficult to differentiate between? As an example did you know when/if you ever felt nervous and/or excited? Could you tell the difference between the two?

Expressing emotions

- How would other people describe you in terms of your emotional expressiveness? (Are they aware that they don't experience the intense emotions of performance the way people might expect them to?)
- How would you describe your emotional expressiveness in everyday life in comparison to competition? **PROMPT:** How do you react to good/ bad news, are you able to remain calm about things which others get worked up about for example poor driving, children misbehaving etc.?
- I've been asking you a lot of questions about emotions. Would you say it has been easy to describe these feelings and emotions or not? I say this, because, in a sense we're asking you to describe in words how something really *felt*. It's quite possible that these feelings are not really accessible to conscious

thought and words. Is that the case for you? Would you say you find it easy or difficult to talk about emotions?

Coping strategies and Psychological strategies

- Please tell me about any other coping and or psychological strategies you employed when competing?
- Did these coping strategies ever become automatic, or did you consciously have to think about using them? Again, this is no right or wrong answer here, as athletes talk about both approaches. Some athletes also talk about some strategies being automatic and others being consciously employed
- What other psychological strategies have you used?

NOTE: One of the difficulties for some of these athletes may be a difficulty expressing themselves verbally (i.e., they have tended to express themselves with their body). This makes yes/no responses potentially more likely. The interviewer will need to be aware of this, and be sure to reflect on (and record) such responses. (Observation of whether there's a mismatch between the emotion they're speaking about and the emotion they're displaying and how emotional they are when talking about emotional events will be important here).

Theme 4: Personality factors

Here we're interested in personality. I want to be clear from the outset that I do not believe any particular personality trait is inherently good or bad. Although society might suggest that some traits are more or less desirable (provide some examples) I do not subscribe to this view. I am of the opinion that every personality trait can be beneficial in certain environments, particularly in high level sport.

As some examples, research with the military suggests that war heroes share some of the same characteristics as people with Autism Spectrum Disorders. There is also lots of evidence that effective leaders have a level of narcissism and psychopathy associated with them that is above average. One study, which specifically looked at US Presidents, suggests that certain 'negative' characteristics are in fact adaptive in certain occupations, including leadership positions. This is important as one is not likely to succeed at the highest levels without feelings of superiority, being fearless etc.

Questions/points

Potential and natural talent

- Do you think you always had potential and natural talent? Were you simply born to play rugby?
- How easy did you find it reach a good standard in rugby and to win matches? Did you find it easier than your competitive peers to train and win or was it something to do with your up-bringing?

- Did any of your close or extended family play rugby or other sports? How did your parents feel about you playing rugby?

NOTE: Some of these issues may also have been covered in positive and negative events, and also in relationships. Athletes will need to be carefully guided, as we are likely to touch upon issues that they have not thought about in depth before and possibly never expressed.

- How do you think your friends or fellow rugby players would describe you?
- How did your school reports, teachers, and coaches typically describe you?

Perfectionism/obsessiveness

- Some people are very laid-back, whereas others are more perfectionist/obsessive – either of these two extremes could be beneficial. To what extent were/are you a perfectionist? Obsessive? Were you always like this?
- Was this perfectionism about you (i.e. was it self-focused) or was it about the team (team level of perfectionism)
- How do you think this may have influenced your rugby career?

Agency

- How much control do you generally feel like you have over the world? (Would you describe yourself as a pawn in a chess game, where external influences largely control what happens, or the chess player, where you are in control of making things happen). Do you feel this is the same in rugby? Did you ever notice any change in how much influence you felt you have/had over things after playing in important games? Can you provide examples?
- How comfortable were you with taking risks during major games? How open were you to new experiences/ideas? How creative do you think you were?
- Were you encouraged to take risks during your sporting career (training, competition). If so, by whom? Did you take a lead in risk-taking?
- How comfortable were you in taking the lead and influencing others? Were you happy to influence others to benefit yourself (emphasise that this is NOT bad!)

Conscientiousness

- How conscientious were you? Were you always that way?
- What was your level of conscientious in comparison to your competitive peers? What is it that makes you think you were more/less/ similar?

Optimism/attribution

- Were you always optimistic, or sometimes pessimistic? How did (would) people most close to you (coaches, parents, training partners) typically describe you?
- In general, what sort of questions did you ask regarding the high-points and low-points in your life? Do you try to find reasons for things happening? People often have characteristic styles for describing why good and bad things happen. Can you describe the sorts of thought processes that you go through when you win or lose a particularly important game? Have you always looked at things this way?

Openness and agreeableness

- How much did/do you reflect on the things which happen in your life? Is this something you find easy and enjoyable, is this something you do naturally?
- How important is it to you, that the things you do fit with your own values and ideals? Can you give me an example of this in relation to rugby?
- In general how do you respond to rules and authority? How easy do you find it to comply with specific guidelines or instructions?
- How comfortable are you with making demands of other people or imposing your will on to other people and situations? How do you respond when other people impose things on you?

Coachability

- How open were you to different coaching methods and trying new things in training?
- How did you find receiving feedback from coaches? Was this something you found difficult to deal with or did you appreciate getting feedback?
- In general, was the feedback you received from coaches in line with your own views of your performance and abilities? Were there times when you felt coaches either overrated or underrated your performance and/or ability? Can you give me an example?

Narcissism

We've already talked about your emotional response to pressure, such as anxiety however I would like to ask you a bit more about the type of pressure which comes with having a high profile job and performing in front of an audience.

- How do you view this kind of pressure? What are your experiences with this and how did you typically respond to it? How would others describe you in this regard?
- Some people loathe training whereas others love it. Can you tell us how you felt?

- Did/do you like being admired by others?
- Wanting to get recognition for doing things well is normal. Some people might try and get this by performing really well in some situations or being a leader. Others like to be recognised for being a team player/helpful/mother Teresa/saint. To what extent if any do either of these apply to you?

Psychopathy/fearless dominance

- I mentioned earlier the idea that some people like to get the first hit in on an opponent and try and dominate them. For some people, the idea of being dominant/powerful is quite a large part of who they are. Again, this is not necessarily a bad thing. To what extent did you want to dominate your opponents in rugby? Was this consistent across all aspects of your life or just on the rugby pitch?
- Also, how bold or fearless would you say you were, if at all? For example, how willing were you to put your body on the line during a match? How far would you push this and what was your physical risk taking like in comparison to your team-mates? Did this happen more/less often in certain circumstances (e.g., key games, key points in tight matches etc.)?
- With regard to social situations, how much would you say you led or dominated in social situations? Do you like to be in control or do you sit back preferring others to make decisions or take the lead? Was it always like this?

Other-focused personality traits

- How did you relate to your team-mates, did you develop strong friendships, to what extent did you confide in one another about your experiences?
- How important is/ was the performance of your team-mates to you? How aware were you of the performance of others?
- How did the experiences of your team-mates affect you? How much did you understand and empathise with their experiences?
- How did watching your team-mates deal with set-backs such as drop in performance, injury, de-selection, make you feel?
- To what extent were you supportive of your team mates? Or did you feel it was important to leave them to solve their own problems?

NOTE: For this point, the interviewer should pick up on some specific points raised by the athlete under positive and negative events.

- Show them a blank 2 x 2 agency-communion model figure or with example descriptors for each box. This figure is one way of thinking about personality. Some people can be very highly focused on themselves and not other people, some can be very focused on others and not themselves, and others can be

both. Where would you say you fitted into this figure? Can you provide examples?

Theme 5: Relationships with coaches and family

Questions/points

Coach relationships

- Could you tell me about the most influential coaches you've worked with and rank the top 3 or 4, without whom you might not have reached your level of expertise. Could you describe your reasons for giving them these rankings?
- Tell me about your relationships with your coach(es).

Prompt: What was he/she like, what were the most important things he/she did/do, what environment did they create? How helpful were these environments? Were they a challenge?

What did it feel like to work with this coach? How did this coach make you feel emotionally?

What was it about your coach(es) that makes you say that?

What was this coach like in terms of discipline, did they set specific boundaries? How did you respond to this?

Did you ever regard any of your coach(es) as being some sort of surrogate parent?

NOTE: If absent father, do you think that's got anything to do with why this coach was so important?

NOTE: Potential to link early childhood perceptions with the coaching experience - an emotional hook into the sport. An example prompt here might thus be: "You said earlier that your father worked a lot and was often not at home, that you spent a lot of time with your mum. When that happens, many people search for a sort of father figure - often a coach; what was your experience of coaches?"

Relationships with other people: e.g., Team members, mentors, teachers

- We are interested in your relationships with other important people, such as team members, mentors, and teachers. Could you tell me a little bit about some of your relationships with these important others (in addition to people we have already discussed)?
 - Prompt: what was their role in shaping who you became?
- Within your wider social circle have you had any difficulty in sustaining satisfying relationships? Could you give me an example?
- Other than things we have mentioned earlier (e.g., obsessiveness over rugby) were there other things that may have influenced the relationships you had with important others (e.g., time of season, intensity of training)?

- **NOTE:** Interviewer must be sure to use throughout this theme as a prompt: “You’ve said xxxxx. How would other people (e.g., partner, coach, parent, sibling, etc.) describe you?”. Romantic relationships as well as friendships, relationships with family members should all be explored.

Theme 6: Career turning points and other experiences

Mid-career turning points

- Can you recall any specific turning points during your career and how did they exert their influence on you?
- Please tell me about any other particular points which may have prompted you to consider where you might go in your sport,

Prompt: the following might all be considered turning points (although this is far from an exhaustive list) the transition from junior to senior rugby, winning/losing major competitions, being part of a particularly successful or unsuccessful team, receiving particularly favourable/unfavourable media reports, etc.

- Was there some specific point when you developed any specific goals or aspirations? To what extent did you envisage reaching the level you did in your sport?

Injuries & Illness

- Please would you tell me a bit about injuries and illnesses throughout your life? What I’d like to do is ask if you could just recall the three most major injuries or illnesses that you experienced – those that you feel had a significant impact (e.g., a meaningful change in your planned training and competition behaviour) on your journey to reaching your highest level in your sport.
- Please now tell me why you consider these injuries/illnesses to have been so significant.
- What impact did these injuries/illnesses have on your development, training, or competition? Are they still having an impact in any way?
- In relation to your experiences of managing the injuries/illnesses you describe, what were the most valuable things you as an individual did to aid your recovery? (How did you deal/cope/manage with these injuries/illnesses?)
- How much did any injuries/ illnesses contribute to your decision to stop playing rugby?

Other obstacles and/or setbacks

- What other obstacles did you experience in your career?

Follow up: How long did that setback/obstacle keep you from training and competing? How did you experience/view/deal with that?

- Earlier we discussed some things regarding personality. How did your

personality influence you in getting through the setback?

- Prompt: Were you conscientiousness in getting through the setback/obstacle, or optimistic/pessimistic? What reasons did you give for the setback/obstacle?

Development Programmes

- If you were involved in Development Programmes, is there anything you would want to add about the benefits or otherwise of the development programme?
 - E.g., What specifically about it was beneficial or otherwise? When did being a part of a development programme matter most and why (if at all)? What was going on then that was of help/hindrance?
 - Use of sport science support?
 - Coach support
 - Lifestyle support
- Could you tell me here a bit about the climate/culture in the Development programme and the way things were run?
- Is there anything else you would specifically want to say about climate / culture and the leadership of the sport and programmes you were involved with?

Leadership

- At what point did you receive your first leadership position in the sport?
- What were the most important leadership development experiences you were exposed to?
- What are your feelings on leadership and being a leader in the various teams you have played for?
- In your experience, what influence and responsibility did you have as a player, in shaping the team culture? What was the impact of player input (or lack of)?

Ending of sport

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Are there any other specific things, which we've not already talked about, which are important in the context of retirement?

Finally

Is there anything we may have missed that you feel would be important? For example, are there factors outside of your sport that would give us some insight

into why you became the sportsperson you did/are? Something unique to you, perhaps that makes you different everyone else? As I've already touched on a few times during this interview, is there something else from before you even got into sport that you feel might be important for a full understanding of how you developed into the athlete you were? Is there something you don't quite understand or just feel but have difficulty expressing (can't really say what it is) – that unsaid or unexplainable something? Something you'd almost feel might sound silly/dumb but that somehow you feel is relevant?

Appendix B: Athlete Psychological Survey

Athlete Psychosocial Survey

You are about to complete a four-part survey that will help us to understand a little more about who you are and what experiences you have had in your life. This survey has been developed by researchers at Bangor University as part of a project with the Rugby Football Union (RFU), which aims to identify the factors that influence the development of super-elite performance in rugby.

The first part of the survey is about your early life experiences and career experiences to date, the second part asks about your personality and attitudes to your sport, the third section covers competition and training behaviour and the fourth section asks about your relationships with other people. Each section contains a series of statements. Please read each statement carefully and then decide the extent to which you agree or disagree with the statement by circling the number that is most relevant (1 if you 'Strongly Disagree' or 5 if you 'Strongly Agree'). Please try to answer the statements as carefully and honestly as possible. You may or may not think that some of the things we are asking about are surprising, sensitive or somewhat private and may be wondering why we are asking them. We are asking these questions in an attempt to gain as complete an understanding of you as possible. The more we know about young players the better we can understand the factors that influence players' progression through the development pathway and the better we are able to support you as athletes.

We take confidentiality very seriously, particularly as we are asking questions about your life to this point. There are no right or wrong answers in the survey and your answers will not affect your place in the camp. None of the information will be passed on without your permission, except in circumstances where you or someone else is at risk. Please speak to a member of the research team about this if you have any questions so we can make sure that only appropriate information is passed on. Just to reiterate, your answers will not affect your position in the Academy, the aim is simply to be able to better understand you so that you can be coached and supported on your development through the pathway as well as possible.

Life Experiences					
In this section, we would like to know about your childhood experiences as well as your career experiences to date. The first 14 questions are about your childhood experiences. Questions 15 and 16 focus on your career experiences to date. Firstly, with your childhood in mind, please indicate the extent to which you agree or disagree with each of the following statements.....					
	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree
1. My family were high achievers					
2. People in my family competed against one another a lot of the time					
3. My family expected me to beat other people					
4. My family worked hard to achieve things that were important to them					
5. My family expected me to achieve high standards					
6. My family expected me to outperform my opponents					
	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree
7. My family were very hard working					

8. My family members were very competitive with each other					
9. My family expected me to show clear personal improvements					
10. I experienced a moment within my sport that inspired me					
11. My family expected me to perform to the best of my ability					
12. Finding rugby was a turning point in my life					

These next questions ask about your career experiences to date.....

13. I have experienced a significant event that made me more determined to succeed in my sport					
14. I have experienced a significant turning point in my sporting career that enhanced my focus					

Personality and Attitude Towards Your Sport

The following questions relate to your personality as well as your attitudes towards rugby. For these next statements, please think about how well they describe you as a person and your views towards your sport. It is important that you think about how they best describe you *now* and *not* how you would like to be in the future....

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree
15. I love how nervous competition makes me feel					
16. In rugby, failure is not an option for me					
17. I am driven by a need to succeed in rugby					
18. I cannot live without rugby					
19. During training, I get completely furious if I make mistakes					
20. During matches I get completely furious if I make mistakes					
21. In rugby, I put my own interests before the interests of others					
22. I am often emotional without understanding why					
23. I am drawn to things I am afraid of					
24. Succeeding in rugby is the only thing that matters to me					
25. I feel that other players generally accept lower standards for themselves in sport than I do					
26. I have an almost obsessive feeling for rugby					
27. During training, I get frustrated if I do not fulfil my high expectations					

28. During matches, I get frustrated if I do not fulfil my high expectations					
29. Others criticise everything I do not do perfectly					
30. In competition, just the idea of not winning fills me with dread					
31. When it comes to rugby, you have to be selfish					
32. People tell me to describe my feelings more					
33. I am willing to be disliked if it means being able to achieve my targets in rugby					
34. Others expect my performance to be perfect					
35. I have extremely high goals for myself in sport					
36. Something inside me means that I can't help myself from playing rugby					
37. When it comes to rugby I am ruthless when I need to be					
38. I think I am a special person					
39. I like having authority over people					
40. I am secretly "put out" or annoyed when other people come to me with their troubles, asking for my time and sympathy					
41. I often interpret the remarks of others in a personal way					
42. I frequently find that I don't know how to keep a conversation going					
43. I find it easy to work out what someone is thinking or feeling just by looking at their face.					
44. It does not upset me if my daily routine is disturbed					
45. I notice patterns in things all the time					
46. I do not take advantage of people even when it would be good for me					
47. How much I like someone really depends on how much that person does for me					
48. In today's world, I feel justified in doing anything I can get away with to succeed.					
49. I tell other people what they want to hear so that they will do what I want them to do.					
50. I see myself as extraverted, enthusiastic					

51. I see myself as critical, quarrelsome					
52. I see myself as anxious, easily upset					
53. I see myself as open to new experiences, complex					
54. I see myself as reserved, quiet					
55. I see myself as sympathetic, warm					
56. I see myself as calm, emotionally stable					
57. I see myself as conventional, uncreative					
58. I see myself as dependable and self-disciplined					
59. I see myself as disorganised, careless					

Training and Competition Behaviour

We would like to know about you as an athlete. For these next statements, please think about how you behave as an athlete within rugby.....

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree
60. I leave no stone unturned in preparation for competition					
61. When playing rugby, I feel successful when I perform to the best of my ability					
62. I always produce a high quality training session					
63. No matter what is going on in my life, I still turn in a good training session					
64. When playing rugby, I feel successful when I beat other people					
65. I go beyond the norm to prepare for competition					
66. My sport is the most important thing in my life					
67. When playing rugby, I feel successful when I show clear personal improvements					
68. When playing rugby, I feel successful when I outperform my opponents					
69. Rugby offers me more than anything else in life (e.g. friends, family, relationships, money)					

Relationships with others							
In this final section, we would like you to read each of the following four statements and decide whether the statement is like you or not, by circling the number which you most agree with (1 = Not at all like me, 7 = Very much like me). Once you have done this for each of the four statements, please also then answer the final question by deciding which of the four statements best describes you :							
	Not at all like me			Somewhat like me			Very much like me
A: It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.	1	2	3	4	5	6	7
B: I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.	1	2	3	4	5	6	7
C: I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.	1	2	3	4	5	6	7
D: I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.	1	2	3	4	5	6	7
After reading each of the statements above (A – D) please circle the letter corresponding to the statement that best describes you.	A		B		C		D

Appendix C: Demographic and Developmental Sporting Activities Questionnaire

Player Demographic & Developmental Sporting Activities Questionnaire

Name:					
Date of Birth:					
Academy Club:					
Position:					
Education		Name of School:		Ages to and from:	
Sports Played on a regular basis (either formally or informally) from age 6 – 22yrs.		Sport:	Ages to and from:	Level	No. of Hrs per week
Ranking (in order of importance)	1				
	2				
	3				
	4				

	5				
	6				
Siblings		Gender (M/F)	Age	Plays Rugby? (Y/N)	
#1					
#2					
#3					
#4					
Parents					
Does/ did your Dad play sport? (Y/N)		If yes, which sports:			
Does/ did your Dad play rugby? (Y/N)		If yes, to what level:			
Does/ did your Mum play sport? (Y/N)		If yes, which sports:			
Does/ did your Mum play rugby? (Y/N)		If yes, to what level:			
Milestones					
How old were you when you specialised in playing rugby (i.e. when all your time playing sports became devoted to rugby)?					
How old were you when you specialised in your current position?					
How old were you when you joined a professional rugby academy?					

How old were you when you first moved (relocated) to attend regular rugby training?	
Were you ever taken out of an Academy? If so how old were you and how old were you when you got reselected?	
<p>In Season / Off Season: For your current club can you please indicate when the current in-season (including pre-season) starts and finishes and when the current off-season starts and finishes:</p>	
Month In-season starts:	Month off-season starts:
Month In Season finishes:	Month off-season finishes:
<p>Now, for a typical week at your club, how many hours are you engaged in rugby practice or training for both the in-season (including pre-season) and off-season, (practice could mean any of the following, individual practice or training with or without a coach, team practice or training with or without a coach, plus any other type of rugby practice you have experienced):</p>	
Hours of training during in-season:	
Hours of training during off-season:	
<p>Finally for the a typical week at your club, how many hours of structured rugby competition are you engaged in for both the in-season (including pre-season) and the off-season:</p>	
Hours of competitive matches during in-season:	
Hours of competitive matches during off-season:	

<p>Mental Skills: How many hours during a typical week are players engaged in mental skills training practice (e.g., visualisation skills, working out pre-performance routines, relaxation or concentration techniques etc.).</p>	
<p>Vicarious Learning: How many hours during the typical week are players engaged in learning through watching rugby (e.g., watching rugby on T.V., watching other rugby players' practice and/or matches in order to increase their own skill).</p>	
<p>Deliberate Practice/ Deliberate Play: I'd like you to think about the amount of time in that typical week that consists of practice activities that are effortful, focused, goal directed, but perhaps not inheritably enjoyable - this is known as deliberate practice. I'd also like you to think about the amount of time in a typical week that consists of practice activities that are fun, voluntary, free from a specific focus or goal, and that provide immediate gratification - this is known as deliberate play. It's important to consider time spent both at training and outside of training. Now please split the proportion of time (in percentage) of your typical week between these two practice types.</p>	
<p>Deliberate practice %</p>	<p>Deliberate play %</p>
<p>Number of Hours:</p>	<p>Number of Hours:</p>
<p>Intrinsic/ extrinsic feedback: Again thinking about a typical week, we would like to know about the opportunities during practice that allow you to develop your own feedback. For example, instances where you might only be given feedback when you asked your coach/peers for it? Or where your coach/peers asked you to describe what a particular play or drill felt like, or how you could improve performance before giving you feedback? Maybe you are provided feedback after a period of delay. Maybe you just generate your own feedback a lot of the time...</p> <p>Compare this with times where your coach provides constant feedback, without allowing delay for you to think about this yourself.</p> <p>Please tell me what proportion of practice contained each of these types of feedback (0% = never; 100% = all the time).</p>	

Generating your own feedback %	Constant feedback from coaches %
Key Transitional Point: Finally, I would like you to think about whether there you have been through a key learning experience up to this point in your life. This is open to your interpretation, but please be as specific as possible- stating why you think this was key.	

Appendix D: Coach Practice and Training Survey

Coach Practice and Training Survey

Physical Fitness: Thinking about a typical week in the season, how many hours would players spend on specific physical fitness/conditioning training?		
Mental Skills: How many hours during a typical week are players engaged in mental skills training practice (e.g., visualisation skills, working out pre-performance routines, relaxation or concentration techniques etc.).		
Vicarious Learning: How many hours during the typical week are players engaged in learning through watching rugby (e.g., watching rugby on T.V., watching other rugby players' practice and/or matches in order to increase their own skill).		
Conveying Information: If you now consider all three of these types of practice as a whole and think of all the practice players do in a typical week, I would like you to consider how instructions about technique, strategy, and your performance are presented to them.....		
Is information ever presented in verbal form? % of time	Is information ever presented via a demonstration? % of time	Is information ever presented via video/ DVD form? % of time
Amount of Practice (Hrs per week)	Amount of Practice (Hrs per week)	Amount of Practice (Hrs per week)
Context Specificity:		

<p>I would like you to consider whether practice environments are similar to the competition environment. Examples are situations where practice environments mirror competition closely, that is, opposition specific training, full contact drills/ match, drills in specific areas of the field etc. Please also try to recall situations where these examples might have happened ‘accidentally’, for example (</p>
<p>Based on the types of examples just spoken about, what proportion of practice is similar to competition? (0% = never; 100% = all the time).</p>
<p>Prevalence (% of time):</p>
<p>Amount of Practice (Hrs per week):</p>
<p>Please can you tell me how difficult (1 – 10) these sort of “match scenario” sessions typically are.</p>
<p>Difficulty (1 – 10):</p>
<p>Anxiety Specificity: With regard to practice matching competition, I would like you to consider what the stress of practice was like in comparison to that of competition. Please pay particular attention to practices where pressure to perform was introduced. Examples of such practice could be the introduction of consequences to performances deemed unsuccessful (e.g., , , being dropped to the bench if players fail to perform to the standard expected or are made to perform a mundane job for the good of the team for missing tackles or dropping passes.) Please tell me what proportion of practice is set up so that the pressure induced was similar to that of competition (0% = never; 100% = all the time).</p>
<p>Prevalence (% of time):</p>
<p>Amount of Practice (Hrs per week):</p>
<p>Please can you tell me how difficult this pressured practice typically is (1 – 10)</p>
<p>Difficulty (1 – 10):</p>
<p>Finally, in situations where you practice in a pressured environment, can you provide some details about how pressure is induced?</p>

<p>Focus of Attention: O.K., I now want you to spend a little more time thinking about a typical training week. I would like you to consider where players' focus of attention is during practice. There are two types of situation that I would like you to consider:</p> <ol style="list-style-type: none"> 1. Situations where players are focused on their body (e.g., as a coach you may ask players to focus on their hands or where you ask them to move their feet and their head in a certain direction when performing certain skills). 2. Situations where players are focused on the outcome of their movements (e.g., when you might ask players to focus on the hands of the player they're passing to....the flight of the ball... where the ball was passed to etc...). <p>Please can you now tell me how the proportion of time during practice where players focus on their body movements during training, compared to when they focus on the outcome of their movements? (0% = never; 100% = all the time)?</p>		
% Prevalence/ Split:	BODY:	OUTCOME:
Amount of Practice (Hrs per week)	BODY:	OUTCOME:
<p>Nature of Focus of Attention: For both the body and outcome focuses you just told me about, I would now like you to recall whether the majority of that focus was on the separate aspects of a technique/skill (e.g., when you broke the technique down into parts for example with tackling <i>the movement and position of your feet, your shoulder position, the height at which you placed your arms etc.</i> or whether they were more holistic and simply focused on the technique as a whole (e.g., <i>getting in a big hit, tackling man and ball</i>).</p> <p><i>Place a 'p' if the majority of their focus is on separate or individual aspects of a skill or place an 'h' if the focus was more holistic in nature. In situations where it is 50:50, place an 'e'.</i></p>		
P/H/E:		
<p>Constraints/ Prescriptive Learning Approach: Finally, I would like to understand how often practice encourages players to learn skills with a prescriptive coaching approach versus a task based coaching approach.</p> <p>Prescriptive coaching typically involves lots of demonstrations and verbal instructions about how to perform a skill in a technically correct fashion together with lots of feedback and guidance about how to adjust this technique on future attempts.</p>		

Task based coaching typically involves creating situations where learners are encouraged/forced to find solutions to scenarios through exploration and discovery. The scenarios may be created by;

1. Manipulating the task (e.g., players have to pass a certain number of times before crossing the try line or only use the blindside)
2. Manipulating the environment such as the playing surface, the weather conditions (dry, damp), and the availability of sensory information (i.e., the vision, hearing, or 'feel' of the player).
3. Manipulating the player, perhaps by limiting their movement (e.g., one handed off-loads, restricting vision, the use of ropes or elastic bands).

Please tell me how much practice during a typical week consists of prescriptive coaching and how much consists of task based coaching. There may have been times where practice fell into neither of these categories, and coaching was actually non-prescriptive and non-directional, meaning players are left to their own devices.

% of time	Prescriptive:	Constraints:	Neither:
Amount of Practice (Hrs per week)	Prescriptive:	Constraints:	Neither:

Fig 1. TYPICAL PRACTICE WEEK