

STRENGTH AND CONDITIONING IN MEN'S PREMIERSHIP
HOCKEY: A CASE STUDY OF UNDERSTANDING, INFLUENCES
AND SUPPORT

By

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A thesis submitted to

The University of Birmingham

for the Degree of

MPhil (B) SPORTS COACHING

School of Education

The University of Birmingham

November 2010

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ABSTRACT

Traditionally, efforts to improve performance in team sports have focused on technique and tactics at the expense of physical fitness (Stolen et al, 2005; and Reverter-Masia et al, 2008). However, with renewed vigour on enhancing performance in sport at all levels, several avenues within the realm of sport science are being utilised to facilitate this process.

One of these avenues is strength and conditioning. The main objective of this mode of sport support is to maximise an athlete's physical performance whilst seeking to prevent injuries (Hunter & Harris, 2008; and Dorgo, 2009). Within England, little is known about how strength and conditioning is used within non-professional team sports such as field hockey. This study therefore takes residence within a men's Premiership hockey club.

18 male players from a Premiership hockey team in England were selected, and all players completed both a training diary form and a semi-structured interview. An interpretive framework was adopted in order to analyse the data that emerged.

Through a qualitative approach, the study reveals more about the role strength and conditioning plays within one of the top men's hockey teams in England.

The findings of this study establish a typology of four different player groupings (Majors, Make-its, Masters, Minors) relating to each player's understanding of, influences towards, and support within strength and conditioning.

ACKNOWLEDGEMENTS

A sincere thank you must go to a number of people, as without their help the completion of this M.Phil would not have been possible:

- To my research tutor Dr. Martin Toms for his continuous guidance, patience and support. I cannot thank you enough for all you have done.

- To my family for always providing a positive influence, and for keeping me encouraged when I was wavering at the finish.

- To all the players and coaches who agreed to be a part of this study, thank you for welcoming me to your club, giving up your free time, and letting me understand more about the role of strength and conditioning in a premiership hockey club.

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Chapter 1: INTRODUCTION

1.1 Introduction to Chapter

The purpose of this chapter is to outline the focus of the study and the rationale behind selecting such an area for research. The research area will then be introduced in more detail before looking at the chosen methodology for this study as well as providing an overview for the thesis.

1.2 Introduction to the Research Area

With renewed focus on enhancing performance in sport, several avenues within the realm of sport science are being utilised to develop individual athletes and teams of athletes. One of these avenues is that of strength and conditioning. In essence, the key objective of strength and conditioning is to maximise an athlete's physical performance in seeking to enable him/her to be more physically effective whilst seeking to prevent injuries (Hunter & Harris, 2008; and Dorgo, 2009).

Field hockey is a popular sport for men, women and children in England, with the majority of hockey being played through a national club structure with 1050 clubs of varied sizes across the country (England Hockey, 2009). At the top end of this club structure sits the National Premier Hockey League consisting of ten teams (mirrored in both the men's and women's sport). The investigation intends to focus on this end of the hockey spectrum.

Traditionally, efforts to improve performance in team sports have focused on technique and tactics at the expense of physical fitness (Stolen et al, 2005; and Reverter-Masia et al, 2008). However, the necessity of superior performance in sport has impelled coaches and athletes to use increasingly effective and sophisticated training methods (Koutedakis et al, 2006).

1.3 Outline of the Study

The current literature available for the sport of field hockey provides us with a rich foundation of quantitative research studies which have highlighted the necessary physical requirements for any field hockey player and the differences in these

characteristics between elite and non-elite players. Notably aerobic and anaerobic endurance, speed, agility, strength and flexibility are defined as being key (Reilly & Borrie, 1992; Boyle et al, 1994; Aziz et al, 2000; Bishop et al, 2003; Astorino et al, 2004; Elferink-Gemser et al, 2004; Spencer et al, 2004a; Spencer et al, 2004b; Spencer et al, 2005; Elferink-Gemser et al, 2007). There is however still very limited empirical research on the training top level hockey players do, or should be doing, in order to reach their potential and maximise their performance in this sport.

This study therefore proposes to utilise a qualitative methodology with an interpretive theoretical framework in order to gather in depth data about an area that is yet to be investigated. It is hoped that by discovering more about the specific strength and conditioning tools male premierships hockey players employ in their training, physical training for this sport in England may see some development and promotion in the future.

1.4 Methodological Background

As previously discussed, in the past, quantitative research has been the dominant methodology for studies on field hockey and the sport's physical requirements. Both laboratory and field based testing have been used to produce empirical literature. Notably Elferink-Gemser et al (2007) produced a case study in the Netherlands over a three year period. Four different tests were used in order to discover more about the participant's physical abilities. Elite players showed superior performance over their sub-elite peers through all tests. What this study does not inform us of however is why the elite players performed better. There is no data to tell us whether or not this is related to any additional activities these players were doing either on or off the hockey pitch.

In order to discover more about what top end field hockey players do in their training in England, two research methods were selected. Firstly, training diary forms were used to ask players to account for all the activity they had undertaken over the last seven days. Following directly from this, each player participated in a semi-structured interview in order to gain a more participant-centred view of the different activities each player partakes in. Through the chosen research methods, players from a men's premierships hockey team were asked exactly what training they did away

from the pitch, why they do this training, and where their influences for this training have come from.

1.5 An Overview of the Thesis

This initial chapter gives a brief synopsis of the rationale behind this study and summarises its focus. Chapter 2 reviews the literature that is relevant to the subject area as well as depicting key references that have directed the focal point of this research piece. Chapter 3 details the research methods chosen for the study, the reasoning behind selecting such methods, and the processes undergone to gather and collect data. Chapter 4 discusses the themes and findings from the data and links these findings back to the relevant research from chapter 2. The final chapter draws conclusions on the study, addresses implications for both strength and conditioning and field hockey in England, and highlights potential research matter for the future. The study closes with a short account of the process undergone by the researcher. This will include a brief narrative on the background of the researcher and the grounding of the study, as well as the researcher's reflections on professional practice, limitations, and the project as an experiential journey.

1.6 Chapter Conclusion

This chapter has introduced the research area and justified the rationale behind selecting such an area for research. The chosen methodology has been briefly outlined, and an overview of the thesis has been provided. The next chapter will provide an overview of the literature relevant to this study.

Chapter 2: LITERATURE REVIEW

2.1 Introduction to the Chapter

The purpose of this chapter is to review the literature related to the sport of field hockey, in particular those articles that focus on the physical aspects of the sport. The chapter begins by looking at the background of hockey in England, which leads to an exploration of the physical demands of the sport. The chapter will then look at the concept of strength and conditioning as well as training adherence and performance in sport at an elite level.

2.2 A Background to Field Hockey in Great Britain and England

The game of hockey (or field hockey) is played widely across the world, and is a sport played by men, women and children across Great Britain (England Hockey, 2009). There are eleven players to a side, with sixteen players making up a squad, with a combination of goalkeepers, defenders, midfielders, and attackers. Each player has a stick with a rounded head to play the ball with the ultimate aim of scoring goals by putting the ball in the other team's goal.

Great Britain Hockey is comprised of the home nations England, Wales and Scotland. To be eligible to represent Great Britain, a player must be affiliated to a Home Country Governing Body (Great Britain Hockey, 2009).

In England, the Home Country Governing Body is England Hockey. England Hockey (2009) suggest that within England, the majority of hockey played is through a national club structure, with 1050 clubs of varied sizes in the country (an average of 4-6 teams or 80 people per club). The National Premier League is the apex of a pyramid under which sits three other national leagues (conference north, east, and west). These leagues are supported by the foundations of a strong regional and county base of leagues below them. This structure is mirrored in both the men's and women's hockey divisions. On an international scale, England's major three tiers include both men's and women's under 18, under 21 and senior squads.

2.3 The Coaching Structure of Field Hockey in Great Britain and England

The England Hockey Board is the lead home nation in the GB strategy group that includes England, Wales and Scotland. England Hockey states that all of the coaching awards have been re-written in the last three years to reflect the modern game and its requirements (England Hockey, 2010a). There are currently four levels of coaching within the coaching structure (not including the Leadership Certificate which is a generic certificate including elements of umpiring and administration). Level 1 is intended to provide the essential skills and knowledge necessary to run a safe and enjoyable session for players being introduced to the game. Components include; basic techniques, principles of play, use of small-sided games, the rules of the game, underpinning theory and knowledge, and skills to create a safe, enjoyable and effective environment (England Hockey, 2010b). Level 2 is designed for those coaches who wish to coach the techniques of the game beyond the introductory level and apply them to tactical play and the coaching of teams (Level 1 is a prerequisite to this course). Level 3 is for those who wish to coach tactical and team play to a more advanced level. It is only when you get to Level 3 that there is any mention of integrating ‘fitness’ into the coaches skill base. “Those at Level 3 should be able to devise and implement an appropriate programme of fitness, skill development, tactical play, match preparations, and technical corrections for a team playing at a high standard” (England Hockey, 2010c). There then follows a list of ‘essential’ and ‘desirable’ criteria under which capability of planning a fitness programme is found on the ‘desirable’ list. Level 4 is the pinnacle of the coaching structure and is still under development. Coaches wishing to progress to this level need to be working in the National League and/or be involved with junior international teams with a view to progressing to senior teams.

There is no mention of strength and conditioning within the four levels of coaching under the England Hockey guidelines, only that of ‘fitness’. It may therefore be recognised as a completely separate entity, however, it is still said to be desirable for higher level coaches in England and Great Britain to be able to devise fitness plans. Unfortunately it is not possible to see how coaches are supposed to go about this or whether or not they are assessed on their knowledge of ‘fitness’ before they are passed as an advanced (Level 3) coach.

2.4 The Physical Demands of Field Hockey

The advancement of sports science in recent years has created an avenue of exploration in the identification of the determinants of athletic performance (Godfrey & Whyte, 2006). In order to do this within the sport of hockey, the physical demands of the sport must first be identified and analysed.

2.4.1 Playing Arena and Rule Alterations

Senior level hockey is played on a pitch measuring 91.40 metres by 55 metres, with matches being played over two halves each lasting 35 minutes, with a 5-10 minute interval at half time. Hockey is a game that has recently undergone significant modification. The introduction of the artificial pitch in the 1970s has changed the pace and style of the game dramatically (Spencer et al, 2004a; and Elferink-Gemser et al, 2007). Initially, artificial turf pitches were given a sand base and this allowed the ball to be transferred from player to player at a much greater rate than it could be on grass. This surface also allowed for a more consistent and predictable movement of the ball as artificial pitches are much flatter and smoother than grass. More recently, water has been favoured as the base for artificial pitches. This allows the ball to be moved faster still, and is a more comfortable surface for athletes to play upon, as there is slightly more give under foot, and less abrasion when in contact with skin. This is now the surface of choice for national league competition and international play. In addition, the introduction of changes in the rules has also modified the game (Spencer et al, 2004a; and Elferink-Gemser et al, 2007). The most significant of these being that there is now no limit to substitutions made, and the offside rule has been removed. These changes have influenced alterations in the physiology of the game, and changed the physical demands of this sport at all levels (Reilly & Borrie, 1992; Lemmink et al, 2004; and Spencer et al, 2004a), they have yet however to inspire a significant increase in research in this sport.

2.4.2 Aerobic and Anaerobic Endurance

Competitive hockey match play can be described as a non-continuous, high intensity, intermittent activity that places heavy demands on the aerobic energy system (Reilly & Borrie, 1992; Boyle et al, 1994; and Elferink-Gemser et al, 2004). A study by Spencer et al (2004a) used time-motion analysis to document the movement

patterns during an international field hockey game. Results showed that on average, low-intensity modes of activity (consisting of walking and jogging) accounted for 87.0 +/- 7.6% of the total player game time. High intensity running (striding and sprinting) accounted for 5.6 +/- 0.9% of the total player game. However, this study was based upon no more than one international game, and only recorded the output of 14 players from one team (Australia Men). For this reason, it is hard to establish whether or not the results from this study would apply to a wider population of hockey players. Considering this however, results would still suggest that in order for a player to last up to seventy minutes of match play, he/she should have a certain level of aerobic endurance, and that a sound aerobic base would be a physical prerequisite of the sport.

However, although players may be active at a low intensity for a large percentage of the time played, they must also be physically prepared to cope with the demands of the higher intensity activities (Aziz et al, 2000). Many coaches and sport scientists believe that a high level of aerobic fitness is an important requirement for superior anaerobic performances during sustained intermittent activities as it is thought to enhance recovery from high intensity activity (Aziz et al, 2000). Lemmink et al (2004) state the ability to produce high intensity running efforts is crucial for top players, and is cited by Reilly and Borrie (1992) as being a discriminating factor between elite and county level players. Similar to other team sports such as football and rugby, the ability to run efficiently and cope with intense bursts of speed and changes in direction are clearly very important performance-related characteristics of elite play. Hockey however also has one additional unique requirement from other team based field sports and that is the skill of playing in a semi-crouched posture (Reilly & Seaton, 1990; and Elferink-Gemser, 2004). This position is used throughout the game when passing, dribbling, receiving/moving for the ball and challenging for the ball, and causes extra physiological strain on players (Reilly & Seaton, 1990; and Elferink-Gemser, 2004). The intermittent running patterns of the game include accelerating and decelerating over short distances at maximum speed (often in succession of each other), and covering longer distances such as the full length of the pitch with sub-maximum pace. The continuous variations in running and consistent changes in direction ensure a high overall effort in field hockey which can be very physically demanding (Patel et al, 2002; and Astorino et al, 2004). Successful players

must possess the physical ability to be able to cope with and manage these factors (Elferink-Gemser et al, 2004).

2.4.3 Speed and Agility

The ability to perform maximal short duration sprints with speed intermittently during a game is an integral component of team sports (Baker & Nance, 1999; Spencer et al, 2004a; and Spencer et al, 2005). Speed can be described as the ability to react quickly, perform a short burst of movement, or run continuously at high pace (Watson, 1995). If a player can reach the ball before his/her opponent then he/she has won possession for their team. A team in possession of the ball has the ability to attack and therefore score goals (the game objective). All of these disciplines are essential when taking part in the sport of hockey. Both outfield players as well as goalkeepers must be able to react at speed in a number of situations. Rapid bursts of movement are necessary for players to outrun the opposition to meet the ball first or to dribble past a player with a fast acceleration. Although goalkeepers may not have to cover the same ground, their reaction time and movement to the ball must be performed with speed in order successfully to defend their goal. More continuous bursts of speed are used during successful breaks of play that move from one end of the pitch to the other, and outfield players must move accordingly to support the attack or defence. Spencer et al (2005) examine the limited data concerned with short-duration and repeated sprinting in field-based team sports. They highlight that time-motion analysis may not always be an effective method to use in achieving more data in this area as they say the accuracy and detail of the data may be limited by the speed and skill of the analysts.

Field hockey also takes a multidirectional nature, so in addition to speed, the ability to change direction rapidly while maintaining balance without loss of speed is an important component for success as well, and is known as agility (Lemmink et al, 2004). Hockey players, like many team sport athletes, are required to accelerate, decelerate, and change direction consistently throughout competitive play. It is key that players are able to produce these movements effectively when reacting to stimuli in a match (Sheppard & Young, 2006). Recent research has shown the advantage of using game-based training as means of creating a specific training environment for competition preparation (Gabbett et al, 2009). By simulating the physiological and technical demands of competition, it is hoped that both the skill and fitness level of

team sport athletes will improve. However, although game-based training offers a specific level of conditioning, it may not always replicate the high intensity, repeated sprint demands of competition if players are not motivated by the game in training.

2.4.4 Strength and Flexibility

Strength and flexibility are integral components of any hockey player's physical armoury as both provide the athlete with further physical ability; and can also help in the prevention of injuries (Bompa, 1999; Gabbett et al, 2008; and Jeffreys, 2008). Strength training can be used in the improvement of speed in specific skills within team sports (Gorostiaga et al, 1999; Newton et al, 1999; and Reverter-Masia et al, 2008). Resistance training, traditional strength and power training methods (i.e. Olympic style weightlifting, traditional strength training, plyometrics, and vertical jump training) have been shown to enhance functional performance (i.e. running and jumping) in athletic and nonathletic populations (Blazevich & Jenkins, 2002; Coutts et al, 2004; and Tricoli et al, 2005). These training methods have been utilized in several training studies and are commonly used by strength and conditioning coaches (Simenz, 2005).

2.5 The Hockey player as Athlete

2.5.1 Strength and Conditioning

Physical performance in sport involves effective, purposeful movements of the body. With renewed focus on enhancing performance, several avenues within the realm of sport science are being utilised to develop athletes and teams of athletes. One of these avenues is that of strength and conditioning. In essence, the key objective of strength and conditioning is to maximise an athlete's physical performance in seeking to enable him/her to be more physically effective whilst seeking to prevent injuries (Hunter & Harris, 2008; and Dorgo 2009). Strength and conditioning contributes to both the physical and physiological development of athletes for elite sport. The concept encompasses the entire development of an athlete and what is needed to improve their performance. This can include work on strength, endurance, speed, agility, plyometrics, core stability and flexibility (English Institute of Sport, 2009).

2.5.2 Elite Performance

It is well known that with correct exercise training, players can improve their performance. This is highlighted in the research paper by Elferink-Gemser (2007) which depicts the differences in performance between two groups of youth hockey players in the Netherlands. All participants were part of a talent development programme of a prestigious field hockey club, but subjects were divided into two groups (elite and sub-elite) depending on their selection for the Dutch Field Hockey Association (i.e. “elite” players had been selected). The results showed that elite players performed better than their sub-elite peers on all physiological tests. Elite players performed more runs on the interval shuttle run test, and showed they were faster in the peak shuttle dribble test, repeated shuttle dribble test, and slalom dribble test. The tests were made at regular one year intervals over a three year period, and the test protocol was identical year on year. However the sample was weakened by a relatively high drop out rate. The study began with 126 participants, but this number decreased by almost 50% by year three to just 65 participants. Athletes were reported to have left over the time period due to drop out from the talent development programme, or for reasons precluding them from not attending one of the tests. Improvements in performance were recognised in both groups over the 3 year period. Part of this could be explained by the athlete’s physical maturation and development, and part could be due to familiarisation with the testing protocol. One explanation by the researchers of this study of the difference in performance of the two groups is the increased number of hours spent training by the elite group (i.e. they train more). Although this may be true, the study does not go into detail or suggest what additional training these players might be doing in order to improve their performance. Traditionally, efforts to improve performance in team sports have focused on technique and tactics at the expense of physical fitness (Stolen et al, 2005; and Reverter-Masia et al, 2008). There is a gap in the literature for studies that evidence this culture within sport in England; it may therefore be of interest to see if this tradition still exists.

While the maintenance of physiological function is clearly important in team sports such as hockey, during such activities the completion of the required skills is at least as important in determining success (Sunderland & Nevill, 2005; and Gabbett et al, 2009). Players therefore, especially at an elite level, must be able to perform the technical skills well, but they must also be conditioned to a certain level where they

are able to perform these skills under pressure when they are being subjected to the high physical demands of the game. Research into the performance of field hockey during National League matches has shown that during the second half of match play there is a decrease in the amount of high intensity activity performed (Lothian & Farrally, 1994). If a team can delay the onset of fatigue in competition, then they are more likely to take advantage of their opposition in the latter stages of a game. Therefore being physically fit holds massive relevance and importance in top level competition.

2.6 Training and Development

2.6.1 Training Adherence

Despite field hockey's global popularity, little has been written on the specific training that hockey players should undertake in order to develop performance. Leslie et al (2007) argue that there is still only very limited research on the physiological characteristics required for elite hockey play, and how these develop in elite players from junior to senior level.

Some of the key researchers in the field of training adherence are Palmer and colleagues, conducting three empirical studies of relevance to this one between 1998 and 2000. Palmer et al (1999) identify that the vast amount of adherence research in sport and exercise settings have focused on exercise behaviour, whilst studies focusing on elite performer's adherence to training are sparse. In 1999, Palmer et al used a naturalistic enquiry to identify fitness training facilitators and barriers experienced by elite netball players and to determine whether they were related to types of fitness training behaviour. Palmer et al (1998) found that adherence to a nine week training programme with junior elite netballers was low, with only 21% meeting the training criterion. The study reported a number of barriers to training including exams, school work, injuries, illness and bad weather. Similarly when Palmer et al (1999) studied an elite squad of senior netball players' adherence to a fitness training schedule, only three of the fifteen players (20%) that participated were reported to have followed the programme fully. Interestingly, there was no reflection in age and experience of the players as to whether or not they followed the programme or not, i.e. the three players that complied varied in age from 18 to 32 with three to fourteen years experience. The players that reported barriers that precluded them from

following the programme fully and those that chose not to follow it at all, ranged in age from 18 to 29 with one to eleven years of experience. Analysis identified twelve facilitator concepts that aided the athletes to train including self motivation, training routine and training support, enjoyment, and outcome expectancy and value, i.e. believing that because they are representing a national team they want to play well and in order to do this they must be fit. There were nine barrier concepts that emerged from the data including lack of self motivation, enjoyment, outcome expectancy and value, and lack of individual confidence and player/coach support. A study by Marlow and Bull (1999) found that attitudes towards fitness training varied among elite female cricketers. They believe that the players' attitudes had a real impact on their adherence to fitness training, thus supporting work by Palmer et al (1999). In this country, World Class Performance funding is provided to British governing bodies of sport to help achieve consistent success in international competitions. Without 100% training adherence, athletes might not receive the full benefits of a recommended programme and might be unable to compete effectively at a world standard (Palmer et al, 2000).

2.6.2 Training Influences

Successful careers in sport demand large amounts of time and resources in order to compete at the top level (Conzelmann & Nagel, 2003). Within the current literature available, empirical studies on coaching in general have taken focus on where coaches have gained their knowledge from, and how their experiences have affected the way they work. Werthner and Trudel (2006) present a case study based upon an elite Canadian coach and illustrate the different learning processes in three types of learning situations; mediated, unmediated, and internal. They look to explore from the coach's perspective the ways in which coaches learn in order to develop. Through this paper they highlight the importance of understanding that there is no necessity to polarise between learning through mediated learning situations (i.e. formal courses) and unmediated learning situations (informal mentoring), but to appreciate the importance of reflection through using material of learning from external experiences or from the material already within a coach's cognitive structure. Wright et al (2007) use a larger sample of thirty five coaches when exploring the different learning situations in which youth ice hockey coaches learn to coach through semi-structured interviews. Results showed seven different learning situations in which coaches

develop their knowledge. These were; large-scale coach education programmes, coaching clinics/seminars, formal mentoring, books/videotapes, personal experiences related to sport, family, and work, face to face interactions with other coaches, and the internet. They emphasise the importance that there is value to all seven types of learning, and they should all be recognised and developed further instead of merely focusing on the primary resource identified, this being large-scale coach education programmes.

Schempp et al (2007) recognised strategies employed by golf coaches to improve their knowledge and teaching. From the 31 participants within their study, results showed that coaches sought out experts in the field to broaden and deepen their understanding of coaching as well as attending seminars to hear the latest findings from experts in the field. Use of video technology to analyse and evaluate their own performances, as well as reading, were also reported as means of understanding more about coaching. Cushion et al (2003) note that coaching can be highly dynamic and complex as coaches need to develop a wide range of skills and knowledge. On the other hand, athletes too must develop a good base of knowledge about their sport and how best to train for that sport as they mature and work towards competing at an elite level.

Côté (1999) and Becker (2009) suggest that both parental and coaching support are two key factors in helping athletes succeed, but there is nothing detailing where athletes gain their knowledge about training from and who or what influences them in their learning. Whilst there is developing literature on how coaches learn, there does not appear to be the same progression when looking at how athletes learn. This theme will therefore be explored later in this chapter.

2.6.3 Training to Expert Standard

Interest in athletic performance at a high level has existed since the inception of sport (Johnson et al, 2008). Previous research has identified a number of constructs related to elite athletic performers. Notably, elite athletes have previously shown high levels of commitment (Côté, 1999; Vernacchia et al, 2000; and Holt & Dunn, 2004), and having sport as a central part of their lives (Mallett & Hanrahan, 2004).

Literature to date does inform us there are a number of factors that play a significant role in the development of expert performance. However, Durand-Bush and Salmela (2002) highlight that very little research has looked at the entire career

development of outstanding athletes and how these elite sports people maintain such high level performances over an extended period of time. Their investigation puts emphasis on these two key areas whilst examining a variety of factors through a more naturalistic inquiry. The sample for this study included 10 athletes having won at least two gold medals at separate Olympics and/or World Championships. Results showed that athletes progressed through four different stages throughout their careers. These included the sampling years, the specialising years, the investment years and the maintenance years. Compared to the previous stages of their careers, practice sessions were much more intense and regimented during the investment years. As well as spending a considerable time refining the technical aspects of their sport practising from 15 to 40 hours a week, they would spend in addition another 1 to 7 hours lifting weights or doing other dry land activities. Most of the athletes within this study also followed specific training programmes that were designed and monitored by strength and conditioning coaches. Results showed that the athletes enjoyed deliberate practice activities that involved technique or tactics more than physical or dry-land components. However, they did enjoy the outcome of this process, that is to say, improved strength and performance. It was reported that training basically became a full time job from the investment stage, although some athletes still went to school or worked part time. This commitment carried over in to the maintenance stage. Athletes would undoubtedly benefit from knowing what experts do to stay at the top once they become the best. This paper looks to provide insight into this; however, there is still a lack of literature in this area.

2.7 Performance in Sport

2.7.1 The Sports Environment

The necessity of superior performance in sport has impelled coaches to use increasingly effective and sophisticated training methods (Koutedakis et al, 2006). In recent years there has been a surge in the advancement of sport science and the identification of the determinants of athletic performance. Despite this fast increasing pool of knowledge, sport science has often been viewed by coaches as inaccessible, too technical, or in many cases, lacking in ecological validity (Meyers, 2006). However, with rising pressures in the arena of elite sport, more and more coaches and athletes are turning to science to seek additional support. What Meyers (2006) tries to

convey is the importance of focus on additional areas of sport science (i.e. biomechanics, physiology, nutrition, and psychology) to supplement a coach's work in the sporting environment. The paper suggests that the merging of sports science and coaching will allow today's athletes to not only excel and compete at much higher levels, but also allow the athlete to prevent injury and maintain a healthier career.

A study by Reverter-Masia et al, (2008) focuses on the conditioning services in elite Spanish clubs of team sports. A comparison is made between sports in professional leagues (i.e. football and basketball), and those that participate in the top division amateur leagues (i.e. handball, volleyball, field hockey and indoor football). A survey was administered to those responsible for the conditioning services within the teams and 77 out of 94 people responded. Teams were divided into two classes (A and B) under their professional or amateur status depending on performance. 58% of the professional teams hired a full time conditioning coach, in comparison to 41% of class A amateur teams and 0% of class B teams. Results suggest that the more professional teams with larger budgets take very seriously the strength and conditioning needs of their athletes and are trying to protect and better prepare them for competition.

There is a dearth of research exploring the same theme within England. It may be of notice that very few sports teams with amateur status employ extra coaches to lead their strength and conditioning, but numbers and statistics to support or contradict this are not available. There is an expectation of many head coaches to cover strength and conditioning with his/her athletes without extra support. If these coaches do not know exactly what they are doing this could be detrimental to the physical development of those athletes.

2.7.2 The Coach

Wikeley and Bullock (2006) and Galipeau and Trudel (2006) define coaches as educators, in that their role is to work with one or more athletes in order to move him/her to an improved level of performance. Similarly, Côté (1999) explains that coaches play a vital role in helping talented athletes improve themselves during their sporting careers. The outcomes of a large proportion of sports science research is intended to benefit the practice of sports coaches, and in turn the development of athletes. However, in the literature on coaching, frequent references are to be found that claim that a 'gap' exists between sport science research and coaching practice.

Williams and Kendall (2007) used surveys and interviews as research tools to examine the perceptions of elite coaches and sport science researchers in Australia regarding the research needs of elite coaching. One of Williams and Kendall's (2007) main arguments is that there is a need for sport science researchers to become more active in disseminating results of research. Coaches and athletes are currently missing out on a large fund of information due to lack of translation of scientific jargon and poor communication pathways. This concept was highlighted when the paper later suggested there needs to be a change in the delivery of research findings, and found that the use of appropriate forums, appropriate lay-language, and information incorporated into coaching accreditation material are more likely to be of use to coaches (Sands, 1998). This would certainly seem like a more effective method of translating information to coaches and thus to the athlete.

A major objective of sport scientists and elite coaches is the enhancement of athletic performance. "Training theory may supplement the coach's practical knowledge to help him formulate a balanced training programme" (Dick, 2002; 212). The majority of research papers that focus on the physiology of sport are of a scientific, quantitative nature. This type of research can often be hard to digest, and applied to a practical setting such as the coach must take. Through the literature on hockey, much of the focus is on testing physical fitness components as opposed to analysing the physiological demands so that strategies can be put in place for the physical development of players. Coaches, trainers, and players are continually searching for effective methods of identifying and developing those characteristics in a player that may enhance performance (Lemmink et al, 2004). Physical training is an important and integral aspect of any sport as it is one area that can be easily controlled. Alongside genetic endowment, state of training is the most important factor in influencing performance (Lambert, 2006; and Williams, 2007), yet within the sport of hockey, there seems a current lack of focus in this area. To perform at the top level, elite players must be prepared to invest many hours of intensive training over many years (Starkes & Ericsson, 2003). Part of a hockey coach's role should be to create a sound learning environment where it is part of the culture to put extra time off the pitch into physical training, and to ensure that this extra time is spent doing the correct training and exercises that will aid that athlete to improve therefore having a positive effect on the team's performance as a whole.

2.7.3 Future Development

When looking forward to making improvements in the area of physical fitness within the sport of hockey, research angles such as that taken by Elferink-Gemser et al (2007) and Polman et al (2004) could be of great use. Elferink-Gemser et al (2007) measured physiological, technical, tactical, and psychological characteristics of thirty elite and thirty five sub-elite players on three occasions, separated by intervals of one year, with the aim of identifying performance characteristics that could help predict future elite hockey players. By identifying the most important performance characteristics within physiology, coaches will know more of where to aim their focus with fitness training. Polman et al (2004) compared the efficacy of three different fitness programmes with three groups of female soccer players over a twelve week period. This type of research could prove valuable, as by testing different types of programmes, more information will be available for coaches on what could work for their players. Coaches of hockey however must keep in mind that although they are working with a team/group of athletes, each player is an individual and he/she may have different areas of weakness in their physical performance. Dick (2002; 222) stresses that, “The coach must view the development of fitness as unique to athlete and situation”. Coaches of hockey must be able to cater for the individual, and also respect the varying strength and conditioning needs of different playing positions.

There are a myriad of ways coaches influence the improvement of athletes. Wang and McJunkin (2005) discuss the important role that coaches play in the overall development of an athlete’s ability, physical well being, mental maturity, discipline and sportsmanship. It is crucial for coaches to provide quality coaching to athletes from a young age so they can obtain a positive experience through athletic activities. Wang and McJunkin (2005) put emphasis on a number of standards of physical preparation and conditioning including; utilizing research based conditioning principles to prepare participants for the demands of sport, designing programmes of training, conditioning, and recovery that properly incorporate physiological and mechanical principles, teaching proper nutrition relevant to managing health, body weight and optimal physical performance, and demonstrates knowledge of the use and abuse of drugs and supplements so providing athletes with appropriate and accurate information to maintain healthy sport participation. An information resource specific to hockey that focuses on this area of the sport would be invaluable for hockey

coaches and athletes at all levels, and would certainly be of great use in bringing the sport of hockey forward.

2.8 Chapter Conclusion

Through quantitative testing, the literature provides us with a rich foundation of information on what the physical demands of hockey are. Notably, aerobic and anaerobic endurance, speed, agility, strength and flexibility (Reilly & Borrie, 1992; Boyle et al, 1994; Aziz et al, 2000; Bishop et al, 2003; Astorino et al, 2004; Elferink-Gemser et al, 2004; Spencer et al, 2004a; Spencer et al, 2004b; Spencer et al, 2005; and Elferink-Gemser et al, 2007). However, there is still little empirical research on the specific training top level hockey players in this country do or should be doing in order to meet these physical demands and compete to their physical potential. There is currently an abundance of scientific research available, but little is disseminated in a way that is easily accessible to the sport specific coach or athlete (Williams & Kendall, 2007; and Meyers, 2006). As yet, no research has taken a qualitative angle in the area of strength and conditioning for field hockey. This study will now therefore take focus on the research methods that have been used to discover more about the strength and conditioning concepts employed by male premiership hockey players in this country, in seeking the promotion and future development of physical training for field hockey in England.

Chapter 3: METHODOLOGY

3.1 Introduction to Chapter

This chapter will begin with a summary of the research area and an explanation of why such an area has been selected for research. A qualitative approach using an interpretive framework has been utilised for this investigation. Reasons behind employing such a strategy as well as the research methods chosen within this framework will be presented, rationalised and justified. In addition, the chapter will explore the processes used to gather, analyse and interpret the data, as well as discuss the challenges of using qualitative research in practise.

3.2 Area of Research

As discussed in the previous chapter, the majority of research on the sport of field hockey to date has taken a quantitative approach, particularly when looking at the physical aspects of the game. Currently, there are no empirical studies (either quantitative or qualitative) investigating the training regimes of elite/top end field hockey players in England. There is of course some research within this field which includes studies by Elferink-Gemser et al (2004 & 2007) who base their studies in the Netherlands, and Spencer et al (2004a, 2004b & 2005) who base their studies in Australia. These countries are two of the strongest in the world when it comes to international competition.

In addition to the gap in the literature on field hockey and training in England, there is an equal dearth of studies reflecting where athletes receive their stimulus and knowledge about training from, and whether or not they have an understanding of the concept of strength and conditioning. Studies by Durand-Bush and Salmela (2002) and Greenleaf et al (2001) however are important in providing us with information on how elite (Olympic and World Champion) athletes made their progression to the top of their sport, as well as sustaining a successful career there. In addition, research by Wright et al (2007) and Werthner and Trudel (2006) have explored how coaches learn to coach. Wright et al (2007) used semi-structured interviews as means to discover more about the different ways 35 youth ice hockey coaches learnt how to coach, and Werthner and Trudel (2006) based their study around an in depth case study of one

individuals' experiences of learning in coaching. This research could be useful when looking closer at how athletes learn to train and who or what has influenced this training.

The researcher within this study wanted to discover more about what, if any, strength and conditioning tools are employed by top end hockey players in this country as well as their understanding of the concept. The designs and outcomes of the papers highlighted above were used as stimuli to formulate a design (which will later be reflected upon) to take into the field in seeking to find out whether any information discovered could be used to develop and progress the training of hockey players in this country.

3.3 Methodological Paradigm

Although research in the area of strength and conditioning for field hockey is scarce, the quantitative research present which depicts the different physiological aspects of the game is still relevant in making us aware of a number of physical components making up the sport; for example, work by Elferink-Gemser et al (2007) who put forward the different performance characteristics of young field hockey players in the Netherlands over a three year period. In addition, research studies based in Australia by Spencer et al (2005) and Spencer et al (2004a&b) use different structures of quantitative research to find out more about repeated sprint ability and its relation and importance to field based team sports such as hockey. There still lies a gap however in the literature dealing with how hockey players train these physical components in order to compete at the top of their sport.

In order for coaches and athletes to learn more about training methods used to develop performance, the possibility of taking an alternative angle by using a qualitative approach may be a positive move in increasing the comprehensive literature available. David Gilbourne is one practitioner who has taken a qualitative route through an area of sports research (notably sports psychology) that was once previously dominated by quantitative research. Gilbourne (2002) uses personal reflection as a way of delving into a narrative of experiences in sport and sports injuries and their connection to everyday life, relationships, and sense of self. Gilbourne and Richardson (2006) use observational and reflective techniques to focus on the everyday work of applied sport psychologists. Flick (2006) argues for the

current relevance of taking a qualitative approach to research as he believes the deductive methodologies deriving research questions and hypotheses from theoretical models and testing them against empirical evidence are failing due to the differentiation of objectives. A primary reason as to why a qualitative approach was adopted for this study was to delve deeper into the social construct that surrounds the sport of field hockey in England and to discover more about player's use and knowledge of strength and conditioning. It is hoped that through taking a new approach to this subject area, a more in-depth and focused understanding of strength and conditioning in Premiership club hockey will be facilitated, and by gathering information and generating findings, more interest and focus in this area could potentially be developed.

3.4 Research Approach

Qualitative research is a situated activity that locates the observer in the world (Denzin & Lincoln, 2005a). It is a diverse term encompassing a range of techniques that focus on discovering more about the meaning rather than the measurement of specific phenomena (Schwandt, 2001). Key elements giving qualitative research a distinctive character include: providing an in-depth understanding of the social world, using small samples selected on the basis of salient criteria, data collection methods involving close and interactive contact between the researcher and participants, detailed data, open analysis, and outputs which tend to emphasise the social meaning (Ritchie & Lewis, 2003). It is important to recognise however what is meant by interpretive research and also to draw distinction between it and qualitative research.

Interpretive research is a more specific term defined in terms of epistemology (the relationship between the researcher and the people being studied). This is combined with ontology (the interpretations and views held by the researcher about the subject area), and the methodology (how the process is being carried out). Denzin and Lincoln (2003) discuss the thought that all researchers are philosophers in that they are guided by abstract principles. All of these principles will make an impression on the study; for example the questions that are posed to the participants, the way the responses to these questions are interpreted, and the way the data is finally analysed and reported. In order to account for the possible impressions these principles may

have on this study, and to allow for as open as approach as possible, this chapter will now follow with a short section detailing the background of the researcher.

3.5 The Researcher

The researcher played hockey for eleven years (competing at Regional under 18, under 21, and National League level), coached hockey for two years, and has more recently been involved in the field of strength and conditioning for the last three years.

On completing her undergraduate degree, the researcher began seeking work in the field of strength and conditioning. She has recently completed a twelve month internship (October 2008-October 2009) as a Strength and Conditioning Coach for DNA Sports Performance based at the University of Manchester, working here with TASS (Talented Athlete Scholarship Scheme) and University of Manchester Scholarship athletes. The researcher's interest in strength and conditioning has continued to grow and she has now gained full accreditation to the UKSCA (United Kingdom Strength and Conditioning Association) in seeking to develop her career further in this field. The researcher is currently employed (2007 to present) as a Strength and Conditioning Coach for two Premiership Hockey teams (one men's and one women's side).

3.5.1 Researcher Bias and Reflexivity

As the researcher previously played hockey at a high level and continues to be involved in the sport as a support coach (strength and conditioning), this background has provided her with a strong awareness of the subject area. Because of this, she is able to appreciate the experiences that the participants may have had whilst taking part at a competitive level in this sport. Amis (2005) suggests that immersion in the same field as the participants may allow for the researcher to be more aware when posing questions and follow-up questions, and may also allow for a greater depth of knowledge in specific subject areas. However, the researcher is also aware that because of her own professional and personal background, there may be a bias view taken on the findings. Therefore the researcher decided to select a group of players she had never previously met or worked with as a strategy to reduce researcher bias.

By entering a different club for research, much of the researcher's knowledge and possible prejudices may be challenged or dismissed.

Unlike quantitative research, qualitative methods take the researcher's communication as an explicit part of knowledge instead of deeming it an intervening variable (Flick, 2006). Therefore the subjectivity of the researcher as well as those being studied becomes part of the process. In order for the subjectivity to be minimised, the researcher tried to keep the process of data gathering as simple as possible, whilst keeping it easy and accessible for the full sample of players to participate. Interviews therefore took place at the club where the players trained. The researcher wanted the research environment to be as familiar and comfortable for the participants as possible. Interviews were also arranged before evening training sessions so that the scheduling would not interrupt the players' routines too much. Interviewing skills of the researcher were practised and refined through a pilot study discussed later within this chapter, and all interviews took place in a side room at the hockey club's clubhouse in order to reduce interruptions from the outside world. Meetings and interviews were all kept relatively informal so that the players were allowed to feel relaxed about the study in the hope that they would be as open as possible with their responses to both the training diary forms and during interviews.

The researcher has acknowledged that the analysis of this study may be partly subjective as would be any analysis of qualitative research, but every attempt has been made to conduct the investigation as objectively as possible, and it is hoped that because of the researcher's previous knowledge, this will serve to add further layers and depth to the discussion.

3.6 Research Methods

In order to gain a deeper appreciation of the training load and regimes of the 18 Greentown squad members partaking in this study, two research methods were employed. In reflection of work by Lines (2007), diaries were used as a precursor to interview to provide the researcher with more room for probing on the specifics of each subject's training. The researcher wanted to firstly gain insight into the activities of each member of the hockey team, and then have the flexibility to discuss these activities in more depth through interviews which were semi-structured in style.

3.6.1 Diaries

The first of the two methods employed within this study was the 'training diary'. Diaries were selected as one of two methods in this study primarily as prompt mechanisms during interviews enabling the researcher to delve further in notable issues within the participants' training. They could also be used as a reference point after all the research had been gathered and was being analysed.

Such tools have previously been used in research by Polman et al (2007), Lines (2007), and Nicholls et al (2009). The former of these three studies focused on a group of twelve professional rugby players and their mood between home and away matches. Six analogue scales were used (as opposed to five in the later study by Nicholls et al (2009), as well as behavioural factors and self-rated performance. Diaries were completed at the closest possible time each evening before retiring and participants were asked to leave blank what they could not remember rather than completing the diaries retrospectively. Both these two studies were quantitatively based and results were presented as statistics.

Lines (2007) selected training diaries as well as interviews in a qualitative study on the impact of selected sports media events on the active participation of a group of youths aged fourteen to fifteen. It was reported that the structured daily diaries were used so that the researchers could get insight into individual daily patterns of consumption and interpretation. They were used a precursor, providing groundwork for determining themes worthy of more in-depth interpretative work completed through focus group and individual interviews. The primary reason for the use of training diaries was to allow the participants the opportunities to reflect personally on their experiences, and was also a means of discovering more within this social enquiry.

Finally, Nicholls et al (2009) used a group of five rugby union players to discover more about acute sports related stressors, coping, and emotion during training and matches. The players were originally asked to complete the diaries for thirty one days, but results showed that on average, diaries were only completed for nineteen days in total by each player. This factor possibly highlights the fact that thirty one days was a slightly unrealistic length of time for the players to stay committed to filling in the diaries, and could perhaps have been shortened to ensure full completion.

This study is closest in relation to the work by Lines (2007). Work by Polman et al (2007) and Nicholls et al (2007) are still of value when designing a diary that might

be appropriate to use with athletes, but Lines (2007) combined these diaries with the addition of the interview in keeping with a qualitative approach. This study has been influenced by this structure of research and has been adapted for use to discover more within a different sporting field.

3.6.2 Interviews

Like any research method, interviewing has both its strengths and weaknesses. Notably, depth of response and building trust and rapport with participants would be two strengths, but unconscious bias and possible leading of interviewees can be seen as weaknesses (Gratton & Jones, 2004). The core features of interviewing include: the interactional exchange of dialogue, a relatively informal style, and fluidity and flexibility of structure (Mason, 2002).

Despite the possibility that both the spoken and written word will always have a slight residue of ambiguity, interviewing is one of the most common and powerful ways in which we can try to understand our fellow humans (Fontana & Frey, 2005). Interviewing includes a wide variety of forms and a multiplicity of uses. Most commonly, interviews take place on a face to face basis, but they can also be conducted over the telephone or in a group scenario. Interviews can be said to be structured, semi-structured or unstructured. In structured interviewing the interviewer asks all respondents the same series of pre-established questions with a limited set of response categories. Open-ended questions are relatively infrequent in this type of interview and because of this there is little scope to probe and dig deeper around certain areas of interest that may become apparent with an interviewee. Bryman (2001) highlights that when using the semi-structured interview, the researcher has a list of questions or fairly specific topics to be covered, often referred to as the interview guide, but the interviewee has a great deal of leeway in how to reply. Questions may not follow on exactly in the way outlined in the schedule and additional questions may be asked as the interviewer picks up on things said by the interviewees. By and large though, all the questions will be asked and a similar wording will be used in every interview.

An example of research in sport and exercise where semi-structured interviews were used as the main research tool was a study by Hardcastle and Taylor (2005). Here this method was employed to identify any changes in exercise cognitions of fifteen women both during and following a ten week community exercise

intervention. An opportunistic sampling process was adopted depending on availability of participants and their willingness to take part. This strategy was also based upon theoretical sampling used to guide data collection and generate theory (Strauss & Corbin, 1998). This allowed the researcher to broaden theoretical insight in the ongoing process of data collection and analysis, and involved choosing people to interview with a view toward findings that might challenge the emerging theory (Hardcastle & Taylor, 2005). Interviews for Hardcastle and Taylor's (2005) study took place privately in the cafeteria during visits to the leisure centre for an exercise session, and took an informal, conversational style. Data was subsequently used from eight of the participants who provided particularly rich data. However, by only using data from eight of the participants, the investigation does leave itself open to bias, as final participants were selected by the researchers themselves and not at random.

Other relevant studies which are athlete focused and selected interviews as their main methodological source are Trudel (2006), Durand-Bush and Salmela (2002), and Greenleaf et al (2001). In contrast from the latter two studies, Trudel (2006) chose to select only one participant for his study. The main objective of Trudel's (2006) investigation was to discover more about how much of being the best is related to training and how much is based upon genetics, as well as looking into the importance of coaches, competition, and access to facilities and resources. Although this study achieves in-depth data from one individual's experience of the journey and the progression it takes to reach the Olympic Games, it perhaps lacks in reliability with such a small sample. One of the downfalls of qualitative data is that it can be so vast it becomes challenging for the researcher to illustrate the most salient points; however as a qualitative researcher it could be argued it is also important to find out the viewpoints of as many participants as is manageable in order to make the data more reliable. Both Durand-Bush and Salmela (2002) and Greenleaf et al (2001) were able to achieve this with 10 and 15 participants respectively. Both studies used in-depth, open ended, semi-structured interviews as their method in seeking information from elite athletes about their experiences of their progressions to Olympic and World Championship competitions, their performance, and their ability to maintain their performance to reach these competitions a second time round. Durand-Bush and Salmela (2002) conducted interviews face to face, where as Greenleaf et al (2001) conducted interviews via the telephone. Although more data may be available during a face to face interview (i.e. field notes), using the telephone can be advantageous if

the researcher has specific people he wants in his/her sample and he/she does not have the means to travel to each person.

The current investigation seeks to discover more about the different modes of strength and conditioning top end field hockey players employ for their training away from the pitch. In contrast from previous studies in this area, this study has chosen a qualitative methodology in looking to achieve more in depth data from individual players and seeing what kind of dedication and focus to training it takes to compete at the top. Semi-structured interviews have been chosen as it is important that there is a little more flexibility to probe and ask questions beyond the initial set of questions. Interviews would take place in a quiet, private place, that was easy for the players to access, and final interview questions would be established after being tested in a pilot study.

Two previous studies of relevance to this investigation are that by Durand-Bush and Salmela (2002) and Greenleaf et al (2001). Durand-Bush and Salmela (2002) examine the factors that contributed to the development and maintenance of expert athletic performance. They selected a sample of ten participants (four male and six female), all of whom had won two gold medals at separate Olympics or World Championship competitions. The key method employed to gather research upon their sample was in-depth, open-ended, semi-structured interviews.

Greenleaf et al (2001) also used a qualitative approach in an investigation about elite performance. Their aim was to gain a better understanding of factors perceived to have positively and/or negatively influenced Olympic performance. This time fifteen athletes (all Olympians at either the Atlanta or Nagano Games) were interviewed. Interviews were conducted via the phone. The advantage of this being that the researchers were still able to gain information from participants who may not have been able to take part had they had to travel along way to be interviewed in person. Interviews were semi-structured and were all tape recorded and transcribed verbatim.

3.7 Research Design

3.7.1 Gaining Access / Gatekeepers

The purpose was to find out more about what additional training premiership hockey players in this country do away from the pitch in striving to enhance their performance. The research setting was therefore identified as being an England

Premiership Hockey Club. Before research could commence, access to a Premiership Club needed to be granted. This was dependant on official permission by certain personnel who could legitimately grant or withhold access, termed a 'gatekeeper' (Silk et al, 2005). In this instance it was the Head Hockey Coach of the England Premiership Hockey Club (pseudonym – Greentown) that had been identified for study. Initially contact with the 'gatekeeper' at Greentown was established via the telephone, and later at an introductory meeting. Sands (2002) highlights the importance of establishing a relationship with the leading person of the culture you are entering through building rapport. Sands (2002) recognises the importance of the 'gatekeeper' as he/she controls access to the group or community you are looking to study. The first meeting with the Head Coach was therefore very important in setting the tone of the study in seeking permission for access. Entry was soon negotiated and granted by the Head Coach, and this was shortly followed by a full squad meeting which took place in January 2009 before the main study took place. From this first meeting the researcher was able to meet the full squad, ask if they would be willing to participate, as well as gain contact details for each player so that interview times could be arranged. The researcher received a positive response from the players who were all interested in being involved in a research project about their sport.

All interviews were conducted before training sessions on either a Tuesday or a Thursday. Players were contacted by phone to arrange times and three to four players would be interviewed one after the other before a training session. The time and day that each player was interviewed was chosen by the player in order to cause as little disruption to their lives as possible. Previous research has suggested (Hammersley & Atkinson, 1995; and Gratton & Jones, 2004) that organising interviews in a setting where the participants will feel comfortable and being mindful to accommodate the schedule of their busy lives are all part of good planning on behalf of the researcher.

On arrival at the club for each interview session, the researcher would greet the players in the hockey club house and interviews took place in a quiet side room. This allowed for little interruption to the interview process and allowed each participant to speak freely in a one to one situation with the interviewer without the distraction of other players/coaches in the proximity. Interviews started on Tuesday 10th February 2009, and were all completed by Thursday 5th March 2009.

3.7.2 Participants

A group of participants on which a study is conducted is known as a sample (Thomas & Nelson, 2001). Silk et al (2005) discuss the arguments for and against comparing different cases or concentrating on a single case. The former allows greater depth of analysis into a particular phenomenon, and by contrast the latter allows the emergence of particular characteristics that may provide insight into reasons for different cases (Silk et al, 2005). Within this study, it was decided that because access to the whole first team squad had been granted by the head coach (the gatekeeper), all players from that squad would be used for research to get the best insight possible about the team and the training activities these players engaged in away from the pitch as individuals. In total, there were eighteen participants for this study. This included all sixteen players making up Greentown Hockey Club's Men's first team, plus two additional first team squad substitutes. Players ranged in age from 18 to 31, with an average age of 24.5 years. The hockey club and the eighteen players were all provided with pseudonyms after providing data for the study in compliance with the researcher's promise to protect maintain anonymity. In addition, any references made to representing one of the three Home Countries under the Great Britain umbrella (England, Wales or Scotland) has been referred to as 'Home Nation'. If a player has discussed representing a different international team, this has been referred to as 'Country'. Any details or specifics of these teams (other than age groups) have not been discussed. Similarly, all other outside sport support networks such as Institutes of Sport have been given the generic name of "Sports Institute" as opposed to revealing the exact name of the Institute which may lead to players becoming easily identifiable.

3.8 Pilot Study

The theory behind a pilot study is to allow the researcher to develop a strong, supported rationale for the strategy, and to allow for modification once all the processes have been tested (Marshall & Rossman, 2006). Prior to main work on the thesis commencing, and in line with recommendations by Robson (1995), a pilot study was utilised for this investigation. This allowed the researcher to refine research instruments, practise interviewing skills and for all processes to be tested and

evaluated. Any necessary modifications could then be made to ensure the most effective methods were used for the final work.

The pilot study took place in October 2008 at the same hockey club where the main study would later take place. For the pilot, ten players from Greentown's second team were selected at random by the head hockey coach after a training session. It was important that the players selected were not involved in the first team set up so that the final study would not be undermined. Although the head coach could have been biased as to whom to select for the pilot, this was of no great consequence as the most fundamental part of this process was to trial the methods, not to focus on the data collected. All ten players were initially asked to complete a consent form informing them of a very basic outline of the study, what would be required if they chose to participate, their rights to leave the study at any time, and that all data would be stored safely and anonymity would be applied throughout. This was not only used to check that the consent form was easy to understand and complete, but also that the pilot was ethically legitimate. Once the sample had agreed to take part, they were then asked to complete a training diary form accounting for their individual training on and off the pitch for the last seven days. The forms included three columns under; 1) hockey training, 2) general training, and 3) other sport/leisure activities. From this group of ten, the Head Coach/gatekeeper selected four players to take part in a recorded interview the following week before a training session. Before each interview commenced, each individual participant was reminded of his rights within the study. All interviews were semi-structured in nature with a list of twelve questions that would be posed to all participants, but these could also lead to further questioning. The training diary forms were also used as probes from which more data could be gathered. All interviews were tape recorded and lasted for approximately 10 minutes. Once the four had been completed, they were transcribed verbatim ready for analysis. All training diaries were stored safely and correctly where only the researcher had access, and all interviews were stored in a document file under a password that only the researcher had knowledge of.

On completion of the pilot, there were a couple of areas that needed to be refined before data collection for the main study could begin. Firstly the size of the sample used for interviews and the time allocated for these interviews to take place were recognised as limiting factors. Although there was depth to the data gathered, this could be increased significantly if the number of participants and the time available to

talk to the participants was increased. A positive aspect was that all players who completed the training diary forms reported it to be comprehensive and easy to complete. However, some players did put the wrong activities in the wrong columns, so a decision was made to expand the explanations of the titles of each column, i.e. from 'hockey training' to 'hockey training i.e. pitch training or a match'. Another positive from the pilot, was that it allowed practise and refinement of the researcher's interviewing and transcription skills (Fontana & Frey, 2005). Finally, the pilot also revealed a number of interesting themes which could be probed further through interview in the final study in order to discover and understand more about aspects of strength and conditioning within the game of hockey, and the players who compete at the top end in this sport.

3.9 Ethical Considerations

There are many ethical issues surrounding social research just as there are with any human activity (Hammersley & Atkinson, 1995). When designing a plan for research and collecting and analysing data, it is important that the ethical implications are also considered. Flick (2006) cites a number of aspects to take into account including informed consent, anonymity when writing about research, and doing justice to participants when writing about data. When looking particularly at interviewing, Fontana and Frey (2005; 715) state that, "Because the objects of inquiry in interviewing are humans, extreme care must be taken to avoid any harm to them". In order to overcome possible barriers in this study, measures were put in place prior to collecting research.

After access to the sample was gained through a gatekeeper, participants were asked in person if they would be interested in taking part in a postgraduate research study related to sport, hockey and fitness. After a positive response, all squad members left their details by which the researcher could contact them by telephone. Once interview dates and times had been established for each player in the squad, they would meet the researcher to start the research process.

Anonymity was the technique used to protect the identities of the participants within this study. Anonymity ensures that no one (excluding the researcher) can identify a given response from any participant within the study (Babbie, 2007). Anonymity was ensured to all participants throughout this study, and the players were

informed of this through the consent forms provided (See Appendix A). They were also aware that in order to keep the responses anonymous, pseudonyms for all players would be used in the write up of data. Once the researcher had started to gather data, it was clear that a number of words would also need to be disguised to keep players unidentifiable. For example a number of the players receive strength and conditioning support through the country they represent, therefore the sports institutes were numbered and countries would be referred to as home nations as opposed to the actual country's name.

3.10 Data Collection

3.10.1 Training Diary Forms

Krane and Baird (2005) suggest that although interviews are the foundation for qualitative research, their rigidity supports the need for increased methodological diversity. Within this study, an additional 'training diary form' was completed by players immediately prior to their interview. Although this additional method was utilised, the study was not mixed method in its entirety as the training diary forms were a means to expand on questions posed to the participant, but the main source of data was provided by the interviews themselves. The form asked them to account for their last seven days of activity (See Appendix B). The form was broken into 3 separate columns: 1) 'hockey specific activity' (i.e. pitch training or a match), 2) 'general training' (i.e. strength and conditioning/fitness training in or out of the gym), 3) 'non-hockey sporting activity' (i.e. a different sport/leisure activity). In contrast to studies by Nicholls et al (2009) and Polman et al (2007) who asked their participants to fill in their diaries on a daily basis over a set period of time, participants for this study were asked to recall their activities for the last 7 days.

Within the training diary forms participants were asked to account for the date, the specific activity they had engaged in, the time of day the activity took place, the duration of the activity, and the intensity of the activity performed. Intensity of activity was marked on a scale of 1-5, with 1 being very low intensity and 5 being maximum intensity. Problems are raised with a scale such as this as the numbers can be very open to individual interpretation, i.e. low intensity exercise for one player may be more moderate for another. Intensity of activity however was not a major focus of the forms or the probes that were formulated from the forms.

The idea of incorporating the training diary form into the study as means of additional data collection came so that the researcher would have added reference to revisit when collecting the interview data. As well as this, the training diary form was utilised as a resource by which the interviewer could probe and develop further questioning. The main focus would be around the general training column. This was used to determine more specifically what additional training the group of hockey players did away from the pitch. This included strength work in the gym as well as conditioning before or after a hockey training session or in their own time.

In reality, the majority of players were able to remember all the training they had completed over the last week, as their training in season (at the time the interviews took place) was often very similar week on week. However, there were occasions when players found it more difficult to recall exactly what they had done, or they had trained in a different manner due to a minor injury etc. Results from these forms may therefore have consequences if the information reported was not exactly as it occurred.

3.10.2 Athlete Interviews

Interviews were all semi-structured in nature. Similar to studies by Wright et al (2007) and Potrac et al (2002), an interview guide provided the topics to be investigated, any new ones that emerged through the course of the discussions could be explored and probed. Such an approach not only allowed for a full and systematic discussion with each participant about their training, but it also allowed freedom in the sequencing of questions and flexibility in the time spent on topics covered (Robson, 1995; and Patton, 1980).

The interview guide/list of questions can be seen in the appendices (Appendix C). Interviews started with more general questions about each individual such as their age, their experience in hockey to date, and their current occupation. From here the questions became more specific and focused upon the area of study. The interview began with very general open questions to give some time for the interviewer to build rapport with the participant and for them to become comfortable in the interview environment (Silk et al, 2005). From this the interviewer could gauge a little more about the participant and how best to approach certain areas of investigation with him. The researcher wanted to collect and assemble as much information about each participant and their experiences in hockey within the allocated time frame. In this

particular scenario, interviews could last for no longer than twenty minutes, as participants had to finish and get ready before training began. A possible weakness in the study could be noted as lack of time with each individual. Perhaps more data would have been gained if the researcher had been immersed in the field for a longer period of time and had been allowed more time to delve deeper in the interviews.

As interviews and times were arranged prior to each training session, the majority of meetings ran smoothly. There was one occasion when a member of the team was not present due to illness. In this case another member took his place and the former member was interviewed at a later date.

3.10.3 Data Recording

Bryman (2001) discusses the use of tape recording and transcription when employing interviews as a research tool. By collecting data in this way, the researcher can not only review what has been said but also the way in which the interviewee said it. If this aspect is to be woven into an analysis, it is necessary for a complete account of the series of exchanges in an interview to be available. A tape recorder is also valuable as it allows the interviewer to be fully absorbed in listening to the interviewee rather than being distracted by writing notes. One limitation of this method though is that the non-verbal interactions are not recorded.

Upon meeting the participants, the same process was followed each time. The researcher made the same introductory statements, clarifying again the nature of the interview and the purpose of the study (Robson, 1995). Each participant was asked for their individual consent, and they were also informed that they were free to terminate the interview at any time. This introduction was performed at the start of each interview, and has been documented and can be viewed in the appendices (Appendix C). None of the participants questioned the introduction, and all participants were happy to continue once they had been assured of the anonymity surrounding the study. During two occasions with two different participants, interviews were interrupted by club staff enquiring about when the room being used for interviews would become vacant; other than these occasions interviews ran according to plan.

Interviews were recorded using an Olympus VN-3100PC digital recorder. The collection of audio files produced were digitally transferred onto the researcher's computer which was password protected. The researcher was the only person with knowledge of this password.

3.11 Data Analysis

After being recorded, each interview was transcribed verbatim ready for analysis. Transcription of the recordings is important, but it is also very time consuming. It is a process that must be carefully done in order to avoid mistyping and therefore misinterpretation (Denzin & Lincoln, 2003). Once each interview had been transcribed, they were all numbered and dated, and each participant was given a pseudonym in order to keep with anonymity guidelines. All interviews, as well as training diary forms, were stored safely where only the researcher had access.

In order for analysis to take place, the researcher firstly studied each interview alongside each training diary form. Thematic analysis is a process for encoding qualitative information (Boyatzis, 1998). The encoding requires an explicit code; in the instance of this study, a number of themes (patterns found within the information) became apparent through the interpretive framework. The framework is based around the data that emerges from the study, therefore the theory is derived from the data, and is then gathered and analysed through the research process (Strauss & Corbin, 1998). Themes were generated inductively from the raw information and then, after transcription, each interview was carefully combed for information that came under these themes, and quotes were then put into category lists. Gradually the data could be pulled together under different areas of thought. Contrasts and similarities could then be drawn between the experiences of different players. It was again important for the researcher to be as objective as possible when drawing themes from the data. The data had to be scrutinised until clear patterns emerged (Strauss & Corbin, 1998).

3.12 Establishing Validity and Reliability

Mason (2002) discerns that research is valid if you are observing, identifying or measuring what you have proposed you intend to. This concept as a whole is often explained using two dimensions. Internal validity is whether you are investigating what you claim to be investigating. External validity is concerned with the extent to which the constructs generated, refined or tested can be applicable to other groups within the population, or to other contexts or settings (Lewis & Ritchie, 2003).

Reliability is generally understood to concern how easy it would be to replicate research findings and whether or not the same results would be found if the study was performed again using the same or similar methods (Lewis & Ritchie, 2003). Within the realm of qualitative research many including Holstein and Gubrium (1995) believe that the concept of replication is naïve given the complexity of the phenomena, and argue that such studies can never be, nor should be repeated. Although this study could be repeated, findings may differ depending on the individuals involved.

A definite disadvantage of the study is that we are only allowed to see the actions of one Premiership club and their strength and conditioning strategies. The study would be given much more depth if it had been possible to analyse findings across a number of Premiership clubs.

3.13 Chapter Conclusion

The selection of a qualitative approach for this study allowed for the researcher to pursue in-depth data of the experiences of male Premiership hockey players in England and the additional training they do away from the pitch. This chapter identified the research methods employed and gave justification as to why they were selected, as well as providing insight into how the data was processed and analysed. Themes and findings were developed from the analysis and they will now be discussed in the following chapter.

Chapter 4: DISCUSSION

4.1 Introduction to Chapter

Within this chapter, the sample will be primarily introduced. This will be followed by the first key finding from this study, that of ‘player groupings’. Four different groups were discovered within the Greentown squad and reasons as to why players were categorised under these groups will be discussed. The additional emerging themes from the data collected will then be examined and explored whilst being linked back to the research literature from the areas of hockey, strength and conditioning, and athlete training.

4.2 Greentown’s Hockey Players

Greentown is a well established hockey club based in the north of England. For this study, the 18 players who make up the men’s first team squad were selected for interview. The men’s first team compete in the England Hockey Premier League which is the highest competitive hockey league in the country.

Having collected all the data it became quickly apparent that the foremost emerging theme was that of ‘player groupings’. Although all eighteen players train and compete together for their club’s first team, they are all currently at different levels when it comes to their international hockey status away from their club. A number of players currently play for their nation, some are on the fringe of doing so, many have been previously involved with a national hockey set up, but some never have. Based on this varying current status, four groups were identified, namely; The Majors, The Make-its, The Masters, and the Minors.

The group titles were decided on to reflect the standing of each individual within the team with relation to their international involvement. ‘The Majors’ were so named to highlight the players who are currently representing their home nation and train with their home nation on a regular basis. ‘The Make-its’ are a group of players that are close to breaking into their home nation squads, but have not done so yet, and they are unsure whether or not they will make it. ‘The Masters’ have all been there and done it. The older more experienced generation of this team who have all been involved in a home nation set up at an earlier stage and mastered it, but have now

retired from international play and simply represent their club. Finally, ‘The Minors’ are the smallest of all four groups and represent the players within the squad that have never been involved with a home nation set up, and with relation to this, it could be argued that they play a more minor role.

4.2.1 The Majors

Name	Age	Employment (Part Time/Full Time)	International Status	Country Represented	Current S&C Support
Luke	18-24	Employed (PT)	Current Senior	Home Nation 1	Sports Institute
Matt	18-24	Student (FT)	Current Junior	Home Nation 1	Scholarship Scheme
Sean	18-24	Student (FT)	Current Senior	Home Nation 1	Sports Institute
John	18-24	Student (FT)	Current Junior/Senior	Home Nation 2	Scholarship Scheme

The Majors are a group comprising of four of the Greentown players including Luke, Matt, Sean and John. The group has been given this title as all members are currently part of a home nation squad. Luke and Sean are currently playing at senior level, and Matt and John are currently under 21 players.

Luke has been brought up in a hockey family with his mother, father, and brother all competing to a high level. Luke has worked his way up through the Greentown teams to the first team where he currently plays alongside his home nation indoor and outdoor hockey commitments at senior level.

Matt is one of the youngest members of the Greentown squad. Whilst studying full time at sixth form college, he currently represents his home nation at under 21 level.

Sean is currently in full time education at university. He has been playing hockey since he was 5. Since taking up the sport he has played at Greentown, and over the past four years he has played for his home nation at both under 18 and under 21 level. He is now involved with his home nation’s senior squad.

John has played for Greentown for two years and also represents his home nation at under 21 level.

4.2.2 The Make-its

Name	Age	Employment (Part Time/Full Time)	International Status	Country Represented	Current S&C Support
Oliver	18-24	Student (FT)	Development Senior	Away Nation 1	/
Chris	18-24	Student (FT)	Development Junior	Home Nation 1	/
Craig	18-24	Student (FT)	Development Junior	Home Nation 1	/
Dan	18-24	Employed (FT)	Development Senior	Home Nation 1	/
Russel	18-24	Employed (FT)	Development Senior	Home Nation 1	/

The Make-its are a group consisting of five players within the Greentown squad. All of these players are involved in a home nation development squad. They are all close to making it into a full international set up, but have not done so yet.

Oliver has been playing hockey since he was six or seven years of age, and has been playing National League hockey since he was sixteen. He is currently involved at a developmental level for his country.

Chris has been playing hockey nearly seven years. He has played for Greentown for three to four seasons and during this time he has been involved in both under 18 and under 21 home nation set ups.

Craig has been playing hockey since he was seven; all his family have been involved in the sport as well. He has been playing at Greentown for two years and has played hockey for his home nation at under 18 level. He is currently involved in the under 21 set up for his home nation.

Dan has played for Greentown since he was in his late teens. He has played for two different clubs previously, and he now has aspirations to represent his home nation. He is currently involved in their development set up.

Russel has been playing hockey from an early age. He is currently in his fourth season at Greentown and has played for his home nation at under 18 and under 21 level. At present he is involved in his home nation's senior hockey set up.

4.2.3 The Masters

Name	Age	Employment (Part Time/Full Time)	International Status	Country Represented	Current S&C Support
Brian	30-34	Employed (FT)	Previous Junior	Home Nation 1	/
Graham	30-34	Employed (FT)	Previous Junior	Home Nation 1	/
Tom	25-29	Employed (FT)	Previous Junior	Home Nation 1	/
Pete	25-29	Employed (FT)	Previous Junior	Home Nation 1	/
Mike	25-29	Student (FT)	Previous Senior	Away Nation 2	/
Paul	25-29	Employed (FT)	Previous Junior	Home Nation 1	/
Mark	25-29	Employed (FT)	Previous Junior	Home Nation 1	/

The Masters include Brian, Graham, Tom, Pete, Mike, Paul and Mark. All of these players have previous experience at an international level representing their nations. They may have either played previously as a full international (Major) or been involved in a development squad (Make-it), but they all now compete in the England Hockey Premiership only and form the oldest group of players within Greentown squad.

Brian has played for Greentown for nearly eight years, and has previously played for two different National League Clubs. He represented his home nation up to his late teenage years.

Graham has played for Greentown for five years. He previously represented one additional National League club as well as his home nation as an under 21 player.

Tom has been playing for Greentown for ten years. He has previously represented his home nation at under 18 and under 21 level.

Pete has played hockey since he was around ten years old. He has played National League for 8 years and was involved with his home nation at under 18 level.

Mike currently plays for Greentown and has previously represented his country at all age group levels including senior level.

Paul has been playing hockey from a very early age. Since then he has represented his home nation at all age group levels, but is no longer involved. He has been playing at Greentown since he was in his early teens.

Mark has been playing in the National League for ten years for three different clubs including Greentown, and has also represented his home nation at under 18 level.

4.2.4 The Minors

Name	Age	Employment (Part Time/Full Time)	International Status	Country Represented	Current S&C Support
Greg	25-29	Employed (FT)	/	/	/
Adam	18-24	Employed (PT)	/	/	/

The Minors are the smallest of the four groups; Greg and Adam are the sole members.

Greg is in his late twenties and works full time. He has played National League hockey for 6-7 years, playing at one other club prior to joining Greentown. He has represented his county and region for hockey, but has never been involved in any home nation set up.

Adam works part time, and is currently in his first season at Greentown. Like Greg, he has played for his county, but never been involved in a home nation set up.

4.2.5 Group Identification

It was important that these groups were identified as it provides the reader with an understanding of the background of each individual team member as we discover more about their approaches to training. The discussion will now begin to delve deeper into the player's understanding of strength and conditioning, and more exclusively, what the members of Greentown do in their additional training.

4.3 Strength and Conditioning Components for Hockey

The literature highlights aerobic and anaerobic endurance (Reilly & Borrie, 1992; Boyle et al, 1994; Aziz et al, 2000; Elferink-Gemser et al, 2004; and Lemmink et al, 2004), speed and agility (Baker and Nance, 1999; Lemmink et al, 2004; Spencer et al, 2004a; and Spencer et al, 2005), and strength and flexibility (Bompa, 1999; Gabbett et al, 2008; and Jeffreys, 2008) as being the main physical components required of an athlete competing in hockey at an elite level. Strength and conditioning is a means to maximise an athlete's physicality within each of these components away from the pitch in order for them to be advantageous on it.

There appeared to be conflicting ideas within the squad about what exactly strength and conditioning is and what it encompasses. When asked what their understanding of strength and conditioning was, seven of the eighteen players admitted their knowledge was limited and that they did not have a great understanding of the concept.

4.3.1 Players Understanding

The Majors seemed to have the best grasp of what strength and conditioning is compared to the other three groups. Matt stated his knowledge was quite good and felt he knew why he does certain things in training. Luke felt equally as comfortable saying;

“Well conditioning I'd say it's you know obtaining a level of fitness which is suitable for your sport, er, and strength I'd break that down into also specific training for your sport”. (Luke, 10th February 2009)

Both John and Sean felt their knowledge was adequate, but Sean did add that he does speak to his strength and conditioning coach to find out more about why he is told to do certain things, and went on to say that his knowledge has improved since training at a Sports Institute.

In contrast, the other three groups (Make-its, Masters, and Minors) do not have a specialist coach for strength and conditioning support. Their ideas therefore seemed more limited. Master Tom summed up the general knowledge of the remaining squad members in saying,

“Not a great understanding to be honest with you, partly because I’ve had no professional advice on it”. (Tom, 12th February 2009)

From the literature we can see that the key objective of strength and conditioning is to maximise an athlete’s physical performance in seeking to enable him/her to be more physically effective whilst seeking to prevent injuries (Hunter and Harris, 2008; and Dorgo, 2009). It is clear from the data that the squad’s view of what strength and conditioning is, is fairly vague, and that few have been exposed to any clear explanation of what is meant by the concept to better their understanding.

4.4 Squad Training

4.4.1 Pre-Season Training

From the data collected, one of the initial findings established about Greentown’s fitness training as a squad was that there appeared to be much more emphasis on this during the preseason as opposed to the competitive season. This corresponds to work by Dupont et al (2004) and Astorino et al (2004), who state that a primary goal of preseason conditioning is to optimise performance during in-season competition. During the season there is more focus on tactical and technical improvements while maintaining physical fitness. Master Tom says,

“So the run up from kind of July, August, beginning of September is all about us trying to get fit and sharp and stuff”. (Tom, 12th February 2009)

Major John goes on to say,

“Preseason we had quite a lot, well running and speed endurance stuff so you can just go away and do it yourself on a pitch or double doggies and sprints and things so we’ve had a bit about that, but during the season we

just concentrate on our training” (referring here to technical training).

(John, 24th February 2009)

Both Major Sean and Master Mark agree that there is an emphasis on improving fitness and running more in the preseason, but Major Sean says, that the focus is drawn away from it as Greentown reaches its competition phase.

These results reflect notions in the literature that suggest that historically, efforts to improve performance in team sports have focused on technique and tactics at the expense of physical fitness (Stolen et al, 2005; and Reverter-Masia et al, 2008).

Although there seems to be a focus on improving fitness during the preseason build, this seems to deteriorate as the squad enters the competitive season.

4.4.2 In-Season Training

As a squad, Greentown men’s first team train twice a week on Tuesday and Thursday evenings. In season, all players regularly attend these sessions and then compete in the league at the weekend. From discussion with the players about their hockey training with the club it was apparent that the standard structure of an average week of training revolves around these two sessions in the build up to their league matches each weekend. The training diary forms distributed to players for completion before each interview were used primarily to establish what other training players did away from these sessions. Many of the players however, reported that some of their fitness training was done prior to their technical work on the pitch on Tuesday and Thursday evenings. When asked who led these sessions, the general consensus was that they were usually led by coach 1 or coach 2 (both hockey specific coaches), but if they were not on hand then one of the players would lead the session.

Although hockey is not a professional sport in England, Greentown are still one of the top ten teams within the country. Having conditioning sessions led by either a sport specific coach or a player is in contrast to countries like Spain who report that 58% of professional sports teams (football and basketball) and 41% of amateur sports teams (handball, field hockey, volleyball and indoor football) hire a full time conditioning coach to support the sport specific coaches (Reverter-Masia et al, 2008). Employing an additional conditioning coach allows the sport specific coach to better focus on the technical and tactical aspects of the game instead of feeling pressured to cover additional angles.

Both Masters Brian and Graham state that running before sessions is performed as a team, however, when Minor Greg was asked if the running was performed as a team he said,

“No because it’s before training so a lot of the guys can’t get here before, early enough to get cracking on it”.

He goes on to say,

“It’s not formally run, it’s a couple of us get together and agree what we’re going to do. It’s not already pre decided”. (Greg, 17th February 2009)

This brings us back to suggestions made by Meyer (2006) that with rising pressures in the arena of elite sport, more and more coaches and athletes are turning to science to seek extra support. However the same paper highlights the common problem of scientific research being largely inaccessible and too technical for sports coaches to translate into their work. A lot is expected of the sports coach if they have to lead all the technical work with their athletes as well as support them in other areas such as strength and conditioning, nutrition and psychology. Through funding, the Majors do receive some of the additional support necessary to nurture athletes at the highest level. The Make-its, Masters, and Minors however are all still competing in the top league in the country, yet the support they receive is limited.

This chapter will now begin to explore in more depth exactly what these players do in terms of training when they are away from the pitch and where their knowledge has come from for their additional strength and conditioning work.

4.5 Individual Training

Data from both the training diary forms and the interviews show that all eighteen players at Greentown undergo some form of additional training away from the pitch. The number of extra sessions ranged from one to five with an average of 3.1 additional sessions a week in total. Sessions detailed gym/resistance sessions, running, recovery sessions, or different sporting/leisure activities.

4.5.1 The Majors Training

All four Majors train on the pitch a minimum of twice a week and compete in matches between one and three times a week. In addition, all four players do gym

based resistance training with the aid and support of a trained strength and conditioning coach, as well as performing one other running session away from the pitch. Mallett and Hanrahan (2004) recognise one of the main constructs related to elite athletic performers is having sport being central to their lives, as well as work by Starkes and Ericsson (2003) who believe that to perform at the top level, elite players must be prepared to invest many hours of training over many years.

4.5.2 The Make-its Training

Like the majors, these squad members are also on the pitch for an average of two sessions a week, and can be competing in one to three matches per week as well. All of the Make-its also participate in resistance based sessions in gyms away from the pitch; however, because they are yet to qualify as full international squad members, they do not receive the same support, and therefore lack structure in their additional training. Other than Craig, the Make-its tend not to do extra running sessions away from the pitch, but both Make-its Oliver and Russel report that they participate in one additional sporting activity per week as well as their hockey. Possible questions that arise with this group might be that of injury. Van Mechelen et al (1996) reported that a high level of player exposure time (i.e. playing hours) shows consistently to be the most significant predictor of sports injury occurrence. These players complete a similar volume of training each week as the Majors, but because they do not have anyone to monitor them away from the pitch, their training may not be as productive, they may suffer injuries through poor lifting technique in the gym, or they possibly run the risk of overtraining in seeking to establish themselves as full international players.

4.5.3 The Masters Training

The Masters complete an average of two pitch sessions per week as well as their one match for Greentown each weekend. The Master's volume of training is lower than that of the Majors and the Make-its, however all seven of this group still do additional training away from the pitch. Brian, Graham, Tom and Paul all noted two run sessions per week, whereas Mike and Mark do a light run as a recovery session and Pete does no extra running at all. All of the Masters apart from Paul and Mark attend a gym to do resistance training between one and three times per week, and Graham also noted swimming in his training diary as an additional sporting activity

away from hockey. The Masters of Greentown have all had quite different experiences in hockey compared to those in the current Major's group. On reflection Graham says he received little support with regard to the physical side of the game when he was involved at an international level. Tom agreed with this in saying there was emphasis on running, but very little done in terms of strength work. Paul said he felt there was structure when he was involved in the under 16 and 18 squads of his home nation, although he did say the players were instructed to keep training diaries, but were not given information on the training they should be doing. He reported,

“No, we never got a training programme. It was more of a case of go away and get fit, come back and show us what you've done and then we're going to test you and if it doesn't match up then we'll have a go at you or you know, things like that”. (Paul, 26th February 2009)

Similarly, Mark reports on a lack of support when he was playing at international level too. He says,

“It was just sort of here's a booklet, follow this kind of thing. I wouldn't say I learnt from them”. (Mark, 5th March 2009)

4.5.4 The Minors Training

Greg and Adam have never been involved in an international hockey set up. In contrast from the rest of the squad, neither of these players partakes in any additional resistance based training. Both however perform between two and three additional running sessions per week.

4.5.5 Individual Structured Training

Very little of the additional training the members of Greentown undertake is structured, however, the Majors all receive some additional support through sports institutes. In stark contrast to the other players in team, the Majors work with strength and conditioning coaches away from the pitch in seeking to maximise their performance on it. Luke talks about his training and says,

“I've got a good instructor there (Sports Institute) who helps me out quite a lot, and he points out my flaws in technique and everything, and I am feeling the benefit of a lot of the exercises now”. (Luke, 10th February 2009)

Luke has access to a sports institute and is learning how to lift correctly and with good technique as well as being provided with a structured training programme. Luke reports that with the phase of training he is in at the moment with the home nation team he represents, they are currently doing around three hours of additional conditioning and three hours of additional strength work away from the pitch each week. He goes on to say that much of the conditioning work is geared around sprinting and sprint endurance. This corresponds with work by Baker and Nance (1999), Spencer et al (2004a), and Spencer et al (2005) who state that the ability to perform maximal short duration sprints with speed intermittently during a game is an integral component of team sports. Luke's strength work is very much core focused, but he also works on areas which his strength and conditioning coach believes to be fundamental to the game of hockey. In addition, he has also been prescribed some additional exercises to help generate strength in one of the specific skills (notably 'drag flicking') that he performs on the pitch. Luke says he is feeling the benefit of doing extra training and believes the support he receives from his sport institute helps give him an advantage over his peers and those players who do not receive funding. Like Luke, Major Sean also has funding from a Sports Institute. He also reports that before he benefited from this he didn't really do much at all away from the pitch, however he's now working alongside an S&C coach to develop his strength in seeking improvement in his hockey.

In the past Major Matt attended a local gym on his own where he said he would maybe do a run and probably train his upper body. He is now funded by an athlete scholarship scheme and has regular one to one sessions with an S&C coach. As this is all new to him he is currently being taught the techniques of basic lifting exercises as well as developing an understanding of injury prevention. In contrast, John represents a different home nation and so his support varies slightly from the other three players who receive support. He does not have a specific routine set for him at the minute, but does say that he will receive a new programme soon as he is involved in an international competition later in the year. He has also been taught how to lift by an S&C coach and one of his main focuses is SAQ (speed, agility, and quickness) when he is away from the pitch.

4.5.6 Individual Unstructured Training (Strength Based)

Resistance training (strength work) for athletes is primarily incorporated into training for the prevention of injuries and to develop physiological outcomes such as hypertrophy, strength endurance, maximal strength and explosive power (Newton et al, 1999; Gorostiaga et al, 2008; Hunter & Harris, 2008; and Reverter-Masia et al, 2008). Although the paragraphs that follow highlight the kinds of resistance/strength work the athletes from Greentown do in the gym, few of them recognise why they are doing this kind of training. Much of the research literature in this area for hockey points to speed and repeated sprint ability being two physical requirements that differentiate between players who compete at an elite level and players that do not (Reilly & Borrie, 1992; Elferink-Gemser et al, 2004; Lemmink et al, 2004; and Elferink-Gemser, 2007), yet although the majority of Greentown do some form of resistance training, they do not recognise that this resistance work may help them become faster thus developing their speed on the pitch.

Many of the players tend to focus more on upper body resistance training as opposed to training their lower body. When one looks at the fundamentals of hockey it can be seen that lower body strength is essential for making speed gains in running. It is interesting therefore that so many of the Greentown players avoid doing strength training with their legs. Master Tom says when he goes to the gym he does roughly an hour of training with free weights and resistance machines. When asked more specifically what resistance exercises in particular he selected as part of his training in the gym, he said,

“I tend to mix it up, I do a bit of bench pressing for my chest, bit of fly for my chest, erm, do some shoulder press, do some sit ups, and core work as well, do biceps and triceps. To be honest I do most of the work on my upper body, I don’t actually do that much on my legs and lower body”.

(Tom, 12th February 2009)

When probed further about any reason why he did not select any lower body exercises in his training, Tom said he did not know and that maybe he should. Like many others in the squad he feels because he already does quite a lot of running for hockey, it is not necessary to do additional training for his legs in the gym. Make-it Russel is another player that shares this view,

“Because I do so much running I’m always on my feet in work and in training I don’t really do anything on my legs apart from just a warm up

like five minutes cycle or run or row or whatever, and then everything else is upper body”. (Russel, 17th February 2009)

Both Make-its Oliver and Dan are close to breaking into their country’s senior hockey set ups. Unfortunately, at present they do not receive the valuable support that could help them get there. When talking about his general strength training, Oliver says,

“I kind of have to do that myself so to be honest half the time it just turns into whatever I think I’ll do I’ll do”. (Oliver, 10th February 2009)

4.5.7 Individual Unstructured Training (Conditioning Based)

In addition to taking into account strength work in their training, the players at Greentown also put emphasis on improving their conditioning to play hockey. The majority of the time, this type of training for the players at Greentown involves running.

The literature emphasises the importance of aerobic and anaerobic endurance as being vital physical requirements for any field hockey player (Reilly & Borrie, 1992; Boyle et al, 1994; and Elferink-Gemser et al, 2004). In terms of elite play, research has recognised anaerobic endurance as being a significant factor in determining the playing level of an athlete in hockey (Reilly & Borrie, 1992; and Lemmink et al, 2004). All participants in this study noted in their training diary forms that they did some form of additional running outside of their pitch training or matches. Although many identified that this was to help them perform better on the pitch, they were not able to specify why. When looking at a running session Master Brian did outside of hockey training he reported,

“It’s like a warm up run and then there’s about a mile and a half, two miles and I’ll sprint alternate lamp posts”. (Brian, 10th February 2009)

Minor Greg does not do any training in the gym and therefore focuses all his attention on running to improve his fitness. In his training diary form he noted down three running sessions. When asked to expand on these sessions in his interview he said,

“The Wednesday run is a steady 30 minute low intensity, just a run, oh I say low intensity I try and keep it fairly high pace. The others vary from week to week depending on what I need or what I feel I need. So if I need to do shuttles, I’ll do shuttles and turning, if I’m quite happy with that I

want to work on aerobic stuff I'll do a longer run.” (Greg, 17th February 2009)

Again there is no real structure in how Minor Greg trains and he admits he changes what he does weekly even though he knows this may not be the right thing to do.

Majors John and Luke are the only players to mention specific speed work as part of their training. John does specific SAQ drills with an S&C coach at university as part of his training for the home nation he plays for. John focuses on this type of training as he believes it's a vital part of improving his performance on the pitch. He likes to work on improving his speed and his turning ability.

4.6 Stimuli and Influences

As was identified in chapter 2, little research to date has explored where athletes gain their ideas for training from. This section of the discussion will now look to detail what stimuli the eighteen athletes from Greentown have received in influencing them to go and train away from the pitch. This section will effectively be looking at where these male athletes have got their ideas about strength and conditioning from.

4.6.1 Hockey Coaches

Five of the eighteen participants in this study identified a hockey coach as a source from which they had gained some knowledge and influence about strength and conditioning. Master Tom explains that through doing representative hockey in the past, he received some encouragement from his hockey coaches. He has also taken on board things that the coaches at Greentown have suggested. Similarly Masters Mike and Mark have taken knowledge they built up in the past from their home nation set ups to guide them in their additional training now. Minor Greg describes his knowledge as an “amalgamation” from the input he has had from different coaches, and Make-it Oliver highlighted the influence he received from his hockey coaches in the past, but he expands when he says that his hockey coach, “didn't necessarily know what he was doing” as he was not a specialist S&C coach. Improving knowledge by interacting with coaches is in line with research by Schempp et al (2007) who depicted that coaches in the sport of golf sought out experts in the field in order to broaden and deepen their knowledge of the sport. In essence this is what the athletes at Greentown have done when seeking to learn more about their sport by working

with and approaching their coaches as a means to establishing some knowledge about strength and conditioning, whether this knowledge was correct or not.

4.6.2 Hockey Players

A larger proportion of the players (9 in total) felt they received much of their information about training from their peers. Major Luke details that being involved in hockey for a long time he has experienced influences on his training from fellow players. He says,

“Always different ideas floating around the changing rooms, but not really much strength stuff so if you were talking about doing a strength session and going to the gym, I don’t think there’s many people in our changing room that’d be able to pass on the kind of knowledge”. (Luke, 10th February 2009)

Before becoming a funded athlete, Sean explains that most of his ideas on training came from players around him and the friends he has within his club team.

Majors Matt and John, Master Graham, and Minor Greg all agree that with having a career in hockey, there is a tendency to pick up ideas about training just by talking to other players. Master Tom says,

“In terms of actual weight work, I’ve had no input with that if I’m honest with you. It’s just my own, what I’ve picked up, seeing people in the gym doing different exercises, chatting to your mates saying ‘I do this, I do that’, kind of thing”. (Tom, 12th February 2009)

Although there is no direct research that reports athletes learn from their fellow athletes, Wright et al (2007) found that coaches did learn from face to face interactions with other coaches. This suggests that interaction is a means of learning, but again, this type of learning may not be positive if the elements discussed are incorrect.

4.6.3 Personal Trainers and Fitness Instructors

Make-it Dan worked with a fitness instructor over the Christmas period at a gym. He said he employed this person to help improve his fitness, and although he did benefit in some ways, he was never provided with a specific programme or anything he could take away and work with.

“I would like, if someone said to me, ‘look, you need to do this on these days to be successful’, I’d love that. If someone said, ‘look, do this and you’ll be fine’”. (Dan, 12th February 2009)

When asked whether he feels he is making it up a bit, he replied yes, he did at times, but also said in some ways he liked this as there’s lots of variety in his training.

Athletes however do not always follow given instructions on their training when provided with them, as work by Palmer et al (1998) and Palmer et al (1999) shows. Both of these studies focused on the adherence to a fitness training programme by two (one junior and one senior) groups of elite netballers. Results from both studies showed that only 21% and 20% of participants respectively reported to follow the programme fully.

4.6.4 Sports Institutes/S&C Support

Master Luke feels he has benefited from the training he has done at his home nation’s sports institute. He feels the coaches he works with there have tailored the training very specifically around him as an individual as well as considering the demands and the physical demands of the sport he plays.

Make-it Dan also agrees that most of his knowledge about S&C has come from a sports institute, but since leaving one home nation to represent another he is currently in a period of receiving no outside support. He is trying to make it into another home nation side, but unless he gets there, he will not receive the support he needs. He highlights the fact that that players on the periphery of making a home nation team receive little support. Make-it Russel agrees with this notion as he finds himself in a similar situation. He says that last summer there was such a focus on the junior and senior Olympic squads that if you were, as he says:

“In the middle there’s not as much focus on you.” (Russel, 17th February 2009)

4.6.5 Educational Courses

A number of players studied physical education and sport at school and later university and expressed their development in knowledge on some of the physical components of sport through taking up these subjects. Wright et al (2007) report that the primary source of learning for the coaches they studied was from large-scale coach education programmes.

4.6.6 Media

Four of the players use literature and media sources to further their knowledge about training. Major Luke admits that before training with a sports institute, most of his knowledge came from magazines (predominantly men's fitness magazines) and things he had seen on the internet. Make-it Russel has also used magazines as a source of information, and Make-it Chris said,

“Just stuff that I've watched on programmes of maybe how other sports people have done stuff”. (Chris, 24th February 2009)

Minor Adam consolidates this lack of understanding and support with his gym based training by saying,

“Just exercises I've seen people do at the gym. So when I used to go to the gym, just watching what other people did, and seeing like at the gym those pictures of people doing things. I didn't know what weights or anything, just go with what I can”. (Adam, 26th February 2009)

4.7 Training and Performance

When the players were asked if they felt additional training enhanced their performance, fourteen of the eighteen players responded positively. Majors, Luke, Matt, Sean and John, Make-it Dan, Masters Brian and Mark, and Minors Adam and Greg, were all certain that doing additional training away from the hockey pitch would enhance a player's performance on it. Make-its Russel and Chris, and Masters Tom, Pete, and Mike were a little more vague in their response, and Make-it Craig and Oliver, and Masters Graham and Paul seemed some what sceptical of whether or not it plays a big role in their performance.

When the participants were asked why they did extra physical training away from the pitch, there was again a mixed response. Some players such as Make-it Oliver stated that they did the extra work because they felt they had to. They felt that if they were not partaking in any extra training then they would fall behind their team mates and opponents. This corresponds with research by Elferink-Gemser et al (2007) who found elite hockey players performed better than their sub-elite peers on a number of physiological tests.

Majors Luke and Sean recognised that they did extra training because they felt they get an advantage from it. Luke says,

“I think with the Sports Institute stuff I get an advantage over my peers and also people who aren’t on funding”. (Luke, 10th February 2009)

Sean adds,

“Just knowing that like getting into competition I’ve found that it’s so much, it’s so beneficial to you, if you’re fitter during a game, just getting that getting towards the end of the match and you can still keep going then your skills are still going to be at the top of your game, erm, it definitely helps, no doubt about it”. (Sean, 5th March 2009)

This thought is emphasised by Sunderland and Nevill (2005) and Gabbett et al (2009) who believe physiological function is important in determining success as it corresponds with the ability to execute the required skills at the correct time and when under physical pressure such as fatigue.

There is a general consensus from the participants that additional strength and conditioning is an important supplement to work on the pitch to improve skills and competing in matches. The majority agree this does improve performance. However, it may be contested that there is still a void in what training the players of Greentown are doing away from the pitch and what they should be doing. We are not able to establish whether these players are being as productive with their additional training time as they could be, and there is a possibility that the training they are doing may be detrimental to their performance as opposed to enhancing it.

4.8 Chapter Conclusion

This discussion explored the emerging themes from the findings of this study and related them back to previous research in the areas of field hockey, coaching influences, and strength and conditioning. Player groupings were established and documented, and the outcomes of being a part of each of these groups and their relation to training were analysed. In the next chapter conclusions will be drawn, implications for future research highlighted, and suggestions for future research will be offered.

Chapter 5: CONCLUSION

5.1 Introduction to Chapter

This final chapter will address the findings of this study. After initially reviewing the research area, the chapter will lead on to provide a summary of findings from the study. Any implications the study may have will also be discussed as well as the provision for some potential directions for future research in this field.

5.2 The Research Area

This thesis set out to address the sport of field hockey in England and its relation to strength and conditioning. With the majority of previous research surrounding the sport of hockey and its physiological components in the past taking a quantitative stance, this study selected a qualitative methodology in order to take a different approach.

5.3 Summary of Findings

The findings of this study concluded that within the Greentown squad, the eighteen players came under one of four player groups. These are; the Majors (players currently part of a home nation squad), the Make-its (players currently involved in a home nation development squad), the Masters (players previously involved in a home nation squad or development squad), and the Minors (players who have never been a part of a home nation set up).

Figure 1 - A representation of S&C components within player groupings

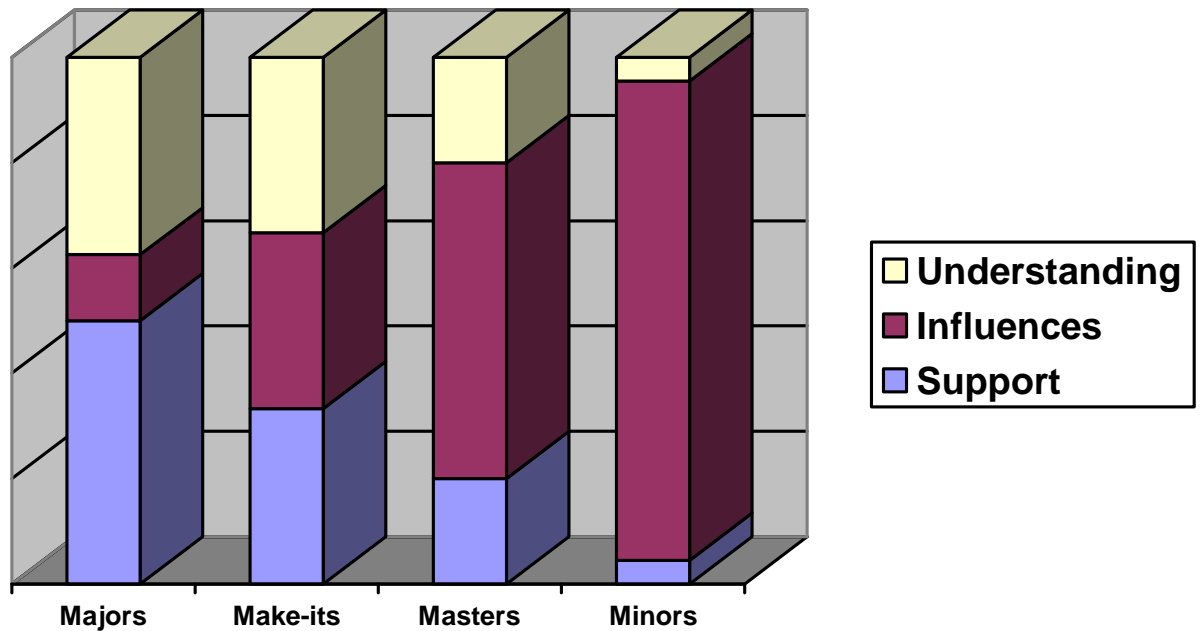


Figure 1 is a representation of the level of understanding, influences and support each player grouping receives with relation to strength and conditioning. It is easy to depict that the Majors receive the most support and because of this their training has the most structure and they have the best understanding about strength and conditioning and why they do additional training. The diagram also shows that as you move down the player groups from the Make-its, through the Masters and to the Minors, the level of support and understanding decreases and the amount of influences from outside factors such as hockey coaches and players, educational courses and the media increases. Strength and conditioning is not fully understood by any of the Greentown players, and this is mainly due to little exposure to strength and conditioning coaches and support.

Training was broken down into five different categories, notably; team training, pre season training, structured, unstructured (strength based), and unstructured (conditioning based) It was discovered that although all members of the squad partake in additional training away from the pitch, it is only the Majors who have any real structure with their training due to the extra support they receive from their home

nations. The remaining members are left to decide for themselves what they think is suitable.

The players were stimulated to train by a number of different influences including; hockey coaches, hockey players, personal trainers and fitness instructors, sports institutes/S&C support, educational courses and the media. It is due to this broad spectrum of influences that many of the players approach their training in very different ways.

The majority of players agreed that strength and conditioning training was an integral part of improving performance on the pitch. However, without guidance, many of these players may be taking part in training that could be detrimental to their performance instead of enhancing it.

5.4 Implications of the Study

Care must be issued when generalising findings based on a small sample. Results from this study were extracted from one of the top ten men's field hockey teams in England. We are unsure however whether these results could be reflected across the other nine teams that take their place in the England Hockey Premier League.

The study does support elements of current research which state that aerobic and anaerobic endurance, speed, agility, strength and flexibility are all important physical components to be considered when looking at the physical aspects of the game of hockey (Reilly & Borrie, 1992; Boyle et al, 1994; Aziz et al, 2000; Bishop et al, 2003; Astorino et al, 2004; Elferink-Gemser et al, 2004; Spencer et al, 2004a; Spencer et al, 2004b; Spencer et al, 2005; and Elferink-Gemser et al, 2007). However the training of these components and why this training is important is not fully understood by any of the players.

The study does however contribute to some new understanding within this area on where these top end athletes receive their influences for their training from. However the sources of information were all very different. In the future therefore it might be of more benefit to draw all of these sources together to format a more condensed information unit which players and coaches can access to understand more about their physical training in seeking improvement in the physical aspects of their game.

5.5 Recommendations for Future Research

The findings of this study provide insight into the lack of focus on strength and conditioning with top end players within England. To understand more about this area and to see whether this is common among more or all premiership hockey teams in England, it would be insightful for more clubs to be investigated.

Much data has been gathered within this study from taking a qualitative approach and it would perhaps be appropriate for this format to be used within hockey clubs outside Great Britain to discover whether there is a different structure or focus on training abroad. This data could then be disseminated to England Hockey and to Premier League coaches for them to decide whether new strategies need to be employed to improve the physical development of hockey players, both at the top end and lower down in the sport in seeking progress in hockey at all levels.

5.6 Chapter Conclusion

This chapter reviewed the area of research with which this study took place and has provided a summary of the findings. Implications of the study have been noted, and recommendations for future research have been suggested to provide possible future directions for research within this field.

5.7 Concluding Remarks

This thesis set out to discover more about the use of strength and conditioning by top end field hockey players within England. It was found that the players use for this strand of sport science was majorly dependant upon their involvement with a home nation set up. Players who are involved receive a higher level of support and therefore have a better understanding of S&C than players that are not. Players receive influences for their training from a number of different sources, and often these sources are not the most valuable for information.

If the physicality of athletes is one variable that if managed correctly is easy to control, it would be interesting to see if the sport of hockey would take a step forward in England if there was improved management around the influences for training

players come under, and if there was more emphasis on strength and conditioning within hockey clubs across the country.

Chapter 6: REFLEXIVE EPILOGUE

This chapter sets out to talk in more depth about the researcher, the research journey, and the researchers' last reflections on the thesis in order to provide a final summary of the experience and the process as a whole.

Having been passionate about sport from a young age, I began my involvement in field hockey from the age of eleven. I started playing at school, and later club, county and regional level. After a 6 month spell playing in South Africa in 2003, I began my undergraduate degree at the University of Birmingham. I represented the university for three years in the BUSA Premiership as well as the England National Hockey League, in addition to this I played for Midlands under 21s and England Universities. Having a background in field hockey as a player allowed me to understand and appreciate the dynamics of hockey teams and clubs before I set foot into a hockey environment as a researcher. It could be argued that this may in fact leave the research open to bias, but I believe my background knowledge was in fact a strength. This became particularly apparent in interview scenarios when points arose that could be probed on. Some of these points may have been missed by a researcher without this background and understanding.

I have always been interested in the physical side of sport, in particular what training methods different athletes use to enhance their performance and become more superior than their opposition. It seems compelling to me why an athlete towards the top competitive end of his/her sport would ever neglect the physical side of his/her training when this is one component which is in every athlete's control.

With this interest, on completing my undergraduate degree, I began to seek out opportunities of gaining experience within strength and conditioning (S&C). Over the last three years I have a have worked with two Premiership hockey teams, completed

a years internship in S&C at the University of Manchester where I gained accreditation to the UKSCA. I have coached a number of individual TASS athletes from a range of different sports. I have also worked with the Great Britain Junior Synchronised Swimming Squad as well as setting up my own S&C project for 'Gifted and Talented' athletes at a school in Manchester, in addition to coaching a number of novice triathletes competing in the sport for the first time.

The research question was derived from this belief in the importance of physical training within sport which in modern terms is known as S&C, a branch of sport science. As I had previous experience in field hockey as a player it was already a sport I had a background knowledge and understanding of. When I started to build a career in S&C, I became more and more intrigued by what kind of training plans different sports clubs were employing in order to support their athletes. I soon recognised that even with sport being at the forefront in many senses in Great Britain with the Olympics on the horizon in 2012, S&C was still an area that was relatively neglected in comparison to the technical and tactical side of training in many sports. This was especially prevalent in non-professional sports such as hockey where funds are limited, and often the head coach is forced to touch all bases of training for his/her athletes with very little support. Within my research I wanted to find out exactly what training top end field hockey players do in this country when they are away from the pitch with a view to discovering more about the use of S&C in hockey clubs as a whole in England.

Before undertaking any research I had to decide whether the results would prove more valuable if I took a 'wide and shallow' or a 'deep and narrow' approach. With issues such as time and cost prevailing, I decided to take the 'deep and narrow' route and select one club from the England Men's Hockey Premiership, and focus solely on

them. It could be argued that this approach was limiting and may have little relevance to those clubs playing in the same league around it given the fact that only one club was isolated and examined. However, the advantage of this approach meant that I was able to build up a very strong picture of each player involved, as well as being allowed to really delve into their understanding of S&C and discover the additional training they employed and why. It can be said that many issues detailed within the discussion of this study, particularly that of 'player groupings', are reflected in hockey clubs at the same level, and perhaps even through different sports clubs. The only way of proving however that 'player groupings' and additional issues found within this study are apparent across the board in the England Hockey Premiership and indeed other sports clubs, would be to actually go out further into the field and formally investigate more clubs.

The journey has been a lengthy process spanning over a two year period. During this time I have continued my work as a coach, where I have seen some of my practise being shaped by what I have been continually learning through my research. I now make certain as a S&C coach that I work even closer with the coaches and athletes I work alongside to ensure communication pathways are strong so that all individuals involved understand the training they are undertaking and the implications it will have on performance.

In terms of professional practise, the experience as a whole has benefited me because I have learned more about the intricacies of different sports clubs. The information within this thesis is important because it highlights the current lack of emphasis on S&C within top end hockey in England, and in seeking to go forward this is something that certainly needs to be further developed and established.

Chapter 7: BIBLIOGRAPHY

- Amis, J. (2005) "Interviewing for Case Study Research", In Andrews, D.L; Mason, D.S; and Silk, M.L. (Eds) (2005) Qualitative Methods in Sports Studies, Berg Publishers, Oxford, pp.104 -138.
- Astorini, T.A; Tam, P.A; Rietschel, J.C; Johnson, S.M; and Freedman, T.P. (2004) "Changes in the Physical Parameters During a Competitive Field Hockey Season", The Journal of Strength and Conditioning Research, Vol 18, No 4; pp850-854.
- Aziz, A.R; Chia, M; and The, K.C. (2000) "The Relationship Between Maximal Oxygen Uptake and Repeated Sprint Performance Indices in Field Hockey and Soccer Players", Journal of Sports Medicine and Physical Fitness, Vol 40, No 3; pp195-200.
- Babbie, E. (2007) The Practice of Social Research, Wadsworth Cengage Learning, USA.
- Baker, D; and Nance, S. (1999) "The Relation Between Running Speed and Measures of Strength and Power in Professional Rugby League Players", Journal of Strength and Conditioning Research, Vol 13; pp230-235.
- Becker, A.J. (2009) "It's Not What They Do, It's How They Do It: Athlete Experience of Great Coaching", International Journal of Sport Science and Coaching, Vol 4, No 1; pp93-119.
- Bishop, D; Lawrence, S; and Spencer, M. (2003) "Predictors of Repeated-Sprint Ability in Elite Female Hockey Players", Journal of Science and Medicine in Sport, Vol 6, No 2; pp199-209.
- Blazevich, A.J; Jenkins, D.G. (2002) "Effect of the Movement Speed of Resistance Training on Sprint and Strength Performance in Concurrently Training Elite Junior Sprinters", Journal of Sport Sciences, Vol 20; pp981-990.
- Bompa, T.O. (1999) Periodisation Training for Sports, Human Kinetics, USA.
- Boyatzis, R.E. (1998) Transforming Qualitative Information: Thematic Analysis and Code Development, Sage Publications, USA.
- Boyle, P.M; Mahoney, C.A; and Wallace, W.F.M. (1994) "The Competitive Demands of Elite Male Field Hockey", Journal of Sports Medicine and Physical Fitness, Vol 34, No 3; pp235-241.
- Bryman, A. (2001) Social Research Methods, Oxford University Press, London.
- Conzelmann, A; and Nagel, S. (2003) "Professional Careers of the German Olympic Athletes", International Review for the Sociology of Sport, Vol 38, No 3; pp259-280.
- Côté J. (1999) "The Influence of the Family in the Development of Talent in Sport", The Sport Psychologist, Vol 13, No 4; pp395-417.

- Coutts, A.J; Murphy, A; Dascombe, B.J. (2004) “Effect of Direct Supervision of a Strength Coach on Measures of Muscular Strength and Power in Young Rugby League Players”, *Journal of Strength and Conditioning Research*, Vol 18, No 2; pp316-323.
- Cushion, C.J; Armour, K.M; and Jones, R.L. (2003) “Coach Education and Continuing Professional Development: Experience and Learning to Coach, *Quest*, Vol 55; pp215–230.
- Denzin, N.K; and Lincoln, Y.S. (2003) *Collecting and Interpreting Qualitative Materials*, 2nd Edition, Sage Publications, Thousand Oaks.
- Denzin, N.K; and Lincoln, Y. S. (2005a) “Introduction: The Discipline and Practice of Qualitative Research”, In Denzin, N.K; and Lincoln, Y.S. (Eds) (2005b) *The Sage Handbook of Qualitative Research*, 3rd Edition, Sage Publications, USA, pp1-32.
- Dick, F.W. (2002) *Sports Training Principles*, A & C Black, London.
- Dorgo, S. (2009) “Unfolding the Practical Knowledge of a Strength and Conditioning Coach”, *International Journal of Sports Science and Coaching*, Vol 4, No 1; pp17-30.
- Dupont, G; Akakpo, A; and Berthoin, S. (2004) “The Effect of In-Season, High-Intensity Interval Training in Soccer Players”, *The Journal of Strength and Conditioning Research*, Vol, 18, No 3; pp584-589.
- Durand-Bush, N; and Salmela, J.H. (2002) “The Development and Maintenance of Expert Athletic Performance: Perceptions of World and Olympic Champions”, *Journal of Applied Sport Psychology*, Vol 14, No 3; pp 154-171.
- Elferink-Gemser, M.T; Visscher, C; Lemmink, K.A.P.M; and Mulder, T.W. (2004) “Relation Between Multidimensional Performance Characteristics and Level of Performance in Talented Youth Field Hockey Players”, *Journal of Sport Sciences*, Vol 22, No 11&12; pp1053-1063.
- Elferink-Gemser, M.T; Visscher, C; Lemmink, K.A.P.M; and Mulder, T.W. (2007) “Multidimensional Performance Characteristics and Standard of Performance in Talented Youth Field Hockey Players: A Longitudinal Study”, *Journal of Sport Sciences* Vol 25, No 4; pp481-489.
- English Institute of Sport (2009) “Sport Science – Strength and Conditioning”, available from; http://www.eis2win.co.uk/Pages/Strength_and_Conditioning.aspx (accessed 16/08/09)
- England Hockey (2009) “All About Hockey”, available from; <http://www.englishockey.co.uk/page.asp?section=46§ionTitle=All+about+Engl+and+Hockey> (accessed 10/08/09)

England Hockey (2010a) “Take Part – Coaching Awards and Insurance”, available from;
<http://www.englishhockey.co.uk/page.asp?section=87§ionTitle=Coaching+Awards+%26+Insurance> (accessed 01/11/10)

England Hockey (2010b) “Take Part – Level 1”, available from;
<http://www.englishhockey.co.uk/page.asp?section=93§ionTitle=Level+1>
(accessed 01/11/10)

England Hockey (2010c) “Take Part – Level 3”, available from;
<http://www.englishhockey.co.uk/page.asp?section=95§ionTitle=Level+3>
(accessed 01/11/10)

Flick, U. (2006) *An Introduction to Qualitative Research*, 3rd Edition, Sage Publications, London.

Fontana, A; and Frey, J.H. (2005) “The Interview: From Neutral Stance to Political Involvement” In Denzin, N.K; and Lincoln, Y.S. (Eds) (2005b) *The Sage Handbook of Qualitative Research*, 3rd Edition, Sage Publications, USA, pp695-728.

Gabbett, T; Jenkins, D; and Abernethy, B. (2009) “Game-Based Training for Improving Skill and Physical Fitness in Team Sport Athletes”, *International Journal of Sports Science and Coaching*, Vol 4, No 2; pp273-283.

Gabbett, T; King, T; and Jenkins, D. (2008) “Applied Physiology of Rugby League”, *Sports Medicine*, Vol 32, No 2; pp119-138.

Galipeau, J; and Trudel, P. (2006) “Athlete Learning in a Community of Practice”, in Jones, R.L. (2006) *The Sports Coach as Educator*, Routledge, London, pp 77-94.

Gilbourne, D. (2002) “Sports Participation, Sports Injury, and Altered Images of Self: An Autobiographical Narrative of a Lifelong Legacy”, *Reflective Practice*, Vol 3, No 1; pp71-88.

Gilbourne, D; and Richardson, D. (2006) “Tales From the Field: Personal Reflections on the Provision of Psychological Support in Professional Soccer”, *Psychology of Sport and Exercise*, Vol 7, No 3; pp325-337.

Godfrey, R; and Whyte, G, (2006) “Training Specificity”, In Whyte, G. (Ed) (2006) *The Physiology of Training*, Churchill Livingstone Elsevier, UK, pp23-44.

Gorostiaga, E.M; Izquierdo, M; Iturralde, P; Ruesta, M; and Ibáñez, J. (1999) “Effects of Heavy Resistance Training on Maximal and Explosive Force Production, Endurance and Serum Hormones in Adolescent Handball Players”, *European Journal of Applied Physiology and Occupational Physiology*, Vol 80, No5; pp485-493.

Gratton, C; and Jones, C. (2004) *Research Methods for Sports Studies*, Routledge, London.

Great Britain Hockey (2009) "The Olympic Hockey Athletes", available from; <http://www.greatbritainhockey.co.uk/athlete.asp?section=000100010002§ionTitle=The+Olympic+Hockey+Athletes> (accessed 21/11/09)

Greenleaf, C.; Gould, D.; and Dieffenbach, K. (2001) "Factors Influencing Olympic Performance: Interviews with Atlanta and Nagano US Olympians", *Journal of Applied Sport Psychology*, Vol 13, No 2; pp154-184.

Hammersley, M; and Atkinson, P. (1995) *Ethnography: Principles and Practice*, Routledge, London.

Hardcastle, S; and Taylor, A. H. (2005) "Finding an Exercise Identity in an Older Body: It's Redefining Yourself and Working Out Who You Are", *Psychology of Sport and Exercise*, Vol 6, No 2; pp 173-188.

Holstein, J. A; and Gubrium, J. F. (1995) *The Active Interview*, Sage Publications, Thousand Oaks.

Holt, N.L; and Dunn J.G. (2004) "Toward a Grounded Theory of the Psychosocial Competencies and Environmental Conditions Associated with Soccer Success", *Journal of Applied Sport Psychology*, Vol 16, No 3; pp199-219.

Hunter, G.R; and Harris, R.T. (2008) "Structure and Function of the Muscular, Neuromuscular, Cardiovascular, and Respiratory Systems", in Baechle, T.R; and Earle, R.W. (Eds) (2008) *Essentials of Strength Training and Conditioning*, Human Kinetics, China, pp3-20.

Jeffreys, I. (2008) "Warm-Up and Stretching", in Baechle, T.R; and Earle, R.W. (Eds) (2008) *Essentials of Strength Training and Conditioning*, Human Kinetics, China, pp295-324.

Johnson, M.B; Castillo, Y; Sacks, D.N; Cavazos Jr, J; Edmonds, W.A; and Tenenbaums, G. (2008) "Hard Work Beats Talent Until Talent Decides to Work Hard: Coaches' Perspectives Regarding Differentiating Elite and non-Elite Swimmers", *International Journal of Sports Science and Coaching*, Vol 3, No 3; pp417-430.

Koutedakis, Y; Metios, G.S; and Stavropoulou-Kalinoglou, A. (2006) "Periodisation of Exercise Training in Sport", in Whyte, G. (Ed) (2006) *The Physiology of Training*, Churchill Livingstone Elsevier, UK, pp 1-21.

Krane, V; and Baird, S. M. (2005) "Using Ethnography in Applied Sport Psychology", *Journal of Applied Sport Psychology*, Vol 17 pp 87-107.

Lambert, M. (2006) "Physiological Testing for the Athlete: Hype or Help?", *International Journal of Sports Sciences and Coaching*, Vol 1, No 2; pp199-208.

Lemmink, K.A.P.M.; Elferink-Gemser, M.T.; and Visscher, C. (2004) "Evaluation of the Reliability of Two Field Hockey Specific Sprint and Dribble Tests in Young Field Hockey Players", *British Journal of Sports Medicine*, Vol 38, No 2; pp138-142.

- Leslie, V; Price, J; Morris, J.G; Sunderland, C; and Nevill, M.E. (2007) "Physiological Characteristics of Junior and Senior Male International Hockey Players", *Sports Medicine and Exercise Sport Science*, Vol 25, No 3; pp269.
- Lewis, J; and Ritchie, J. (2003) "Generalising from Qualitative Research", In Ritchie, J; and Lewis, J. (Eds) (2003) *Qualitative Research Practice: A Guide for Social Science Students and Researchers*, Sage Publications, London, pp219-262.
- Lines, G. (2007) "The Impact of Media Sport Events on the Participation of Young People and Some Implications for PE Pedagogy", *Sport, Education and Society*, Vol 12, No 4; pp349-366.
- Lothian, F; and Farrally, M. (1994). "A Time – Motion Analysis of Women's Hockey", *Journal of Human Movement Studies*, Vol 26; pp255-265.
- Mallett, C.J; and Hanrahan, S.J. (2004) "Why Does the 'Fire' Burn So Brightly", *Psychology of Sport and Exercise*, Vol 5, No 2; pp183-200.
- Marlow, C; and Bull, S.J. (1999) "Attitudinal Factors Influencing Adherence to Fitness Training in International Women Cricketers", *Journal of Sport Sciences*, Vol 17; pp64-65.
- Marshall, C; and Rossman, G.B. (2006) *Designing Qualitative Research*, 4th Edition, Sage Publications, USA.
- Mason, J. (2002) *Qualitative Researching*, 2nd Edition, Sage Publications, London.
- Meyers, M.C. (2006) "Enhancing Sport Performance: Merging Sports Science with Coaching", *International Journal of Sport Science and Coaching*, Vol 1, No 1; pp 89-100.
- Newton, R.U; Kraemer, W.J; and Häkkinen, K. (1999) "Effects of Ballistic Training on Preseason Preparation of Elite Volleyball Players", *Medicine and Science in Sports and Exercise*, Vol 31, No 2; pp323-330.
- Nicholls, R; Jones, C.R; Polman, R.C.J; and Borkoles, E. (2009) "Acute Sport-Related Stressors, Coping, and Emotion Among Professional Rugby Union Players During Training and Matches", *Scandinavian Journal of Medicine and Science in Sports*, Vol 19; pp113-120.
- Palmer, C.L; Burwitz, L; and Smith, N.C. (1998) "Adherence to an Aerobic Training Programme in Junior Elite Netball Players", *Journal of Sport Sciences*, Vol 16; pp99-100.
- Palmer, C.L; Burwitz, L; and Smith, N.C. (1999) "Adherence to Fitness Training of Elite Netball Players: A Naturalistic Approach", *The Sport Psychologist*, Vol 13; pp313-333.

- Palmer, C; Burwitz, L; Smith, N; and Borrie, A. (2000) “Enhancing Fitness Training Adherence of Elite Netball Players: An Evaluation of Maddux’s Revised Theory of Planned Behaviour”, *Journal of Sports Sciences*, Vol 18, No 8; pp627-641.
- Patel, D.R; Stier, B; and Luckstead, E.F. (2002) “Major international sport profiles”, *Pediatric Clinics of North America*, Vol 49; pp769-792.
- Patton, M. (1980) *Qualitative Research Methods*, Sage Publications, Beverly Hills.
- Polman, R; Walsh, D; Bloomfield, J; & Netsi, M. (2004) “Effective Conditioning of Female Soccer Players”, *Journal of Sport Sciences*, Vol 22, No 2; pp191-203.
- Polman, R; Nicholls, A.R; Cohen J; and Borkoles, E. (2007) “The Influence of Game Location and Outcome on Behavior and Mood States Among Professional Rugby League Players”, *Journal of Sport Sciences*, Vol 25, No 13; pp1491-1500.
- Potrac, P; Jones, R.L; and Armour, K. (2002) “It’s All About Getting Respect: The Coaching Behaviours of an Expert English Soccer Coach”, *Sport Education and Society*, Vol 7, No 2; pp183-202.
- Reilly, T. and Borrie, A. (1992) “Physiology Applied to Field Hockey”, *Sports Medicine*, Vol 14, No 1; pp10–26.
- Reilly, T; and Seaton, A. (1990) “Physiological Strain Unique to Field Hockey”, *Journal of Sports Medicine and Physical Fitness*, Vol 30; pp142-146.
- Reverter-Masia, J; Legaz-Arrese, A; Munguia-Izquierdo, D; and Barbany, J.R. (2008) “The Conditioning Services in Elite Spanish Clubs of Team Sports”, *International Journal of Sports Science and Coaching*, Vol 3, No, 3, pp431-443.
- Ritchie, J; and Lewis, J. (2003) *Qualitative Research Practice: A Guide for Social Science Students and Researchers*, Sage Publications, London.
- Robson, C. (1995) *Real World Research*, Blackwell Publishers, Oxford.
- Sands, W.A. (1998) “How Can Coaches Use Sport Science?”, *Modern Athlete and Coach*, vol 36, pp8-12.
- Sands, R.R. (2002) *Sport Ethnography*, Human Kinetics, USA
- Schempp, P; Webster, C; McCullick, B.A; Busch, C; and Sannen Mason, I. (2007) “How the Best Get Better: An Analysis of the Self-Monitoring Strategies used by Expert Golf Instructors”, *Sport, Education and Society*, Vol 12, No 2; pp175-192.
- Schwandt, T. (2001) *Dictionary of Qualitative Inquiry*, Sage Publications, Thousand Oaks.
- Sheppard, J.M; and Young, W.B. (2006) “Agility Literature Review: Classifications, Training and Testing”, *Journal of Sports Sciences*, Vol 24, No 9; pp919-932.

Silk, M.L; Andrews, D.L; and Mason, D.S. (2005) “Encountering the Field: Sports Studies and Qualitative Research”, In Andrews, D.L; Mason, D.S; and Silk, M.L. (Eds) (2005) Qualitative Methods in Sports Studies, Berg Publishers, Oxford, pp.1 - 20.

Simenz, C.J; Dugan, C.A; and Ebben, W.P. (2005) “Strength and Conditioning Practices of National Basketball Association Strength and Conditioning Coaches”, Journal of Strength and Conditioning Research, Vol 19, No 3; pp495-504.

Spencer, M; Lawrence, S; Rechichi, C; Bishop, D; Dawson, B; and Goodman, C. (2004a) “Time-Motion Analysis of Elite Field Hockey, with Special Reference to Repeated-Sprint Ability”, Journal of Sports Science, Vol 22, No 9; pp843-850.

Spencer, M; Bishop, D; and Lawrence, S. (2004b) “Longitudinal Assessment of the Effects of Field Hockey Training on Repeated Sprint Ability”, Journal of Science and Medicine in Sport, Vol 7, No 3; pp323-334.

Spencer, M; Bishop, D; Dawson, B; and Goodman, C. (2005) “Physiological and Metabolic Responses of Repeated Sprint Activities: Specific to Field-Based Team Sports”, Sports Medicine, Vol 35, No12; pp1025-1044.

Starkes, J.L; and Ericsson, K.A. (2003) Expert Performance in Sports: Advances in Research on Sports Expertise, Human Kinetics, USA.

Stolen, T; Chamari, K; Castagna, C; and Wisloff, U. (2005) “Physiology of Soccer: An Update”, Sports Medicine, Vol 35, No 6; pp501-536.

Strauss, A; and Corbin, J. (1998) Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, 2nd Edition, Sage Publications, London.

Sunderland, C; and Nevill, M.E. (2005) “High-Intensity Intermittent Running and Field Hockey Skill Performance in the Heat”, Journal of Sports Sciences, Vol 23, No 5; pp531-540.

Thomas, J.R; and Nelson, J.K. (2001) Research Methods in Physical Activity, Human Kinetics, USA.

Tricoli V.A; Lamas, L; Carnevale, R; and Urginowitsch. (2005) “Short-Term Effects on Lower-Body Functional Power Development: Weightlifting Vs. Vertical Jump Training Programs”, Journal of Strength and Conditioning Research, Vol 19, No 2; pp433-437.

Trudel, P. (2006) “What the Coaching Science Literature Has to Say About the Roles of Coaches in the Development of Elite Athletes”, International Journal of Sport Sciences and Coaching, Vol 1, No 2; pp 127-130.

Van Mechelen, W; Twisk, J; Molendijk, A; Blom, B; Snel, J; and Kemper, H.C.G. (1996) "Subject Related Risk Factors for Sports Injuries: A 1 Year Prospective Study in Young Adults", *Medicine and Science in Sports and Exercise*, Vol 28, No 9; pp1171-1179.

Vernacchia, R.A; McGuire, R.T; Reardon, J.P; and Templin, D.P. (2000) "Psychosocial Characteristics of Olympic track and Field Athletes", *International Journal of Sport Psychology*, Vol 31, No 1; pp5-23.

Wang, J; and McJunkin, D. (2005) "Domain 3: Physical Preparation and Conditioning", *A Journal for Physical and Sport Educators*, Vol 18, No 4; pp22-24.

Watson, A.W.S. (1995) *Physical Fitness and Athletic Performance*, 2nd edition, Longman, UK.

Werthner, P; and Trudel, P. (2006) "A New Theoretical Perspective for Understanding How Coaches Learn to Coach", *The Sports Psychologist*, Vol 20, pp198-212.

Wikeley, F; and Bullock, K. (2006) "Coaching as an Educational Relationship", in Jones, R.L. (Ed) (2006) *The Sports Coach as Educator*, Routledge, London, pp 14-24.

Williams, M. H. (2007) *Nutrition for Health, Fitness, and Sport*, 8th Edition, McGrawHill Higher Education, USA.

Williams, S.J; and Kendall, L. (2007) "Perceptions of Elite Coaches and Sports Scientists of the Research Needs for Elite Coaching Practice", *Journal of Sport Sciences*, Vol 25, No 14; pp 1577-1586.

Wright, T; Trudel, P; and Culver, D. (2007) "Learning How to Coach: The Different Learning Situations Reported by Youth Ice Hockey Coaches", *Physical Education and Sport Pedagogy*, Vol 12, No 2; pp127-144.

Chapter 8: APPENDICES

8.1 Appendix A: Information and Consent Form

University of Birmingham – M.Phil (B) Sports Coaching

Research Information and Consent Form

About the Study

The study in question is looking at the sport of hockey, with particular reference to strength and conditioning.

Participants will all be over eighteen years of age and playing in the Men's Premier Division within England's National Hockey League.

The investigation involves two stages. Initially, each participant will be asked to complete a training diary form which should account for the activity they have undertaken over the last seven days. Once completed, an interview lasting approximately 15-20 minutes will follow. All interviews will be digitally recorded, however, all information collected during interviews will only be viewed by the researcher, and her supervisor if requested, and will remain anonymous. Individuals will not be identifiable in any publication/dissemination of the research findings, and all data will be stored safely where only the researcher has access.

Researcher Contact: Amy Hibbert (phone number & email address)

Declaration to Participants

If you take part in the study, you have the right to;

- Refuse to answer any particular question, and to withdraw from the study at any time.
- Ask any further questions about the study during your participation.
- Be given a summary of the findings from the study upon its completion.

Consent

Participant's Name _____

Participant's Signature _____

Participant's Contact Details _____

Researcher's Signature _____

Date _____

8.2 Appendix B: Training Diary Form

Training Diary

Using the form below, please recall all the activity you have participated in over the last 7 days i.e. hockey, gym training, or another sport/leisure activity. Please fill in the form as honestly as possible, noting; 1) the date you performed the activity (in the left hand column), 2) the activity itself, 3) the time of day you performed the activity, 4) the duration of the activity, and 5) the intensity of the activity you performed (using a scale of 1-5 with 1 being very low intensity and 5 being maximum intensity).

Day	Hockey specific activity i.e. Pitch training or match	General training i.e. strength and conditioning/fitness training in or out of gym	Non-hockey sporting activity i.e. a different sport/ leisure activity
1	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:
2	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:
3	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:
4	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:
5	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:
6	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:
7	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:	Activity: Time of Day: Duration: Intensity:

8.3 Appendix C: Interview Introduction and Guide

University of Birmingham – M.Phil (B) Sports Coaching

Interview Questions

Introduction – This is Interview Number 1 with Name, taking place at Greentown Hockey Club at Time/Day. The participant has been made aware that he can refuse to answer any particular question, and that he may terminate the interview and withdraw from the study at any time. The participant has also been informed that all data collected will remain anonymous and will be stored safely.

- 1) How old are you?
- 2) What is your hockey experience to date?
- 3) What is your current occupation? (Full/part time).
- 4) Looking at the training diary, would you say this is an average week?
- 5) How do you fit everything in? (I.e. training, competing, working/studying, friends/family).
- 6) What would you say your priorities are?
- 7) Refer to “General Training” column and probe around sessions noted by participant. (Why do you go to the gym? Run? Lift?)
- 8) Do you think doing additional training away from the pitch enhances your performance? (Why? In what way?)
- 9) What is your understanding of strength and conditioning?
- 10) Where did you get your training ideas/plans from? Who told you?
- 11) Which elements of your training as a whole do you find most effective?
- 12) Do you have any questions?

Thank you very much for your time.