Elite female hockey player's perceptions and rationale for participating in strength and conditioning training.

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ABSTRACT

This inductive study aims to explore the perceptions, attitudes and rationale for participating in strength and conditioning training. A group of ten, elite, female hockey players were interviewed using a semi-structured format.

The study highlighted that participants showed differing knowledge of the benefits of S & C. It was evident that the participants could be split into two groups (1) those that had experienced injury in the past, for ease these will be named the 'recoverers' and, (2) those who had never had a serious injury, these were named the 'invincibles'. The 'recoverers' were split into two further groups, the 'recurrent recoverers' and 'rapid recoverers'.

Overall the recoverers, but significantly the 'recurrent recoverers' showed a greater understanding of S & C training, highlighting the benefits to performance and injury reduction. Whereas the majority of participants in the 'invincibles' group perceived their engagement in S & C training as only involving strength training, referring to 'weight training' when asked what exercises their training incorporated. A number of them saw it as un-feminine and of a male domain.

The study indicates a number of future innovations that could be incorporated into S & C to increase understanding and participation levels.

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Chapter 1: INTRODUCTION

1.1 Introduction to the Chapter

The purpose of this chapter is to outline the basis of this study. It begins by justifying the reasons for the study based on a literature review of the present research on the sport of field hockey and strength & conditioning (S & C) training. It then discusses the basic methodology of qualitative research and the research questions to be asked. It concludes with an overview of how the study will be documented.

1.2 Outline of the Study

The current literature available for the sport of field hockey is centered around quantitative research methods. This research has highlighted the physical requirements required for participation in field hockey and the differences in physical attributes of elite and non-elite hockey players. The physiological requirements involved during a hockey game include good aerobic capacity and high maximal anaerobic threshold, allowing players to be able to recover more rapidly following high-intensity efforts and, maintain work rates towards the end of the game (Reilly and Doran, 2003, MacLeod et al., 2007). In addition the physiological aspects of speed, muscular strength, power and agility are required in substantial amounts to ensure that high intensity activities are performed at an optimum (Astorino et al., 2004).

The sport of hockey is extremely physically demanding due to the high-intensity, multi-dimensional aspects, the asymmetrical nature of the sport, and the unique stresses that are imposed on the body (Atkinson, 2007; Reilly and Seaton, 1990). This is especially true for young elite female athletes who have greater exposure time to the sport, and who may also be prepared

to take more risks than non-elite athletes. Past studies indicate that the sport of field hockey imposes a high risk of injuries to athletes (Reilly and Seaton, 1990; Murtaugh, 2001; Reilly et al., 2003). It has been suggested that hockey across both genders, along with football, wrestling, and gymnastics is rated as one of the top four sports in injury prevalence (Spencer et al., 2004). Research suggests that participation in an effective S & C training program can promote performance and reduce the risk of injuries in young elite athletes (Myer et al., 2004). However, in relation to hockey, little is known of young, elite, female players participation levels in S & C training, the advice they receive, or their perceptions and reasons for and against participation. This study looks to develop knowledge on this topic area in order to be able to develop performance and reduce injury through training, especially in the domain of S & C disciplines. The study will look to question athletes' reasons for and against engagement in S & C. By developing knowledge on this topic area hockey coaches, S & C coaches and NGBs will be able to tailor athletes training, especially in the domain of S & C training. Maximising athletes performance and reducing their chance of injury. This study will help to develop future innovations to increase participation in strength and conditioning training to both increase performance and reduce injuries.

1.3 Introduction to the Research Area

S & C training is a relevantly young and constantly growing area of sports coaching and training (Dorgo, 2009). It is seen as an integral part of optimal athletic preparation to achieve adequate performance and prevent injury (Pullo, 1992). The purpose of the research investigation was to explore the research question: 'Elite female hockey player's perceptions and rationale for participation in strength and conditioning training'.

The study proposed to develop understanding of the topic from the athlete's viewpoint, taking into account a brief history of their experiences of playing hockey and injuries they have incurred. The study also acknowledges that players' perceptions of S & C training will be shaped through their interactions with coaches, teachers, parents and peers. These perceptions can be constructed in a multiple of cultural sites including club environment, school and in the home (Symes, 2010). The culture of the club towards physical training and S & C training specifically will be important in shaping a players perceptions and understanding of S & C. Club culture and structures are important as they convey an implicit message that affects athlete motivation. It is important that the club culture the young athletes are exposed to is a supportive and caring climate (Pensgaard and Roberts, 2002).

This study builds on previous research conducted and available literature. The researcher's own experiences of both playing and coaching hockey, being involved in injury prevention training and injury rehabilitation after injury, and her relationship with the participants as a team mate, were also factors when deciding the research investigation. The study establishes a list of innovations that could be implemented to increase participation in S & C training.

1.4 Methodological Background

Silverman (2005) explains the methodology as a way of describing how the research is conducted and the specific research techniques that are used to study a topic. In general, research specific to hockey around the topic of S & C training to improve performance and prevent injury, has taken a quantitative approach (Reilly and Seaton, 1990; Murtaugh, 2001; Spenser et al., 2004; Macleod et al., 2007; Hudson, 2007). Although this data is of high value, there are large gaps in our knowledge and understanding of the participants' experiences, knowledge, and perceptions,

in specific areas of hockey. Therefore, this study adopted a qualitative method in order to gather the required information. In basic terms qualitative research provides "detailed description and analysis of the quality or substance of the human experience" (Marvaste, 2004, p. 7). Researchers are generally more concerned with the individual's perception of the world, and as suggested, the researcher shows an appreciation of the perspectives, culture and "world-views" of the actors involved (Allan, 1991).

In order to collect the data, semi-structured, in-depth interviews were used to gain a greater understanding of the participants perceptions and rationale for participation in S & C training. As stated 'interviews enable participants – be they interviewers or interviewees – to discuss their interpretations of the world in which they live and to express how they regard situations from their own point of view' (Cohen et al., 2000, p.267).

1.5 An Overview of the Thesis

Chapter 1 of the thesis provides a general overview. Chapter 2 discusses the relevant literature in regard to the topic and provides a basis for justifying why research is needed on the topic. Chapter 3 is concerned with the methodology of the topic, providing a rationale for the research methods employed, and talks through each of the processes involved. Chapter 4 discusses the results, highlighting the key findings. Chapter 5 concludes the study, summing up the key findings, and also highlights the limitations of the study and areas for future research.

1.6 Chapter Conclusion

This chapter has provided a general overview of the thesis. It has justified reasons for the research topic, and has highlighted the key research question: 'Elite female hockey player's

perceptions and rationale for participation in strength and conditioning training'. It has also introduced the qualitative methodology of the research and provided an overview of the thesis. The following chapter will review the literature relevant to this study topic.

Chapter 2: LITERATURE REVIEW

2.1 Introduction to the Chapter

The purpose of this chapter is to review the literature related to the nature of the game of field hockey and the characteristics of young elite female players. It will discuss the research based on the nature and benefits of S & C training. The review will then highlight some of the ideas discussed in the research to explain the rationale for players participating in S & C training sessions. In order to understand more about the nature of hockey as a sport, the chapter begins by discussing the research conducted on the demands of the game and the characteristics of elite hockey players.

2.2 The Nature of Field Hockey as a Sport

In recent years the game of field hockey has undergone significant modifications (Reilly and Seaton, 1990; Spencer et al., 2004). "The evolution of the playing surface from grass to artificial pitches saw the game change dramatically" (Hudson, 2007, p. 7), leading to an increase in ball control, speed and the range of skills demonstrated by individuals, making "hockey a faster and more exciting game" (Hudson, 2007, p. 7). More recently pitches have developed further with water-based pitches being used instead of sand based. This development has again increased the game speed and led to the progression of the modern game into a faster, more fluid game. Hockey has also been modified dramatically by rule changes. The two most significant changes in recent times have been to allow unlimited substitutions, and the removal of the offside rule (Spencer et al., 2004). Even more recently the introduction of the self-pass rule (2009-2010 season) has had profound effects on the speed at which the game is played. "A 'self-pass' from a

free hit, has been introduced to decrease the number and durations of interruptions to the flow of play and to increase the length of time the ball is in play, it will encourage free-flowing hockey" (FIH, 2011). These changes have markedly altered the tactical and physiological requirements of the game overall, making the intensity higher and the pace of the game faster (EHB, 2010).

Recent studies suggest (Spencer et al., 2004; McLeod et al., 2007) that with the further introduction of the new self pass rules, the hockey player has had to show even greater physiological adaptations, in order to meet the demands of an even faster and more physically challenging game. It is evident that players, especially at an elite level, must be physically fit in order to be able to perform the technical skills at a sufficient standard. In addition they must be able to repeat these skills consistently while under pressure and during prolonged times of high physical exertion during the game of hockey (Sunderland and Nevill, 2005; and Gabbett et al 2009). Therefore if a team is physically strong they can perhaps delay the onset of fatigue during a game of hockey, and be more likely to be the stronger team in the finishing stages of a game. This holds massive relevance and importance in elite level hockey.

The physiological requirements involved during a hockey game include good aerobic capacity and high maximal anaerobic threshold, allowing players to be able to recover more rapidly following high-intensity efforts and maintain work rates towards the end of the game (Reilly and Doran, 2003, MacLeod et al., 2007). In addition the physiological aspects of speed, muscular strength, power and agility are required in substantial amounts to ensure that high intensity activities are performed at an optimum (Astorino et al., 2004). The ability to perform maximal short duration sprints intermittently during a game is an integral component of team sports (Baker and Steven, 1999; Spencer et al., 2004). Similarly, the ability to produce high intensity efforts is crucial for top players (Lemmink et al., 2004) and is cited by Reilly and Borrie

(1992, p. 34) as "being a discriminating factor between elite and county level players". Therefore high demands are placed on both the aerobic and anaerobic energy systems, due to the non-continuous, high intensity and intermittent activity that occur during a competitive match (Reilly and Borrie, 1992; Boyle et al., 1994; Eflerink-Gemser et al., 2004). Other physiological factors include the ability of players to be agile and change direction rapidly, while maintaining balance without loss of speed (Lemmink et al., 2004). This is due to the multidirectional nature of hockey. However, accurately interpreting the mentioned studies is somewhat difficult, especially for the high intensity motions of striding and sprinting. Due to the difficulties associated with data analysis some of the studies have combined the motions of striding and sprinting. The variations in movement classification definitions also result in inconsistent and ambiguous results. In addition, the use of a range of methods (i.e manual charting, video recording, audio recording and computer tracking) to document motion activity can lead to inaccuracies in results.

Time-motion analysis during a game can provide valuable information on the overall physiological demands of team-sport competition (specifically hockey), however it only provides a limited insight into the physiology required to perform repeated short-duration sprints over a brief period of time 'repeated-sprint ability' (Spencer et al., 2004). Spencer et al., (2004) specifically investigate the nature of 'repeated sprint activity' in elite field hockey, in order to provide an insight into this important fitness component of team sport competition. It is thought the reliability of the study was good. However even this study can be seen as insufficient in understanding the physiological demands of the modern game of women's field hockey due to subsequent rule changes and playing surface developments over the last decade. The study by MacLeod et al., (2009) of time-motion analysis of elite women's field hockey, with particular reference to maximum intensity movement patterns is a more up to date study in understanding

the physiological demands of the modern game. Players were videoed and analysed by an experienced observational analyst. However the reliability of the results can again be questioned due to variations in the ability of players, coach tactics and game importance. The elite players in this study were of a mixture of ages, unlike the elite players in the study, who are all under the age of 18. This could have a effect on the results that were recorded.

It is important to highlight that the greater the understanding of the specific demands which are imposed on athletes from both match play and training, the more likely it is that appropriate training and recovery programs can be developed and implemented. This will hopefully lead to enhanced performance and perhaps even reduce the risk of injuries (MacLeod et al., 2009).

2.3 Strength and Conditioning Training

S & C training to improve performance and reduce injury is a recent phenomenon in women's sport, especially hockey. This training involves a broad repertoire of exercises and encompasses the complete development of athletes for elite sport. It incorporates a collection of drills, movements and techniques in strength training, plyometrics, speed and agility, stretching, cardiovascular development, power, explosiveness, balance and core stability training (England Institute of Sport, 2009; Dorgo, 2009).

For many years, women elite hockey players were expected to incorporate it into their overall training programs, and coaches of women teams did not put emphasis on strength training (Poiss et al., 2004). Dorgo (2009) observed that S & C training is a relatively young and constantly growing area of sport coaching and training.

Advances in sports science provide information on S & C training that can be used more effectively by coaches to improve athletes' performance and reduce the risk of injury (Laios et

al., 2005). It is now seen as an integral part of optimal athletic preparation to achieve improvement in performance and prevent injury (Pullo, 1992; Myer et al., 2004) these two main benefits will be discussed in the following sections.

2.3.1 Improving Performance

Previous research is limited on the benefits S & C training has on elite hockey players performance. In the past, efforts to improve elite team sports performance have focused on technique and tactics, while often neglecting physical fitness (Reverter-Masía et al., 2008). However, a number of studies (Newton et al., 1999; Gorostiaga et al., 1999) have highlighted that strength training is important in developing speed in the specific skills of team sports. The research by Newton et al. (1999) is on 16 male elite volleyball players. The study used a control group and a treatment group; with both groups following the same pre-season training program. Except the treatment group also participated in a squat training programme for eight weeks. It concluded that a training program incorporating ballistic resistance training improved participants' leg power, which would ultimately increase speed. The increase in leg power would be beneficial in hockey players when hitting the ball and lunging to tackle. The critiques of this study are that only a small number of players were used and that participants were aware of which group was the control group and which the treatment group. Also, even though it highlighted that participants' leg power increased it did not show evidence that it would ultimately increase speed, which would be of importance to hockey players' performance. Research by Gorostiaga et al. (1999) of 19 young men (8 experimental and 11 control players), over 11 weeks, looked to determine the effects of simultaneous explosive strength and soccer training. The results indicated that young trained soccer players with low initial strength levels

increased explosive strength and speed by adding low-frequency, low intensity strength training. This is also relevant for hockey players because the movement of soccer players during a game is similar to that of hockey players (Spencer et al., 2004). In addition to resistance training, speed, agility and quickness training also enhances speed performance (Deschenes et al., 2002). In order to maximise the effects of speed training to improve multi-directional speed, which is particularly important for elite hockey players (Reilly and Doran, 2003), athletes must incorporate change-of-direction movements into speed and strength training programmes. Research by Deschenes et al. (2002) concluded that plyometrics and resistance training also provide combinatory effects for increasing speed.

Spencer et al. (2004) indicated optimal physical preparation is necessary to ensure optimal muscular endurance and delay fatigue. Research by Spencer et al. (2004) of movement patterns of fourteen members of the Australian men's field-hockey team used time-motion analysis. It concluded that there was a need to perform repeated short-duration sprints over a brief period of time during a game of hockey. With the proportion of time spent striding and sprinting as 4.1±1.1 and 1.5±0.6% respectively, with a mean 4±1 sprints per bout. In addition optimal muscular endurance is required to delay the onset of fatigue during multiple sprint work (Spencer et al., 2004) and to help maintain fitness throughout the season. This study predominately focused on the frequency and duration of sprint activities. Whereas the research by MacLeod et al. (2007) not only focused on establishing the activity profiles of elite female field hockey players during competition, but also the nature of sprint activity concerning pre- and post-sprint activity. The lunge was also included in analysis "due to its frequent use in hockey" (MacLeod et al., 2007, p. 1). The results indicate higher levels of high intensity activities than in the research conducted by Spencer et al. (2004). This though is likely to be the consequence of the incorporation of lunging

as a motion of high intensity, which is a key component of the game of hockey (Atkinson, 2007; Macleod et al., 2007). The research also highlighted a decline in high intensity exercise in the second half, indicating an element of fatigue in performance.

The research by Atkinson (2007) supports the research findings suggested in the previous paragraph. He recommends, specifically in relation to hockey, the importance of a range of strength qualities that can improve an athlete's speed and efficiency around the pitch, and increase the ability of the body to generate and withstand dynamic and highly unstable sport specific forces.

In addition to the improvement of strength and speed, S & C training can develop a range of other fitness components that help to improve performance. These include core stability/dynamic ability, balance, and flexibility (Deschenes et al., 2002), and are discussed in more detail below.

Core stability training helps to ensure that the muscles of the trunk and torso are effectively recruited and they are able to control the position of the lumbar spine during dynamic movements. Along with recruitment of these muscles, the timing, co-ordination, and the way in which they are recruited is also important. Hodges and Richardson (1996) showed that the co-contraction of the transverse abdominus and multifidus muscles occurred prior to any movement of the limbs. It can therefore be suggested that these core muscles anticipate dynamic forces that may act on the lumbar spine and stabilise the area prior to any movement (Hodges and Richardson, 1996). There is growing evidence for the development of core strength and stable balance in athletes (Kibler et al., 2006). This is especially true for young, female athletes who often lack the muscular strength required in their upper legs and torso, 'the core muscles are the most important non-specific muscle group, which should be intentionally trained by young

athletes, regardless of the sport' (Zatsiorsky, 1995, p.98). It is thought that functional core strength and balance training can improve dynamic balance (Holm et al., 2004). An athlete with a dynamically stable core and strong dynamic balance is more effective at transferring forces to the arms and legs, therefore increasing the power of contraction at the extremities and developing strength, speed, and power of movements. It is seen as pivotal for efficient biomechanical function to maximise force generation and minimise joint loads in all types of activity from running to throwing (Kibler et al., 2006). These adaptations may also help to correct postural imbalances and reduce the risk of injuries, at the same time as preparing the athlete to reach optimal performance (Myer et al., 2004).

Flexibility is also thought to be important in sports that involve 'explosive' type skills, such as hockey, with many maximal stretch-shortening cycles (SSCs), requiring a muscle-tendon unit that is compliant (flexible) enough to stretch and release the high amount of elastic energy produced (Witvrouw et al., 2003). The study Witvrouw et al. (2003) on 146 male soccer players concluded that players with increased tightness of the hamstrings and quadriceps have a significantly greater chance of sustaining a musculoskeletal pull. He suggested that stretching is able to increase the compliancy of the tendons and as a result increases the capacity of the tendons to absorb energy consequently reducing the risk of muscle injury and the severity of muscle damage. One critique of this study is that its outlook is narrow, it only examines the effects of stretching on injury and in fact it must be acknowledged that injuries can be multi-factional. A number of factors can affect the rates of muscle injury e.g. fatigue, playing positions, training type and intensity. For example, the players are from a range of clubs, even though they are all professional players the training methods at different clubs may vary, which may elicit an effect on the rates of injuries sustained.

Conversely, a review on the impact of stretching on sports injury risk by Thacker et al., (2004) does not agree. Studies that focus on stretching alone or stretching during warm-ups, half-time and cool downs, concluded that it did not reduce the incidence of match injuries (Abernethy, 2007). Despite this, there is little research on the relationship between dynamic flexibility and rate of injury (Witvrouw, 2003). Evidence also shows that static and ballistic stretching can have detrimental effects on muscle strength and functional performances such as jumping (Weerapong et al., 2004). Further research is needed to investigate the appropriateness of stretching techniques and the optimum level of flexibility required for different sports, and specifically young females in order to maintain or improve performances and reduce the risk of injury.

2.3.2. Injury Prevention

The sport of hockey is physically demanding due to the high-intensity, multi-dimensional aspects, the asymmetrical nature of the sport, and the unique stresses that are imposed on the body (Atkinson, 2007; Reilly and Seaton, 1990). This is especially true for young elite female athletes who have greater exposure time to the sport, and they may also be prepared to take more risks. Past studies (Reilly and Seaton, 1990; Murtaugh, 2001; Reilly et al., 2003) indicate that the sport of field hockey imposes a high risk of injuries to athletes. It has been suggested that hockey, along with football, wrestling, and gymnastics is rated as one of the top four sports in injury prevalence (Spencer et al., 2004). However, despite the sport's apparent popularity, the data on injury rates among field hockey players is limited with most of the research conducted over 10 years ago, yet since then significant rule changes have altered the game dramatically.

The study by Reilly and Seaton, (1990) had severe limitations. The number of participants in the study was limited to 7 male athletes, these athletes were only analysed dribbling over a

short period of time, therefore the results only showed the acute injuries that occur from participating in hockey. In addition significant aspects of the results were based on participants perception and recall memory of back pain, these perceptions could be unreliable. Another study (Murtaugh, 2001) on 161 female hockey players, randomly selected from high school, university and national level athletes, reported 74.7% of the athletes had experienced at least one acute injury. Her findings indicate that approximately half of the injuries that occurred were to the lower limbs. The next most frequent site of injury was the head/face area followed by the upper limbs and torso (Fig. 2). In addition, over 50% of the athletes reported that back pain had affected them during the hockey season (Murtaugh, 2001). The major limitations of this study were that it relied heavily on the ability of the athletes to accurately recall their injuries and it was not possible to calculate the number of injuries per athlete exposure. In addition the study did not focus on any specific level of performance and therefore the information is vague when relating to elite performers.

The research by Murtaugh (2001) highlights that on reaching the age of 18, over 50% of their sample of hockey players had experienced back pain. This is in line with research by Reilly et al. (2003) that found over 53% of hockey players complained of experiencing back pain. Most therapists classify these as over-use injuries due to the high-intensity, multi-dimensional aspects and asymmetrical nature of the sport, and the unique stresses that are imposed on the body (Reilly and Seaton, 1990; Atkinson, 2007). Even though high proportions of the general population report experiences of back pain (Murtaugh, 2001), and the possibility therefore emerges that the pain reported by field hockey players may not be directly attributed to the sport. For athletes under the age of 18, this is a high percentage of the sample reporting back pain. Further research would be required to support or refute the suggestion that the sport of hockey is a main cause of

back pain in young field hockey players.

Research findings by Murtaugh (2001) and Reilly et al. (2003) show similarities and a number of disparities to more recent research focusing on movement assessment of junior international players which has shown "some common functional dysfunctions which exist amongst the hockey group" (Hudson, 2007, p. 4). Intrinsic factors such as mal-alignment of the leg muscles, muscle imbalances and other anatomical problems and extrinsic factors such as training errors, faulty technique, incorrect equipment and surfaces may also increase the susceptibility to injury (Peterson and Renstrom, 2001). Injury statistics add weight to these perceptions (Hudson, 2007).

It is therefore important that all players, especially elite level athletes due to their increased exposure time to the sport, participate in effective training methods to help reduce the chance of injury. The study by Watkins and Peabody (1996) showed that half the injuries reported were over-use injuries. These are generally caused by repetitive overloading, resulting in microscopic injuries to the musculoskeletal system (Peterson and Renstrom, 2001). To prevent over-use injuries, preventative measures proven to be effective should be taught to young athletes.

Most injury prevention generally focuses on modifiable risk factors including: extrinsic factors, such as equipment, playing surface, rule changes, and playing time, or intrinsic factors, such as fitness, flexibility, and balance. There is significant and consistent evidence (Olsen et al., 2005; Hewett et al., 2006), to support injury prevention strategies that include a combination of the following elements: pre-season training, functional training, education, strength, and proprioceptive balance training programmes that are continued throughout the playing season. Studies by Olsen et al. (2005) and Hewett et al. (2006), have shown promising reductions in injury rates using training protocols incorporating one or more exercise components focusing on

balance training, strength and/or agility. A critique of these studies is that they focus on other sports, not specifically hockey, and therefore it cannot be fully determined the effects of this type of training on injury rates in hockey. The combination of multiple components can provide additional and significantly greater performance results than one-dimensional training (Myer et al., 2004). Others have shown that proprioceptive and balance training can improve postural control, and that the lack of postural control and stability were related to increased risk of poor ankle control (Myer et al., 2004; Holm et al., 2004). Similarly it has been suggested that dynamic balance could be improved by functional strength and balance training (Holm et al., 2004). This improvement in dynamic balance may also ensure an athlete has a dynamically stable core, which will develop strength and reduce the risk of injury (Myer et al., 2004).

However the study by Steffen et al. (2008) on young female football players detected little difference in injury rates between the control group and intervention group. The most likely explanation could be that the compliance of the teams and players in the intervention group was insufficient. This may possibly be due to a lack of involvement by the researcher and coach. It is important that young athletes are encouraged and motivated to participate in the types of training recommend and not to be left to their own devices. Palmer et al. (2005) highlights that the process of recommending a training programme does not ensure that the programme will be adopted and maintained, even among members of a sports group whose motivation would be assumed to be high. It is important that injury prevention programmes also enhance performance, as it is more likely that if there is evidence of performance enhancement training effects, athletes will be more motivated to continue.

2.4 Participation in Strength and Conditioning Training

The focus of this section of the literature review is on the reasons why and why not; young, elite, female hockey players participate in S & C training. Due to the interdisciplinary nature of a players' sociological background and the psychological determinants such as self-determination theory and motivation, the study takes a social-psychological approach when discussing the rationale for participation in S & C. There is a wide range of issues that can be discussed to help explain why athletes do or do not participate in training and these will be explored further in the chapter. Palmer et al. (1999) identifies that the vast amount of adherence research in sport and exercise settings has focused on exercise behaviour, with studies focusing on elite performer's adherence to training being sparse. One of the main reasons for this limited research may be that it is thought that elite performers will show naturally high levels of adherence to training.

2.4.1 Adherence to training

Palmer et al. (1998) found that adherence to a nine week training program with a group of junior elite netballers' was low with only 21% meeting the training criterion. Before discussing the findings of the study it is important to highlight the limitations of the study. These include the fact that the role of the coach was not investigated and that the athletes were not supported in their training or given regular feedback, which could have had a significant effect on adherence to training. In addition the cohort of participants was small and was limited to only elite junior netball players. Adherence to training could vary significant within other groups of athletes. The study highlights that many athletes had positive intentions to train, but many did not succeed in turning good intentions into training behavior. The study reported a number of barriers to training

including exams, schoolwork, injuries, illness, and bad weather. The study concludes that to improve adherence to training, athletes training should be regularly monitored (e.g. training diary, coach-athlete contact and feedback) and strategies provided to support the athlete. It is thought that coaches, parents and team-mates, must foster a positive environment in which players are encouraged to train in specific ways and strive for success. . This could help to change an athlete's perceptions of training standards. In this way, athletes could feel more social pressure to training than not to train. Similarly research by Ferguson et al. (2009) on a study of 603 middle school students, showed that knowledge about the benefits of exercise contributed significantly and independently to exercise intent.

Kirk et al. (1997) suggested that the social consequences of time spent training and competing vary according to the nature of the sport itself, location of facilities, and the representative levels of individual participants. These consequences provide evidence that balancing acts are performed by the participants, the participant's family and that there are both social benefits and social costs involved. Issues included time for the athlete to fit in schoolwork, tiredness incurred and the reduction in time for social interaction with friends (Kirk et al., 1997). In addition there will be economic costs, logistical issues and the possibility of lack of facility availability. Research of playing habits and other commitments of a group of 103 elite junior Australian football players from six different clubs, showed that players had considerable playing commitments during the last two weeks of their preseason (in the instance of this particular study), in addition to significant work and school commitments (Finch, 2000).

2.4.2 Athletic Identity

The degree to which individuals identify with the athletic role and look to others for acknowledgement of that role, can be described as a players athletic identity (Brewer et al., 1993). It is thought athletic identity affects participation in exercise and sport. As Symes states ‘‘strong athletic identity is a necessary requirement of being an elite athlete’’ (2010, p.1). She highlights that there are many researched advantages these include a committed and motivated attitude to training and a focus on sport related goals; the discipline necessary for intense training and success in high level sport; a positive effects on athletic performance and improved social relationships (Symes, 2010). If a player is fully aware of the benefits that can be incurred by participating in S & C training, a strong athletic identity is likely to influence a players' decision to participate and remain motivated to continue training. Miller (2009) indicates that it can help one's changes and acceptance of certain beliefs throughout his or her athletic career. In general, athletes who have a prolonged sport career reflect a strong level of athletic identity (Anderson, 2004)

It is also important to consider the formation of identity through participation in sport. Athletic identity is likely to be developed and maintained by the influence of others as well as the athlete himself/herself. Young, elite athletes often develop strong athletic identities through their involvement in sport (Sparkes and Smith, 2002). The club culture is one medium in which athletic identity can be nurtured. A culture in which a strong athletic identity is encouraged through: predominantly self-improvement; professionalism in training; a desire to be the best you can be; and a positive attitude to winning is likely to promote participation in S & C training (Vallerand, 2007)

However, based on a review of the literature it can be suggested that there are both positive and negative consequences associated with strong athletic identity that leads to either a 'Herculean muscle' or an 'Achilles heel'. Positive effects of a strong athletic identity (Herculean muscle) is a strong sense of self, which can ensure a performer's life-long participation, and in relation to injury prevention and rehabilitation; a willingness to continue to train and recover. The negative effects (Achilles heel) include situations where athletes are de-selected, injured or reach the end of their careers. Their strong athletic identity then contributes to serious disruptions to their sense of self. This can lead to athletes struggling with the psychological aspects of the recovery process, as manifested in increased levels of frustration and pain, loss of motivation to perform physical therapy, and elevated anxiety (Brewer et al., 1993).

2.4.3 How Perceptions Underpin and Direct Actions

Kuhlthau states that " perceptions lead to expectations which direct actions" (1988, p. 419). In the 1960's Bandura developed social cognitive theory and highlighted three factors that influence each other bi-directionally: 1) personal factors in the form of cognitive, affective, and biological processes; 2) the way in which one behaves; and 3) environmental events (Mark et al., 2011). He believed that people learn through the experience effects of actions and through the power of social modeling. Researchers working in educational settings are increasingly paying attention to the role that students' thoughts and beliefs play in the learning process (Dinther et al., 2011). Dinther et al., (2011) highlight that within social cognitive theory self-efficacy is an important variable because of the effect it has on students' motivation and learning. The study by Dishman et al., (2010) measures several social cognitive variables in correlation to physical

activity in middle-school girls. A number of the variables could be used in correlation with S & C training in young female hockey players'. These variables include: self-efficacy for overcoming barriers to physical activity; self-management and strategies; perceived barriers to physical activity; outcome-expectancy value of physical activity; enjoyment of physical activity; and social support of physical activity. The study concluded that the results provided valid assessment of social cognitive variables that were crucial in determining changes in middle-school girls levels of physical activity. The study by Dewar (2012) showed similar findings in that results support the validity and reliability of social cognitive scales relating to physical activity among adolescents.

From the literature it is important to recognise that the perceptions of S & C training by young female hockey players, their self-efficacy, self-management skills and strategies to coping with extra training schedules, their out-come expectancy value of participation in S & C training, their enjoyment of participation in S & C training and the social support young female hockey players receive in relation to S & C training will have a significant effect on the direct action of participating in S & C training.

2.4.4 Femininity and Athleticism

Another issue to discuss is the cultural contradictions between femininity and athleticism, and how this affects female athletes' perception and attitudes towards strength and conditioning training. Throughout history sport has been dominated by males - 'the male domain'. The idea of 'being feminine' and 'being an athlete' have often been seen as contradictory. Similarly, there is evidence to suggest that there are significant gender differences regarding the perceived

importance of weight training, but also regarding athletes' confidence in their ability to weight train, their weight training habits, and what is required of male and female student-athletes by their coaches (Poiss et al., 2004). It can be suggested that some individuals still think that women who engage in strenuous training will develop unsightly, bulging muscles and lose their femininity (Cohen, 1999). Similarly, a number of women were worried that by participating in sport, and specifically resistance training, they would be perceived as too masculine and muscular. To counteract this, stereotypical feminine behaviors were displayed (Malcom, 2003).

However, more and more girls are finding ways to manage these cultural contradictions of female athleticism (Malcolm, 2003). In the research conducted by Loze and Collins (1997) reasons for the apparent popularity of exercise, specifically resistance training, included pressure from role models and society's preoccupation with an attractive, healthy appearance. There is evidence to suggest that with such importance attached to physical appearance the desire for the ideal physical image is a major motivating factor to exercise (Wills and Campbell, 1992). Indeed potential aesthetic reasons are ranked as important motivations (Koslow, (1988) cited in Wills and Campbell (1992, p. 45)). It is also thought that physical activity may positively impact on individuals' physical self perceptions, leading to feelings of enhanced self-worth and self-esteem (Depcik and Williams, 2004). Numerous studies support the idea that self-perceptions and body image of healthy females and males can be improved by exercise; including aerobic and resistance training (Bartlewski, Van-Raalte, & Brewer, 1996; Caruso & Gill, 1992; Tucker & Maxwell, 1991 cited in Depcik and Williams (2004, p. 289)).

2.4.5 Motivation

2.4.5.1 Introduction to Motivation

The concept of motivation must also be discussed briefly in relation to participation. Dorgo (2009) suggests that the motivations of an athlete are important in any sports specific training, but it was found to be particularly imperative in S & C training. Simplistically two main types of motivation: intrinsic and extrinsic motivation, are thought to motivate athletes (Vallerand and Loiser, 1999). Intrinsically motivated athletes are more likely to engage in sports activities out of pleasure and fun, whereas extrinsically motivated athletes are more likely to participate in order to derive tangible benefits such as material (e.g., trophies) and social (e.g., prestige) rewards or to avoid punishment (Vallerand and Loiser, 1999). Three types of intrinsic motivation (IM) have been identified: IM to know - relating to exploration, curiosity, and learning. IM towards accomplishments – is linked to task orientations and the idea that individuals want to feel competent, and IM to experience stimulation – refers to the desire to have sensory pleasure, fun, excitement and, aesthetic experiences (Gill, 2000). As suggested by Côté et al. (2003) athletes who experienced fun and excitement during the sampling years may be more intrinsically motivated and that this is necessary as the athlete participates in more structured and performance-orientated forms of practice. Similar research indicates that the main reason for withdrawal from various sports at a young age was 'lack of enjoyment' (Butcher et al., 2002). However, as participants aged, the reasons for withdrawal became more complicated and included issues such as: needing time for jobs and study, the coach, injuries, and other sports taking up too much time. Athletes' motivation will also have a profound impact on the type of experiences that they will derive from their sporting engagement (Vallerand and Loiser, 1999).

2.4.5.2 Self-Determination Theory

Perhaps the single most important contribution to our understanding of the relationship between intrinsic motivation and extrinsic rewards is the theory proposed by Deci and Ryan (1984) of intrinsic and extrinsic motivation that incorporated a central role for Self-Determination Theory. Self-Determination Theory can be summarised as the "distinguishing between the motivational dynamics underlying activities that people do freely and those that they feel coerced or pressured to do. To be self-determining means to engage in an activity with a full sense of wanting, choosing, and personal endorsement" (Deci, 1992, p. 44). Self-determination theory is based on the premise that there are innate psychological needs: for autonomy (to feel in control of actions rather than feeling controlled or obliged to act); for competence (to feel competent in dealing with the environment); and for relatedness (to feel that there is satisfying and supportive social relationships). Rather than contrasting intrinsic and extrinsic motivation, self-determination theory proposes "different ways in which a person's behaviour is regulated and that different forms of behavioural regulation form a continuum" (Ingledew et al., 2004, p.1932). If behaviour is externally regulated it is non-self determined and is controlled by external demands and experiences. If the behaviour is internally regulated it is fully regulated and is engaged in with no sense of internal or external compulsion. By adopting self-determination theory it may be possible to determine the motivational processes by which personality traits influence engagement in health-related behaviours such as exercise (Ingledew et al., 2004), and therefore determine reasons for and against participation in S & C training. A study using regression analyses by Ntoumanis (2001) on 247 British University students corresponds with work conducted by Deci and Ryan (1985) and Vallerand (1997). The study suggested the importance of task orientation in facilitating self-determination motivation in sport. In contrast those with

low self-determination showed ego-orientation predicted motivational variables. These finding are not conclusive though, as the variance explained in most of the analysis was relatively small.

2.4.5.3 Goal Orientation

Research has also linked intrinsic and extrinsic motivation to goal orientation (Cox, 1998). Athletes are thought to have an orientation towards process or performance goal setting. Task-orientated athletes focus on the processes, personal mastery and improved performance. In order to improve their performance they are likely to participate in training methods such as S & C training. They often enjoy enhanced intrinsic motivation, because of their self-determined nature of involvement. Ego-orientated athletes focus was more likely to be upon external criteria for determining success, for example social comparisons. Perceived ability, to the ego-orientated athlete, is more significant than hard work and effort. They are also likely to suffer a loss of intrinsic motivation (Cox, 1998). When faced with challenges or extra pressure to participate, for example in S & C training, it can be thought that these athletes are less likely to persist. A more recent study by Poiss et al. (2004) indicated that athletes who are highly competitive show strong goal orientation. These athletes perceived weight training as essential for overall athletic development, weight training as both beneficial to men and women and the incorporation of weight training in a overall training program regardless of the sport. Since past work has indicated that males and females differ in their goal orientations and perceptions of the purpose of sport (Duda, 1989, White et al., 1998). A limitation of the study by Poiss et al. (2004) is that they did not research gender differences in relation to goal-orientation.

2.4.5.4 Coaches Role in Athlete Involvement

Athletic identity, female athleticism, motivation, self-determination theory, and goal orientation are likely to have a significant impact on the way athletes perceive and are involved in training to prevent injury and promote performance. Similarly, the coach has an important role in promoting participation (Lyle, 2002), but that coaching to promote and coaching to develop performance are very different. As Bloom et al. (1998) explain mentoring of athletes by coaches appears to be an important element in the development of the athlete's career. Similarly Smith et al. (2007) highlight how the coach plays an important role in influencing the nature and quality of the sport experience of young athletes. Youth sport participation can be greatly influenced by the goal priorities the coach promotes, the attitudes and values the coach transmits and the nature of the interactions between the coach and the athletes. The coach has an important role in recognising the participants' different needs through the stages of the athlete's development. Early work by Bloom (1985) looked at 120 individuals from different domains including swimming and tennis. He divided career development into three stages - early, middle and later years. He found that at each stage athletes had different needs and for the athletes to flourish they must be exposed to coaches who provided the appropriate coaching environment. At a young age athletes needed a playful relationship with the coach, and the training needed to be fun and the environment relaxed to keep the athlete interested. In contrast, in later years a more professional and serious approach to competition was required from the coach.

Developing on this the sports scientist Balyi created the LTAD (Long Term Athletic Development) model in the early 1990's (Balyi and Hamilton, 2004). It set out a useful framework of how athletes adapt to training programs and progress performer trainability throughout the various developmental stages (Stafford, 2005). It is athlete centred, coach driven

and is supported by sports science (Robertson and Way, 2005). It argues that the early years of an individual's development are the most crucial and therefore require the highest-quality coaching (Balyi and Hamilton, 2004). It has been proposed by a number of national governing bodies including England Hockey as the first step to considering talent development (Ford et al., 2011). England Hockey have used the LTAD model to develop coaching programmes. At the first level they encourage simplistic technical development through controlled game play, this progresses to more complex technical development and tactical awareness. However, a number of problems exist with the model, which are not always transparent to coaches: The model is only one-dimensional; the model is based on little empirical evidence; and the interpretation of the model is restricted. As Ford et al. (2011) explains coaches should be better educated in how to interpret and use the information within the model. Fundamentally though the model is generic and is not adapted to the individual athlete or sport (Ford et al., 2011). As Norris and Smith (2002) and Côté et al. (1999) highlight, the most essential component of an effective training programme is the concept of individualisation. In the study by Côté et al. (1999) the importance of the coach in an athlete's development was highlighted. It is therefore, essential that the coach has the expertise, experience, and skill repertoire, to adapt their training to individuals of differing ages.

2.5 Chapter Conclusion

This chapter initially gave background information on the nature of the game of hockey, highlighting the key physical demands of the game. Next, the chapter reviewed the literature relevant to strength and conditioning training, and the benefits this type of training has on improving performance and reducing the risk of injury. The chapter continued by discussing the rationale for participation in training, based on athletes' athletic identity, female athleticism,

motivations, self-determination, and goal orientations. In summary, the information provided in this chapter provides an overview of the relevant research to date, against which the findings of this study can be compared and contrasted.

Chapter 3: METHODOLOGY

3.1 Introduction to the Chapter

The purpose of this chapter is to introduce the chosen methodology, providing a rationale for the research methods that were employed. In this project a qualitative approach to research was adopted, primarily with the use of semi-structured interviews. The chapter talks through each of the processes and theories involved when conducting, analysing and interpreting the research undertaken. This chapter also introduces the background and relationships of the researchers and participants. It will also discuss the potential challenges that were presented when conducting the research.

3.2 Methodological Outline

There are a wide range of methodologies and methods that can be used to conduct research. Silverman (2001) explains methodology as a way of describing how the research is conducted and the specific research techniques that are used when studying a topic.

The majority of research conducted in the field of injury prevention for elite athletes has focused on testing athletes and collecting quantitative data in relation to injury surveillance (Murtaugh, 2001; Stevenson et al., 2002) and fitness testing (Reilly and Doran, 2003; Lemmink et al., 2004). Further research using a qualitative approach to collect data could provide more detailed and interesting research in this field. To further understand the meaning of social world phenomena, a qualitative approach to research can be used. In this research adopting a qualitative approach to data collection enables the researcher to gather primary data to provide an insightful understanding of individuals' perceptions and meanings of a particular situation (Popay et al., 1998; Bell, 1993).

The research methodology can be further deciphered as a constructivist, interpretive approach. This was thought to be the best method to develop understanding of the participants experience, perceptions and behaviours towards strength and conditioning training. In particular the interpretive paradigm "allows us to view human behaviour as a product of how people define their world and to see reality from other eyes" (Henderson, 1991, p. 10 cited in Robson, 2002, p. 26). In the research project it will allow development of knowledge and understanding of the athletes' views on the given topic. This approach enables the researcher to develop theory based on data obtained through interaction with the participants. It is a general methodology for developing theory that is grounded in data that has been gathered and analysed systematically. The theory will evolve through interplay between analysis and data collection during the actual research (Strauss and Corbin, 1994).

In addition the constructivist approach takes into account how human interaction helps to create social reality, the researcher must ensure that they are aware that the experiences and actions of athletes are socially constructed and that part of "the task of the researcher is to uncover the multiple social constructions of meaning and knowledge" (Robson, 2002, p. 27). A researcher must pay particular attention to how a participant understands and gives meaning to their experiences. To explain in another way constructivism is more interested in the work or practices that go into creating the social world, and less into its causes. It is important that in the research the participants or variables should not be controlled (Roberts, 1999) cited in (Robson, 2002, p.27) but that the research method should focus on discovering the thoughts of the participant (Silverman, 2005).

3.3 Rationale for Research Method

In order to collect the data, semi-structured interviews were used. Evidence points to the most effective interview technique being somewhere along this 'continuum of formality' (Grebnik and Moser, 1962, p. 16 cited in Bell, 2005, p. 217). All research methods have their strengths and weaknesses, the technique of interviewing is no exception and can be analysed further. According to Cohen et al. (2000) "interviews enable participants – be they interviewers or interviewees – to discuss their interpretations of the world in which they live and to express how they regard situations from their own point of view" (p. 267). Interviews may also yield additional information to that which can be gathered by a questionnaire (Bell, 2005). A skilful interviewer can follow up ideas, probe responses, and investigate motives and feelings. This human interaction allows the questioner to clarify questions and correct misunderstandings (Cohen et al., 2000; Robson, 2002). By using a semi-structured interview technique the researcher has the ability to probe participants to expand on answers further, and is able to make notes on the behaviour of the participants in order to investigate in greater depth participants feelings and ideas. As indicated, when planning research "a considerable degree of expertise in the field of application, experience, instinct, and creativeness is required" (Kraemer and Theimann, 1987, p.96 cited in Mullineaux et al.,2001, p.96). It is important that the questions to be asked are relevant to the research objectives and reflect what the researcher is trying to find out (Cohen et al., 2000). As Tuckman (1972) suggests a research question should fulfil five criteria: have practical worth, have a sufficient range for a study, interest the researcher, have theoretical worth, and be realistically manageable.

In the study by Sparkes et al. (2002) looking at the narrative identity dilemmas of four men who have experienced spinal cord injuries through playing rugby. Interviews of an unstructured

nature took place to attempt to assist the participant to tell his life story in his own way and his own words. This was effective in ensuring that the participants talked in great detail about their injuries and feelings, therefore giving an in depth and reflective understanding of their experiences and attitudes. Similarly, Côté et al. (1993) proposed that too much rigidity in the interview process could reduce the chances of an interview successfully capturing the athletic experience. However, as Bell (2005) states "the less structured the interview the more difficult it becomes to aggregate and quantify the data" (p. 215). These types of studies can require a great deal of expertise to control and a great deal of time to analyse, with much of the information having to be discarded. This can lead to high levels of cost and time (Cohen et al., 2000; Bell, 2005). This can lead to a small sample size for example in Sparkes et al. (2002) study, only four participants were interviewed. Additionally problems arise in transcribing interviews and interpreting responses (Bell, 2005). It is a highly subjective technique and therefore there is always the danger of bias (Bell, 2005).

3.4 Access and Gatekeepers

The initial work that was required was to indicate any gatekeepers and seek their permission for the work to go ahead. Sands (2002) recognises the importance of the 'gatekeeper' as she/he controls access to the group or community you are looking to study. Gatekeepers can influence the research in a number of ways: by limiting conditions of entry; by defining the problem area of research; by limiting access to data and respondents; by restricting the scope of analysis; and by retaining prerogatives with respect to publication. Gatekeepers are therefore the individuals who have the power to grant access to the field (Brewer, 2000). It was determined that the gatekeeper was the coach of the team. Similarly, Sands (2002) highlights the importance

of establishing a relationship with the 'gatekeeper' through developing rapport. This was relatively easy during the study, as the researcher was well known by the coach. The coach was the head coach of the team in which the researcher had played for three years previously.

In addition the coach knew the subjects in detail. As Tushman and Katz (1980) highlighted gatekeepers should be those individuals who are both strongly connected with the internal subjects and strongly linked to external domains.

3.5 The Researcher

The researcher has played hockey for 15 years and has worked as a coach for the past 7 years. She began playing hockey for her local club side before going on to play Lincolnshire County U14, U16, U18 and U21's. She also played East regional hockey at U16 and U18 age groups and attended the final selection squad training for England U18's. Currently she plays for a Ladies 1st XI team in the National League Premier Division. She has been coached by a number of professionals, each with differing views, methods, and varying degrees of knowledge.

The researcher began coaching at the age of 18 as an assistant coach with the East region development squad on summer camps, working at these high performance camps for five summers. Along with gaining valuable hockey coaching experience, she has also gained knowledge through giving presentations on topics such as fitness training, nutrition, injury prevention and management of lifestyle. More recently she has worked as an Apprentice Centrally Contracted coach for England Hockey where her roles included being Head coach of a JRPC (Junior Regional Performance Centres) U15 girls squad and an assistant coach of a futures cup U18 girls squad. Working alongside junior elite performers, experienced coaches, physiotherapists, strength and conditioning coaches and nutritionists, has developed her

knowledge further. She also holds a Level 3 England Hockey coach qualification. Currently she is working as a part-time hockey coach at an Independent School. Further knowledge of coaching and sport science has been developed through studying a Sports Science degree at Loughborough University and undertaking a PGCE in Physical Education.

It must also be noted that during the researcher's hockey playing career she has suffered with recurring back pain and injuries, which has led to her seeking advice, on a number of occasions, from both physiotherapists and bio-mechanists. This has resulted in her participating in a wide range of training methods to reduce the occurrence and severity of the injury, in the process developing understanding and knowledge of S & C training to reduce the occurrence of injuries as well as improving performance. It has also made her aware of the importance of participation in S & C training for all elite athletes. However, more importantly the lack of coaches and players knowledge and understanding of S & C training, the lack of importance they place on this training and the limited provision of this training in junior elite athletes training programmes. This has therefore highlighted the need for greater research in this field.

3.6 Pilot Study

Preceding the main study a pilot study was conducted. This was conducted with a number of players, playing in the same hockey squad as the researcher. Pilot studies are scaled down versions, or trial runs of the major study (van Teijlingen, 2001), and are a crucial element of a well designed study. Success in the main study is not guaranteed by conducting a pilot study, but it does increase the likelihood (Robson, 2002). Pilot studies fulfill a range of important functions and provide valuable insights for the researcher, allowing them to refine methods in order to conduct an effective main study. One of the main advantages of conducting a pilot study was

being able to rehearse the planned protocol of the main study and modify it for the future. Recording the interviews, allowed the interviewer to listen to them and refine her questioning skills. This will hopefully ensure that in the main study questions are not leading and allow the voice of the participant to emerge rather than the agenda of the researcher (Robson, 2002), thereby ensuring participants give honest and thoughtful answers.

After evaluating the researcher's questioning technique, and the structure of the questions used, slight alterations were implemented. In the pilot study the interviewer had a list of probes that could be used; this encouraged the participants to expand their answers and led to a number of interesting points being discussed. It was concluded though that in the main study the list of probes needed to be more carefully structured, because on occasions, probes that were not listed could have been used effectively to help participants expand even further on their answers. For example from the pilot study it was decided that just asking the question 'what training do you do each week during the hockey season?' did not encourage the participants to answer in detail, therefore the probes 'What quantity of training? Why this type of training? Who do you do the training with? Where does the training take place' where added to ensure that an in-depth answer was given by the participants and a good understanding of a players injury history was achieved by the researcher. It was also decided that the words 'injury prevention' would be removed from the questions. In order to ensure that the questions, were not leading the participants into answers relating to injuries they had sustained. Instead, an extra question would be added at the end to gain a brief history of the participants' injuries. This question would also include a number of probes such as 'how? when? where? and for how long where you unable to play?' to ensure that an in-depth answer was given by the participants and a good understanding of a players injury history was achieved by the researcher. In the pilot study the process of triangulation was used.

This is where the participants were given a copy of their transcribed interviews and asked to comment further. This was effective in the pilot study but could be made more effective in the main study, if better structured and comments recorded.

The pilot study identified areas that were of less relevance and could be removed form the main study. The pilot study was effective in developing the researchers interview technique and recognising when to probe participants for further information. The pilot study also helped reveal a number of key themes, which could be developed and researched further in the main study. These key themes included: a strong link between a participants past history in relation to playing and training experience; how injuries sustained affected a participant's involvement, perceptions, and advice received on S & C; how perceptions affected participants reasons for and against participation in S & C training; and lastly that a number of players had strong ideas on how perceptions and introducing innovations can help improve participation in S & C training.

3.7 Ethical Considerations

Mullineaux et al. (2001) states "consideration should be given to ethics" (p. 741). This is becoming increasingly relevant in the context of research. Most research is now subject to review and must be assessed against ethical codes. This emphasis on ethical codes helps to ensure that the participants involved receive the highest standards of professionalism, consideration, and respect; that research is carried out with utmost integrity and in a safe atmosphere; and that the welfare of the participant is paramount. These guidelines can often be met by obtaining ethical clearance and informed consent and ensuring care of the participants throughout (Mullineaux et al., 2001). Prior to conducting the study both ethical clearance and informed consent was obtained. A number of steps were completed when following the Bham protocol for ethical

clearance, these included: a discussion with the researchers supervisor to ensure the relevant ethical issues are considered; a submission of an self-assessment ethical review (AER) form to the relevant ethical review committee and; ensuring research did not commence until approval has been granted.

The coach was first asked if he would consent to the players being involved in the study. All players selected were then first asked verbally if they would be happy to partake in the study. They were asked to fill in an 'informed consent' form (See Appendix A) which outlined the research that they were to be involved in (McFee, 2006). Filling in a consent form voluntarily, ensured that the participants were informed of the proceedings and their right to anonymity and confidentiality throughout the process, as well as making sure they were aware that they could withdraw from the study at any time (McFee, 2006). Further key ethical issues are highlighted in the study in the context in which they occurred.

For the purpose of identity protection and in line with ethical considerations of ensuring participant anonymity and confidentiality, each of the 12 players in the study was given a pseudonym. The concept of confidentiality and anonymity are closely linked, but distinct concepts in that anonymity is one way in which confidentiality becomes operationalised. In the researcher ensuring confidentiality to participants, it is often considered as affording the participants control over their personal information (Wiles et al., 2008). It involves the researcher not discussing information given by an individual with others, and presenting findings in ways that disconnect the link between the real identity of a participant and how his/her identity is referred to in the research report. However, in the research context confidentiality makes little sense. Researchers have a duty to publish the findings of their research. However, they cannot do

this if the data they have collected is confidential (cannot be revealed) therefore, confidentiality cannot work (Wiles et al., 2006).

What researchers can do is ensure anonymity to participants. Through, not disclosing identifiable information about participants and by trying to protect the identity of the participants through various processes. Anonymity can be provided by using a pseudonym; for example a different name for the participant. It is underpinned by the principle of respect for autonomy and demonstrates trustworthiness and maintains integrity in the researcher-participant relationship (Yu, 2008). However as Grinyer (2002) indicates the allocation of pseudonyms can create unease for both the participants and the researcher. In exchanging real names for pseudonyms respondents may feel that they "lose their ownership" (Grinyer, 2002, p. 1), the allocation of pseudonyms to protect identity can cause unanticipated distress for participants and cause complications for the researcher.

3.8 Research Design

3.8.1 Participants – Sampling

Miles and Huberman (1994) suggest that when undertaking qualitative research, it is important that the researcher thinks purposively and conceptually about research sampling. The sample selection must have a theoretical link and the research design must be driven by those priorities (Silverman, 2005). As Creswell (1998) discusses, sampling is usually used to study a representative sub-section of a closely defined population in order to make conclusions about the whole population.

In the study the researcher wanted to select a sample of young, elite, female hockey players to form a case study on a select population of the hockey playing community. A purposive

sampling method was therefore used. This was better than using a random sampling method, as the researcher could seek out a group of participants (Denzin and Lincoln, 1994). A clear criteria was established for the study, to ensure the sample was part of the select population (Creswell, 1998). The sample was selected from a Ladies 1st XI squad in the National League Premier Division, all players had to have experience of playing international hockey, be female and be between 18-25 years of age. The use of purposive sampling and pre-determined criteria helped to try and ensure that the_participants would have the knowledge and experience the researcher requires, have the ability to reflect, the capability to express their thoughts and ideas, have the time to be interviewed, and be willing to participate in the study (Silverman, 2000). The sample study was of 10 players, this number was selected as these players met the criteria that was pre-determine. This number was deemed sufficient to answer the research question and form viable conclusions: due to the nature of the participants selected; their prior knowledge and experience of the research questions asked; and the in-depth nature of the interviews. These factors ensured the researcher gained detailed information on a group of elite female hockey player's perceptions and rationale for participation in S & C training.

3.8.2 Player Histories

To gather background information on each of the participants prior to the study each player was asked to describe their past experiences and achievements in regards to hockey. At the end of the interview they were also asked to recall any injuries that had occurred in the past five years, the specialised help they sought, and if any short/long term treatment/exercises were recommended. It is important to highlight that the use of retrospective recall can be biased in its conclusions, (Rutter et al., 1998) not always corresponding accurately with day-to-day recall, this

must be taken into consideration when analysing and discussing result findings.

Of the players interviewed all had participated at junior international level U16/U18 either for England, Wales or Scotland. Five of these seven players had also played Great Britain youth/U21's and had participated in the World Youth Games. Seven of the players were also currently in the England National Performance Centre training group, which means that they receive two technical sessions a week from England coaches and information and advice from a range of specialists such as strength and conditioning coaches, nutritionists and physiotherapists. Two of these girls also currently play for Great Britain Seniors. The three other players played for either Wales or Scotland seniors.

3.9 Data Collection

3.9.1 Interview Content

The use of an interview technique serves the purpose of gathering information that had direct bearing on the research objectives (Cohen et al., 2000). As Cohen et al. (2000) suggests if interviewing is done effectively it provides access to what a person is thinking, making it possible to determine a person's knowledge and information, their values and preferences, and their attitudes and beliefs of the topic being researched.

The types of interviews used in the study were of a semi-structured nature (see section 3.3 Rationale for Research Method, p. 28-29). The interviews were structured around four main topics: a) The participants past history in relation to playing and training experience and injuries sustained; b) The participant's involvement, perceptions, and advice received on S & C; c) Their reasons for and against participation in S & C training; d) Their ideas on how perceptions and varying methods can help improve participation in S & C training. There were two main

questions and probes, plus an introductory question on training levels and concluding question on previous injuries, are shown in an interview schedule (Appendix B). It was important to have probes in order to gather further information from the participants. When probing participants consideration must be taken to ensure the probes asked are not leading, instead they must be of an open nature followed by a more specific focus. This allowed the participants to answer in their own words and to answer honestly (Robson, 2002).

3.9.2 Data Collection Process

Through a thorough literature review and the use of past experiences and knowledge, the researcher has been able to plan an appropriate research design for data collection. As O'Brien and Israel (1987 cited in Mullineaux et al. 2001, p.96) indicate, the planning and implementation of the data collection must be considered carefully, as it is a very important section of the research design and if flawed, the value of the results is greatly reduced. Once the interview content has been determined, setting up and conducting the interview is the next stage (Cohen et al., 2000). All interviews were conducted away from the pitch in the changing rooms at the club. This ensured a consistent environment, and one that was familiar to both participants and researcher. It was thought that this would help the participants to feel relaxed and answer questions honestly and in detail, therefore reducing bias. As Hammersley and Atkinson (1995) indicate due to the research methods of asking questions of a recall nature/past experience and not observation, the research should take place away from the hockey pitch.

All participants were interviewed separately. This is beneficial for data collection as views that are sensitive or may be held by a minority of participants can be discussed more openly in a one to one situation (Buston et al., 1998). The interviews took place before training on a Monday

to ensure minimal disruption to participants' schedules. The location was also quiet, and the time chosen to conduct the interviews was when the changing rooms were empty. Allowing a conversation to be recorded easily and allow both participants and researchers to reflect on the process. Reflection requires critical review of the data collected, but also the recognition of factors that may influence the research, for example the location of the setting or the nature of the social interaction between the researcher and researched (Brewer et al., 2000). It requires researchers to develop awareness of their own preconceptions of the data, their roles and emerging understanding of the data and to reflect on their actions, while engaged in the research process (Rice and Ezzy, 1999).

On arrival at the interviewing location (club changing room) the participants were asked to fill in an 'informed consent' form (See Appendix A) which outlined the research they were to be involved in (McFee, 2006). Filling in a consent form voluntarily ensured that the participants were informed of the proceedings and their right to anonymity and confidentiality throughout the process, as well as making sure they were aware that they could withdraw from the study at any time (McFee, 2006). The researcher also reinforced the purpose of the study and the format of the interview. The researcher referred to the fact that participant and researcher were familiar, but that this should not affect the participants' answers, and to answer all questions as honestly as possible. The researcher also highlighted the estimated length of interviews as 1 hour. This was determined from the pilot study and was thought to be an optimal length for maintaining focused concentration of both participant and researcher, but also ensuring there was enough time for rigorous data collection.

The interviews were recorded using a digital dictaphone (Olympus VN-5500PC). Apart from the initial reaction from participants when the Dictaphone was first switched on, the

participants seemed relaxed and answered questions in detail and openly. The use of a dictaphone allowed the researcher to record the whole interview and "such matters as pauses, overlaps, in breaths and the rest" (Silverman, 2000, p. 149). Tapes and transcripts also offer the opportunity to be able to replay and transcribe them, to improve the analysing process and to take the research off on a different tack (Silverman, 2000). Due to the interviews being recorded the researcher could focus fully on the interview and only needed to take brief field notes on any extra points of interest to ensure these could be explained fully later on (Miles and Huberman, 1984). It allowed the researcher to fully concentrate on the participant's reactions to questions, their body language and any other important points. It also possibly reduced nervousness and increased concentration of the interviewee, as they were not distracted, by the scribbling of notes. The data was downloaded on to the researcher's computer, which was locked using a personalised password to ensure anonymity and confidentiality of participants' interviews. It was then transcribed using the playback facility on the digital dictaphone using a Microsoft word file. The data on the electronic dictaphone was also erased once the data had been downloaded and transcribed. This all worked smoothly and when transcribing and coding the data, core or common themes could be identified within the data (Côté et al., 1993). These core and common themes could be then used to form the basis for discussion and to allow the researcher to present the data in a format that can be accessed by the participants (Biddle et al., 2001).

3.10 Inside Researcher

Due to the researcher being immersed in the same field as the participants as a fellow teammate and because of her background and past experiences, her understanding of the subject area is extensive, and she is likely to be able to identify with some of the key issues that may

arise during the research. She can therefore be termed an 'insider researcher'. This term is widely used to refer to research on a group of people by a member of that group (Pink-Dandelion, 1995). This type of research, which is going to be implemented in the study, has a number of advantages and constraints. The primary advantage being that the participants are accessible to the researcher. The fact that the researcher was a team-mate of the participants also meant that there was a relaxed atmosphere in interviews, especially as the interviews were conducted in a neutral setting away from the coach and pitch. As Atkinson and Hammersley (1994) suggest, such relationships mean that little effort is required in establishing rapport. Sands (2002) believes this is crucial, because as rapport grows between members of the same culture, a greater degree of familiarity and trust between the researcher and the participant can develop, which in turn suggests that the information they divulge may be more extensive. Similarly, due to the researcher having prior knowledge and understanding of the group, it is likely she will gain knowledge of the issues of the topic and situation more quickly than an outsider (Pink-Dandelion, 1995). However, a concern to be discussed and similarly raised by Robson (2002) is that "respondents may feel their answers are not anonymous and be less forthcoming or open" (p. 233) during the interview process. This was hopefully overcome by explaining to the participants at the beginning of the interview that all interviews would be kept anonymous and that they should be as honest as possible, as no answer was right or wrong.

At the same time it was important that the researcher was aware that her role was to stay neutral and not to lose her distance and objectivity (Fontana and Frey, 2005). The researcher in the study stayed neutral by asking all participants the same questions and probes in a pre-determined order, following a interview schedule that was written out before all interviews commenced. The researcher remained distant by maintaining the same manner throughout all the

interviews, allowing the participants time to answer the questions asked and trying to not react emotively to responses.

In addition a colleague was used to discuss the categories selected for the main interview after the results of the pilot study were collaborated. This was to ensure the categories selected where objective and would help answer the research question. This was done by verbally discussing the findings from the pilot study and the categories selected for the main study. The colleague then gave an objective view on what should be included in the final study. It was after this discussion that it was decided that the words 'injury prevention' would be removed from the questions. In order to ensure that the questions, were not leading the participants into answers relating to injuries they had sustained.

It is also worth acknowledging that the resulting findings are likely to be affected in some way by the questions asked by the researcher (Denzin and Lincoln, 2000b) and the beliefs that the researcher brings with them to the subject area, as these may work to guide the way the researcher collects data and interprets it. Creswell (1998) believes that all qualitative researchers have a "basic set of beliefs that guide their inquiries" (p.74). Tuckman (1972) highlights that the researcher should not let his own biases, opinions, and curiosities affect his interviewing technique and questions. Similarly, the beliefs that the researcher brings with them to the subject area may work to guide the way in which the researcher collects and interprets data, therefore also affecting the results of the research (Denzin and Lincoln, 1994). As suggested, it is the researcher's responsibility to ensure that she has a theoretical framework in which to place her research finding. Certainly the researcher should not suppress her research findings because they conflict with her beliefs (Bell, 2005).

It is important to recognise that the researcher always enters the field with their own

specific set of questions and beliefs, which reflect the researcher's relationship with the people and the area being studied (Epistemology) and their own framework interpretations and views about the subject area (Ontology). As Marvasti (2004; 5) states "our knowledge of social reality is: 1. subjective; 2. situational and culturally variable; 3. ideologically conscious". In addition their thoughts on how the process of research should be carried out (Methodology) is a factor. However, as suggested, research findings will be rendered incomprehensible without the orientation provided by the researcher's prior understanding (Pidgeon, 1997). It can be said that within a constructivism framework subjective interpretations are not a source of bias, but a tool to help the researcher further understand the participants' social reality (Garfinkel, 1967 cited in Silverman, 2000, p. 34).

3.11 Establishing Trustworthiness in Qualitative Research

As Agar (1986) suggests terms like reliability and validity are relative to quantitative research but do not fit the detail of qualitative research. Instead language such as trustworthiness, credibility, accuracy of representation and authenticity of the researcher should be used. Guba's model (1981) assess the trustworthiness of qualitative data, it recognizes four key criteria researchers must consider. The first criteria that is important when assessing trustworthiness is the 'truth value' or 'credibility' (Lincoln and Guba, 1985). This is the internal validity of the research and is usual obtained from the insights and conceptual capabilities of the analyst. The study must present accurate descriptions and interpretations of human experiences. During the research project suitable time was spent with the participants to ensure adequate submersion by the researcher. This allowed for the researcher to check perspectives and allowed participants to become familiar with the researcher, increasing rapport and information digressed by the

participants. In addition to ensure 'credibility' was maintained within the research carried out. A colleague was employed to discuss the chosen categories and ensure they were appropriate for the data. This process permitted another to judge the quality of the resulting project. Central to the issue of credibility is that participants are able to recognise their experiences in the research findings. The participants in the research project were able to read their transcribed interviews, comment and add detail to the content. This ensured that the researcher had accurately transferred participants' viewpoints into data and allowed for an "increase in richness and quality of feedback and data" (Ollis et al, 2006, p. 315).

The second aspect is that of 'applicability', this is the degree findings can be applied to other contexts, settings and groups. However generalisation of qualitative research is not always suitable, each situation is unique. Therefore 'applicability' is not really appropriate instead 'transferability' is more relevant. It is important that researchers provide detailed background information about participants and the research context and setting to allow others to assess the 'transferability' of the results (Krefting, 1991). In my study I explain in detail the context in which the interviews took place and gave details of players past experiences in relation to injuries and participation in S & C training.

The third aspect is that of 'consistency'. The qualitative research field can be complicated by external and unexpected variables. It is important to learn from participants, allowing for variation in their experiences rather than identical repetition. Variability is expected in qualitative research and instead consistency can be defined in terms of 'dependability' (Krefting, 1991). 'Dependability' is how repeatable is the study. In the research project a detailed description of method, questions asked and analysis methods were described to allow for easy repetition of the study. In addition the use of a colleague to check the research plan, increased the 'dependability'

of the research project.

Finally the criteria of 'neutrality' needed to be considered, this is a freedom from bias. That the researcher ensures the data remains neutral and is not a result of other biases, motivations and perspectives (Shenton, 2004). As highlighted in the section above (3.10 Inside Researcher) a number of techniques were used to ensure the researcher adopted a neutral stance. In addition if 'truth value' and 'applicability' are established so should 'neutrality' (Krefting, 1991).

3.12 Data Analysis

When analysing qualitative data it is of vital importance that the researcher provides a detailed description of the procedures, decision criteria and manipulation of data that may occur in order to present the final results (Côté et al., 1993).

3.12.1 Participant Validation

The process of participation dissemination of data can be used to reduce/overcome deficiencies and biases that the methodology may have. This was implemented in the study. Participants were given a copy of their transcribed interviews and asked to comment further and validate that the transcribed material is correct. The aim of research validation is to check that participants recognise the interpretation of the data in the final report, in addition to clarifying the overall findings and enhancing the credibility of the data (Côté , 1999). It was beneficial because it allowed participants the opportunity to think further about their answers and if required, could provide more detail. However a negative impact could be that participants think in greater detail about their answers and begin to try to give answers that they feel are correct.

3.12.2 Data Analysis Process

When the data had been collected it was transcribed and then analysed using content analysis. Following guidance laid down by previous researchers (Côté et al., 1993; Creswell, 1998) on organising and interpreting unstructured qualitative data, an "open coding strategy" (Côté et al., 1993, p. 131) was adopted. The use of coding to interpret data is a well established technique. It involves surveying the data and breaking it into fragments of different categories and instances, which are then regrouped into relevant topics (Atkinson, 1992). In the first instance the coder, de-contextualizes the data by separating relevant portions of the data using tags. The use of two coders can enhance the validity of the study and guard against a single coder's own perceptions and ideas. As tags and their attribution to a piece of information can be discussed until the term best used to describe the piece of text is agreed upon. Secondly the coder/researcher organises the data into categories and instances. The tags with similar meanings are organised into groups/categories and headings are given to these groups that captures the substance of the topic (Miles and Huberman, 1984). As Tesch (1990) highlights these categories must stay flexible during the analysis processes as they need to be modified and refined until seen as satisfactory for the data. Clear patterns only begin to emerge when the data has been fully scrutinised (Strauss and Corbin, 1998). Thirdly, placing meaning on the data and explaining it must occur, this will be discussed later. Finally, it must be added that throughout the process it is important that the data is continually verified and that the data is shown to be valid.

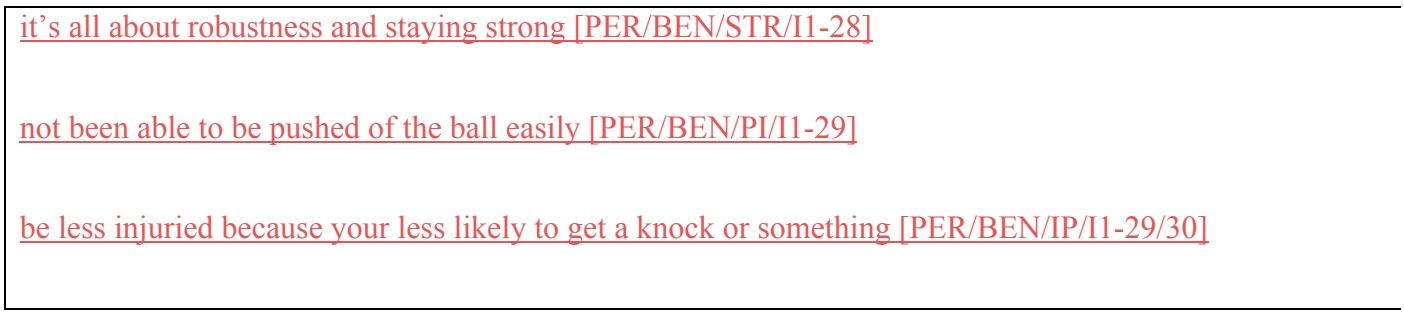
The three concurrent areas of activity in relation to the research are described in detail below. Firstly the data was transcribed and each line of the data was numbered and individual participant's interviews 'tagged'. This helped to simplify and de-contextualise the data, but still allowed the researcher to be able to refer back to the data in its original context, if required.

Secondly, the text was read carefully and organised into categories. This was achieved by transferring any significant quotes that emerged into an individual worksheet in Microsoft Word, along with the tag previously mentioned (Côté et al., 1993, p. 131). For example, a quote by Amy with the tag (5) – 45 was placed in the worksheet with the category heading of 'athletes strength and conditioning training' (TR) and then further placed in the sub-heading 'weight training' (TR/WT).

Continual analysis of the text led to the creation of new categories and subsequently new worksheets or new sub-headings within a category. A number of pieces of text also fell into more than one category. Thirdly, once all the data had been analysed and the relevant text sorted and re-sorted into categories, the researcher was able to process the findings and highlight any relevant pieces of text. The criteria used to aid this included information on players training programmes and playing history, their perceptions to S & C training and their views on interventions to increase participation in S & C training. Finally it was important that the data was verified and shown to be valid (See section 3.11 Establishing Validity and Reliability).

A section of this worksheet is shown below (Fig. 1).

Figure 1: A section of a worksheet used in transcribing the data



strong in your core which is what they want you to be, if you do get a niggle say you hurt your leg or your k body doesn't over compensate and put strain on other parts of the body [PER/BEN/IP/I1-32/33].

The data analysis described is of an inductive nature, from the analysis of the interview data, relevant experiences and perspectives of the participants emerge (Jones et al., 1993). However, due to the researchers past experiences and understanding of the topic and involvement in a pilot study, she was able to predict a number of the topics beforehand. This adds an element of a deductive process to the analysing process.

3.13 Chapter Conclusion

This chapter has discussed in detail the qualitative research methodology chosen by the researcher to develop understanding of participants' experience, perceptions and behaviours towards S & C training. The researcher decided that by using a semi-structured interview procedure, an in-depth understanding would be gained of the chosen topic. This chapter has introduced the researcher and participants in the study and gave details of their backgrounds. This was important due to the nature of the relationship between participants and researcher, and the fact that the latter is an insider. The chapter provided an explanation of the use of a constructive, interpretive approach to research. It also highlighted the methods used to collect, analyse, and interpret data within this study. In addition a discussion on the importance of validity and reliability and how this was established was included.

Chapter 4: RESULTS

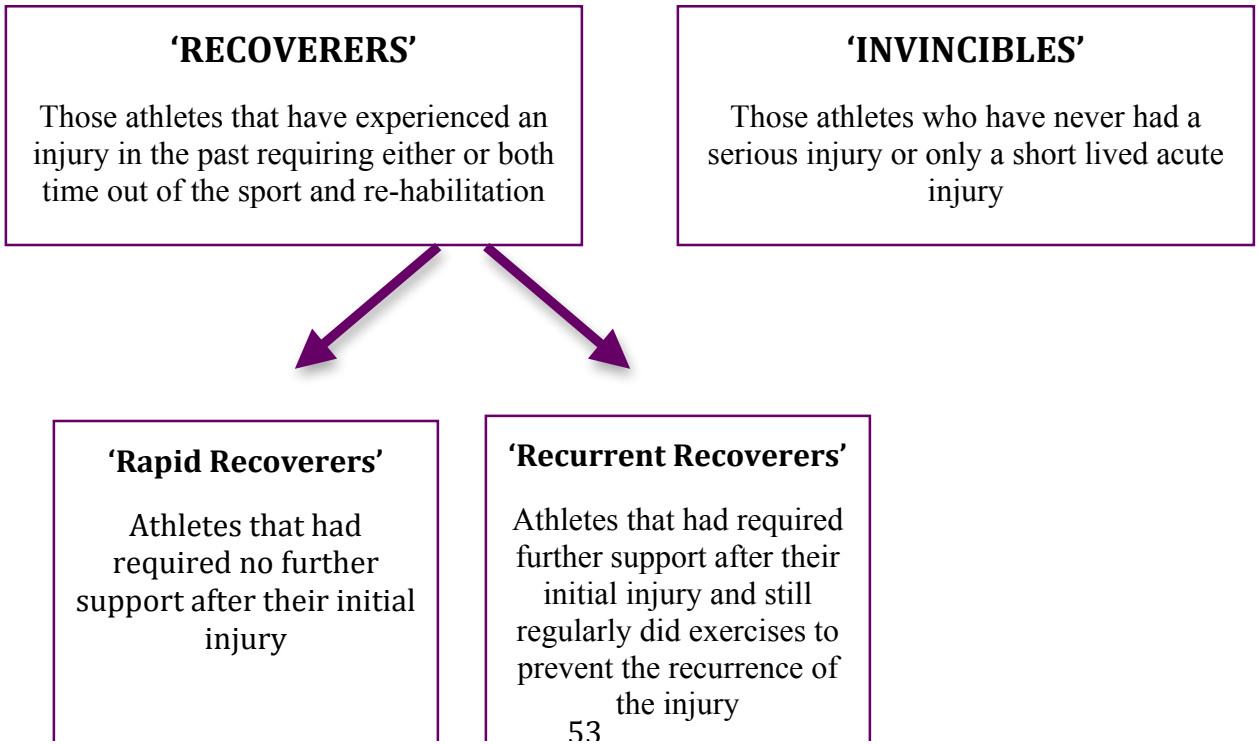
4.1 Chapter Introduction

This chapter will present the key findings and themes from the research study. It will begin with discussing the primary finding of the study that of 'player groupings'. Reasons for players being categorised into these groups will be explained. The additional themes emerging will then be presented. The chapter will also discuss some future innovations that participants suggested to change players' views and increase motivation to participate in S & C training.

4.2 Participants Training/Playing Backgrounds and Injury History

On studying the transcribed material it became evident that participants understanding and perceptions of S & C training were very dependent on the participants past playing injury history and training/playing backgrounds. On reflection it was evident that the participants could be split into two main groups, with one group consisting of two further sub groups:

Diagram 1: Participant Groups



The following section includes a brief description of each participant's past playing experiences and injuries, this information was collected in the fourth section of the interview. It provides background information on participant's training/playing experiences, context and helps explain links between participants past experiences and their understanding, views and adherence to S & C training. All names used are pseudonyms, to help ensure players are not easily identifiable.

4.2.1 'Recoverers' (R)

4.2.1.1 'Recurrent Recoverers' (RE)

4.2.1.1.1 Vicky

Vicky has played England juniors U16's and U18's. She is a member of the National Performance Centre squad. When she was 16 years old she had shin splints, which are an ongoing injury. At the time she had physiotherapy and was prescribed a range of exercises, mainly to strengthen the calves. She still does these exercises and finds they help.

4.2.1.1.2 Alice

Alice represented Wales at U16's, U18's, U21's and senior level. Four years ago she tore her sartorius muscle at training slipping on a cone. She did not train or play for six months. At the time she went to see a physiotherapist, who for six weeks did physiotherapy rehabilitation and ultra sound. After this she was prescribed core exercises and quadriceps strengthening and other exercises to strengthen the muscles around that area. She still sometimes feels the injury and often has to stretch it before and after games. She still participates in regular core stability exercises at home and feels they prevent injury.

4.2.1.1.3 Laura

Laura started playing hockey at aged 8. She has played England International hockey for the past three years, at U16's and U18's level. She is part of the National Performance Centre program. She used to have problems with her knees that occasionally prevented her from playing. She sought specialised help, seeing a number of physiotherapists and was eventually recommended orthodontics as her feet pronated inwards. She was also given a number of exercises to work on firing her gluteal muscles properly so that her quadriceps, gluteals and hamstrings all fired in the right way together. She also worked on improving her core to prevent further injuries. She still does these exercises regularly. Recently she also had physiotherapy screening to check for any areas of concern and help prevent injuries, and everything was said to be fine.

4.2.1.1.4 Clarissa

Clarissa plays for Scotland seniors. She has recently been away to Germany for a European tournament. She has also represented the South region for the past four years. She has had patella tendonitis for the past few years, a recurring injury which stopped her playing for six weeks last summer. She was recommended, through Scotland hockey a program designed specifically to recognise her weaknesses and help improve them and prevent further injuries. Her specific strength and conditioning program was aimed at improving the strength and flexibility of her hamstrings, gluteals and back, to prevent the reoccurrence of injury in the future. She still does these exercises and regularly has physiotherapy.

4.2.1.2 'Rapid Recoverers' (RA)

4.2.1.2.1 Danni

Danni has played England international hockey since U16's and recently played in the U21's World Cup. She sprained her ankle two years ago, stretching the ligaments quite badly. She saw a physiotherapist who recommended exercises to strengthen ankle up. She has had no recurring problems with the ankle. She also strained her quadriceps and she can often feel this, so constantly stretches it before and after playing hockey.

4.2.1.2.1 Amy

Amy started playing hockey at the age of 7. She played England International U16's, U18's, U21's and seniors. She has also represented Great Britain seniors. She is centrally contracted by Great Britain Hockey and has just started a centralised training program with them. This involves training at Bisham Abbey two days a week, participating in three strength and conditioning sessions a week, sometimes with an individual training coach, other times in a small group of around six people. She tore her hamstring when she was 16 years old and had to have six weeks of physiotherapy. The physiotherapist recommended a number of thera band exercises to strengthen up the hamstring. She has only really been advised on or participated in strength and conditioning in the last two years.

4.2.2 'Invincibles' (I)

4.2.2.1 Lucy

Lucy started playing hockey at 11 years old. She played county, Midlands and was involved in the Welsh program from the age of 15. She played U16's for two years, U18's for three years; U21's for two years and is currently still U21's. This year she has also played senior level, participating in the European cup, World cup qualifier in February and she hopes to be part of the squad for the commonwealths in summer 2010. She has never missed two consecutive games of hockey due to

injury.

4.2.2.2 Becky

Becky has played hockey for Wales since she was 14 years old. She has played U16's, U18's and Wales seniors. She has also played super league hockey. She feels lucky with injuries, having had no serious ones in the past, and with any minor injuries she has tended just to get on with playing.

4.2.2.3 Helen

Helen has played hockey since she was about ten years old. She has been playing England international hockey for the past seven years, U16's, U18's, U21's and in the last year has been involved in the England senior program. She has been to the junior youth Olympics twice with Great Britain youth in 2009 and 2007 both times they won the gold medal. She has also played in the senior Europeans for England. She has not really sustained any serious injuries, except a twisted ankle at the end of last season.

4.2.2.4 Charlotte

Charlotte has been playing England international hockey for the past seven years, at U16's, U18's and U21's level. She has also represented Great Britain youth at the youth games in 2007 and 2009, winning gold both times. She has never missed two consecutive games of hockey due to injury.

4.2.3 Group Identification

It was important to identify the different groups of players interviewed, as it provides the reader with an understanding of the background of the participants, and how it may affect their

understanding and perceptions of S & C training in relation to both improvements in performance and injury prevention. The discussion will begin to expand on the players perceptions of S & C training and the implications of theses perceptions on their participation in S & C training.

4.3 Perceptions of Strength and Conditioning Training

When participants were questioned on what they thought was included in their S & C training program, it was evident that ten of the participants understood the main emphasis of S & C training to be weight training:

'I would see strength and conditioning training as weights training' (Becky, 7/12/09, (I)).

'Types of weights vary, we do Olympic lifting so cleans, squats and quite a lot of upper body stuff so bench pressing, chins and then we go on to a core sessions' (Amy, 5/12/09, (RA)).

However, Amy and four other participants showed a greater understanding of types of training and fitness elements involved in S & C training. They highlighted the use of a range of training, including flexibility and core stability training. Similarly Clarissa shows a good understanding of the importance of the S & C for the development of core stability:

'Conditioning for me is like core stability, not just all about pure muscle but actually control of the muscles and movement, it gives you a strong core from which to work' (10/12/09, (RE)).

In addition, two participants (Alice (RE) and Danni (RA)) refer to stretching and the development of flexibility and mobility as important in S & C training:

'I have to stretch it properly (hip), extra stretching, it is the one thing I have to stretch during training' (Alice, 7/12/09 (RE)).

These five of players were all in the 'recoverers' group. Especially when discussing flexibility

and mobility the participants in the 'recoverers' group often referred to their past injuries, stating that it was important they carried out this type of training to aid recovery and reduce injury in the future. In addition the players in the 'recurrent recoverers' group showed more extensive knowledge of the use of core stability to reduce injury.

This greater understanding may be a factor in determining why participants participate in the S & C training that is set for them. This will be discussed in later chapters.

4.4 Why Participants Participate in Strength and Conditioning Training

4.4.1 Improvements in Performance

It was clear from the study that all the participants participated in S & C training, though to varying degrees. This was encouraged by their team hockey coach and supervised by an S & C coach at the university. In addition, a number of participants were given S & C programs from their national squads:

'The seven National Performance Centre (NPC) players and the Talented Athlete Scholarship (TASS) athletes, we have our own individual program set by England Hockey' (Vicky, 7/12/09, (RE)).

It is evident that the majority of participants had some understanding of the range of physiological benefits that occur through S & C training, the effect this has on their physical fitness, and the ability to relate this to their performance on the pitch.

Nine of the ten athletes' interviewed cited an improvement in performance as one of the main reasons for participating in S & C:

'Well it improves your speed and fitness which at the end of the day will improve your performance, I've definitely seen signs of improvement in my personal performance' (Charlotte,

10/12/09, (I)).

Similarly Becky states:

'I do feel it's really beneficial, I do feel the benefits of it in games afterwards' (Becky, 7/12/09, (I)).

The main physiological factors that the participants referred to, in developing performance, was an increase in strength, speed, and power:

'I feel a lot stronger and faster since beginning S & C training' and it helps me to maintain a low position and get to the ball faster' (Amy, 8/12/09, (RA)).

Amy shows a good understanding here, as she emphasis the fitness components of strength and speed that she feels have improved since commencing S & C, she also goes on to describe how these improvements have developed her performance in games.

Overall eight of the ten participants showed that they believed there was a link between participation in S & C training and improvements in performance. There was little difference in opinion between the two groups on this topic.

4.4.2 Injury Prevention

The second main benefit that the participants highlighted as being a reason for participation was that of injury prevention. However, the participant's opinion of the significance of this varied hugely between the two groups. It was hardly mentioned by the players in the 'invincibles' group, but was mentioned by all six participants in the 'recoverers' group and afforded great importance by five of the six participants in the 'recoverers' group:

'Another reason why I motivate myself to do S & C is because it sort of injury prevention for me now' (Alice, 7/12/09, (RE)).

This indicates that she has suffered from injuries in the past and sees it as a way to reduce the chance of gaining further injuries in the future.

'In hockey you have to be in low positions and be able to get to the ball quickly and do that continuously without your body breaking, with all the core stuff, I feel stronger within, touch wood I don't get injured, yeh I do think I don't get injured' (Amy, 8/12/09, (RA)).

Similarly Amy highlights that she is confident that the extra training helps to reduce the chance of injuries.

By a number of participants in the 'recurrent recoverers' group it was given as the leading incentive for them to participate in the S & C training:

'It helps to improve robustness, so injury prevention' (Laura, 7/12/09, (RE))

For these participants and a number of others the recognition that S & C training, can help to reduce the likelihood of injury in addition to improvements in performance, is likely to increase their motivation for participating in S & C training. They are likely to participate without the need for outside forces, for example pressure from the coach to participate.

4.4.3 External factors

A third reason for participation in S & C highlighted by half of the players was that they were instructed to participate by their coach, and would not have a choice in the matter.

All of the players in the 'invincibles' group mention this as a factor:

'For doing S & C my motivation is mainly because I get told to do it, I've kinda been told to do S & C from my coach' (Helen, 10/12/09, (I)).

She goes on to highlight that it is her England coaches that instruct her to participate in S & C training and that she is afraid she will be dropped if she does not comply. Similarly Amy who is

actually in the ‘recoverers’ group highlights that:

‘I always follow the program as it is set, it’s there, it’s not yes you have to do it, you could not, but you would get caught out and that's not what it’s about, you want to be the best person you can be and you want to for the team, so there’s no point’ (Amy, 10/12/09, (RA)).

This again highlights that she is afraid of being caught and therefore will follow the program regardless of whether she really wants to. However she also highlights that she does think that it is beneficial to follow the program and that she would probably still do it even if not instructed, because she sees it as beneficial for her and her teams’ performance.

Five of the six participants in the ‘recoverers’ group gave no mention to the fact they are instructed to participate, with all participants in the ‘recurrent recoverers’ group giving no mention to this factor. In the study Clarissa interestingly states that:

‘Having a highly motivated coach helps you to want to participate’ (Clarissa, 10/12/09, (RE)).

She says this in the context of wanting to improve performance through the use of S & C training.

4.5 Future Innovations to Reduce the Negative Factors Associated with Strength and Conditioning Training

A number of factors were highlighted as reasons against participation in S & C training in young elite female hockey players. These can be classed into three broad categories: attitudes and perception associated with S & C training (including gender identity), time commitments, and the enjoyment factor.

The first to be discussed is that of the attitudes and perception of athletes associated with S & C

training (including gender identity). As shown in the previous section of the participants perceived this type of training as mainly weight training, especially those participants in the 'invincibles' group:

'Its massive weights and all that kind of thing' (Charlotte, 10/12/09, (I)).

She states this in a very negative tone, highlighting her negative perception of S & C training.

Four of the participants express concern at the effects strength training may have on their physical appearance:

'Some players bulk up really quickly, which isn't the best for females, from a basic level, you don't want to bulk up the weight, because when you look at yourself you don't want to be this big, heavy person' (Clarissa, 10/12/09, (R)).

Helen simply states:

'The negative of S & C training is that you turn into a bit of a muscle woman' (Helen, 10/12/09, (I)).

There is some evidence that the participants in the 'recoverers' group have a more positive understanding and perception of S & C training. This could be because they have received education in the past from coaches, physiotherapists and S & C professionals:

'If you were told from your coaches or specialised trainers that it'd reduce injury, and they kinda told you the benefits from it and how it improves performance you would be more motivated to train' (Danni, 10/12/09, (RA)).

Danni here highlights how she thinks that people need to be educated, in order to be motivated to train. She seems highly motivated and has a good understanding of the benefits of S & C training. At the opposite end of the spectrum Lucy indicates that she is unsure of the benefits of S & C training and it would be beneficial to be given more information:

'It would be beneficial to get told what the benefits are and not just do them for the sake

of it' (Lucy, 7/12/09, (I)).

In addition it was suggested that different training types and increased focus on a range of fitness components could be incorporated into the training to reduce the negative perceptions of S & C, and hopefully help to increase motivation levels:

'Types of exercises are good, however I sometimes wish it was a little bit more whole body, as we use everything else as well, I would like to focus a bit more on core and flexibility' (Lucy, 7/12/09, (I)).

The second factor that may reduce participation is that of time commitments on the players. It was illustrated that the participants had conflicting requirements on their time to participate in training, against time needed to complete university work. Two participants highlight a number of time commitments; these are mainly related to training impeding university work:

'I feel it's important but not as important as work and find it hard to justify over my work' (Becky, 7/12/09, (I)).

However a number of suggestions were given that would benefit participants who were struggling to complete all sessions due to time concerns. This is highlighted by Helen's suggestion:

'Maybe doing it more often, but shorter time frames, doing it every single day before you have breakfast, so maybe a bit shorter and focus on a few things' (Helen, 10/12/09, (I)).

The third factor is that of enjoyment. Four players highlight that they do not enjoy participating in strength and conditioning training:

'Don't really enjoy strength and conditioning' (Helen, 10/12/09, (I))

'Don't enjoy it but you know the benefits are going to make you be a better player' (Danni, 10/12/09, (RA)).

This could lead to a reduction in participation by participants. A number of innovations can be

discussed to increase enjoyment. As highlighted earlier education of the benefits of training, would hopefully increase enjoyment, effectiveness and motivation to participate.

Another innovation voiced by participants was that, the participants would like to do S & C training as part of a group:

'Doing it with other people is definitely better' (Vicky, 7/12/09, (RE)).

A number of participants also indicated that to encourage participation it would be beneficial to track progress:

'Be able to see the end results like track your progress' (Charlotte, 10/12/09, (I)).

In addition, a number of participants were given S & C programs from their national squads:

'The seven National Performance Centre (NPC) players and the Talented Athlete Scholarship (TASS) athletes, we have our own individual program set by England Hockey' (Vicky, 7/12/09, (RE)).

'Keep progressing exercises to see developments' (Alice, 7/12/09, (RE)).

4.6 Chapter Conclusion

The chapter begun by discussing the primary findings of the study that of 'player groupings'. It was recognised that the participants could be split into two groups: the 'recoverers' and the 'invincibles', the 'recoverers' group could then be dissected further into 'recurrent recoverers' and 'rapid recoverers' when discussing the findings. The participants understanding and perceptions of the fitness components and benefits of S & C training could then be documented and their participation rationale for S & C could be analysed, using the two headings 'recoverers' and 'invincibles' and the additional sub-headings 'recurrent recoverers' and 'rapid recoverers'. Participants' suggestions for innovations to promote participation were also documented. Although in the results only a select

number of quotes from each athlete were possible, the thoughts of the athletes were well documented, and the voice of the researcher did not come to dominate.

Chapter 5: Discussion

5.1 Introduction to the Chapter

In the following chapter the results will be discussed and explored while being related back to past literature surrounding the topics of the nature of hockey, participant understanding and perceptions of S & C training in relation to both improvements in performance and injury prevention. The implications of players' perceptions on their actions will also be discussed. Future innovations to reduce the negative factors associated with S & C training will be explored.

5.2 Perceptions of Strength and Conditioning training and the implications of this on participation

The main perception that players emphasized was that S & C training mainly consisted of weight training. This perception could have a negative impact on players' participation in S & C training. As Kuhlthau states " perceptions lead to expectations which direct actions" (1988, p. 419). If participants feel that S & C training mainly consists of weight training they may be inclined not to participate because of the negative associations with weight training that were highlighted in the results.

However five players showed a greater understanding of the types of training and fitness elements involved in S & C training. They highlighted the use of a range of training, including flexibility and core stability training. All five players were in the 'recoverers' group, with the players showing the most extensive knowledge of the use of S & C training and specifically core stability to reduce injury in the 'recurrent recoverers' group. This greater understanding may be a factor in determining why participants participate in the S & C training that is set for them. As Dinther et al., (2011) highlights that within social cognitive theory, self-efficacy is an important variable because of

the effect it has on students' motivation and learning.

From the literature it is important to recognise that young female hockey players, self-efficacy, self-management skills and strategies to coping with extra training schedules, their out-come expectancy value of participation in S & C training, their enjoyment of participation in S & C training and the social support young female hockey players receive in relation to S & C training will have a significant effect on the direct action of participating in S & C training.

5.3 Why Participants Participate in Strength and Conditioning Training

5.3.1 Improvements in Performance

It is evident that the majority of participants had some understanding of the range of physiological benefits that occur through S & C training, the effect this has on their physical fitness, and the ability to relate this to their performance on the pitch. Nine of the ten athletes' interviewed cited an improvement in performance as one of the main reasons for participating in S & C and there was little difference in opinion between the two groups on this topic.

A number of studies highlight the benefits S & C training can have on performance and, as Pullo (1992) indicates it is seen as an integral part of optimal athletic preparation. Similarly, research by Sunderland and Nevill (2005) and Gabbett et al. (2009) highlight that the ability to execute the required skills at the correct time and when under physical pressure such as fatigue, corresponds with physiological function. Physical function is therefore important in determining success.

The literatures highlights that hockey players at the elite level have been required to adapt physiologically in a range of fitness components in order to meet the physical demands imposed on them (Reilly and Seaton, 1990), with the added specific demands of lunging with rotation and striking, pushing and flicking the ball, all of which impose unique stresses on the athlete (Atkinson,

2007). The game of hockey also has the unique requirement of playing in a semi-crouched position, which causes extra physiological strain on players (Reilly and Seaton, 1990). Several researchers (Boyle et al., 1994; Reilly and Doran, 2003) have cited a number of fitness components that must be developed which include aerobic and anaerobic endurance, power, strength, speed, flexibility and agility. The implementation of S & C training away from the pitch is a way of maximizing a players fitness levels in each component. This helps to develop their performance and reduce the chance of injury when on the pitch.

The knowledge a player possesses of the effects of S & C training on improvement in performance is likely to increases a players motivations to participate in S & C training. As Palmer et al. (2005) indicates to improve adherence to training, athletes training should be regularly monitored (e.g. training diary, coach-athlete contact and feedback) and strategies provided to support the athlete. Similarly, practitioners need to make the athlete aware of and believe that the advantages of training outweigh the disadvantages. As the study by Dishman et al. (2010) highlights outcome-expectancy value of physical activity or in relation to this study S & C training correlates with increased participation.

5.3.2 Injury Prevention

The second main benefit that the participants highlighted as being a reason for participation was that of injury prevention. However, the participant's opinion of the significance of this varied hugely between the two groups. It was hardly mentioned by the players in the 'invincibles' group, but was mentioned by all six participants in the 'recoverers' group and afforded great importance by five of the six participants in the 'recoverers' group. A major factor in training for athletic preparation is to reduce the frequency and severity of injury

(Gamble, 2013). Sports specific physical conditioning through strength training can increase the strength and structural integrity of muscle or bone. Strength training can help athletes become more resistant to neuromuscular fatigue, which increases the susceptibility of injury (Verrall et al., 2005). In addition to general protective effects of strength training and neuromuscular conditioning, specific training to guard against the prevalent injuries associated with the sport can be employed.

The logical first step in designing sport specific conditioning programs is that of identifying the injuries characteristic of a particular sport and playing position. A study by Rishiraj et al. (2009) followed seventy-five players, under the age of 21 years over a 5-year duration. All injury data were collected post-injury. Data were collected on the player position, games versus practice conditions, injury time, injury type, etc. The predominant injuries sustained were to the lower back followed by ankle/foot then knee. Injuries included muscle strains, followed by tendonitis, while the highest number of injuries resulted from no contact. Also, certain playing positions were at a greater risk of injury and that injuries occurred more regularly latter on in the game/practice. They concluded that by identifying injury trends related to hockey, injury prevention strategies could be developed to reduce the chance of injury (Rishiraj et al., 2009). There is significant and consistent evidence (Olsen et al., 2005; Hewett et al., 2006; Herman et al., 2012) to support injury prevention strategies that include a combination of the following elements: pre-season training, functional training, education, strength, and pro-prioceptive balance training programs that are continued throughout the playing season.

For the participants the recognition that S & C training, can help to reduce the likelihood of injury in addition to improvements in performance, is likely to increase their motivation for participating in S & C training. They are likely to participate without the need for outside forces, for

example pressure from the coach to participate.

5.3.3 External factors

The emphasis on internal and external factors correlates well with the two major types of motivation, intrinsic and extrinsic motivation (Vallerand, 2007). The main external factor discussed by participants in the study was that of the coach. The direct supervision of a coach results in greater training adherence and increased strength gains in young athletes than does unsupervised training (Coutts, 2004). As Bloom et al. (1998) explain mentoring of athletes by coaches appears to be an important element in the development of the athlete's career. However, the coaching method can have a significant effect on the type of motivation shown by the athlete. A controlling coach can lead to players reporting lower levels of intrinsic and externally regulated behavior (Vallerand, 2007). All the participants in the 'intrinsic' group mention the fear of the coach as a factor. This indicates that the behavior is externally regulated, being non-self determined and controlled by external demands and experiences (Deci and Ryan, 1985).

Smith et al. (2007) highlight how the coach plays an important role in influencing the nature and quality of the sport experience of young athletes. Pensgaard and Roberts (2002) also indicate that the coach is one of the most important factors in influencing athletes' motivation. If a coach is highly motivated without been dominating it will encourage intrinsic motivation.

Five of the six players in the 'recovers' group made no mention that they were instructed to participate in S & C training. This could possibly be contributed to their behavior being internally regulated and they engaged in the training with no sense of external compulsion (Deci and Ryan, 1985). They are internally compelled to participate because they recognize that S & C training may lead to a reduction in injury occurrence and an improvement in performance. Palmer et al.

(2005) highlights that the attitudes to training of significant others for example: coaches; parents; teammates can have an effect on the athletes. It must be highlighted that the way in which the coach instructs the players can be important in determining the participant's motivation to participate in set training programs. It can change an athlete's perceptions of training standards. It is thought that when part of an elite squad it is important that the coach fosters a positive environment in which players are encouraged to train in specific ways and strive for success. As this will help to create an atmosphere in which athletes see it as the custom to train and realise that it is vital they maintain the standards set.

In addition to the coach as the creator of a positive climate, it is important that the club culture the young athletes are exposed to is a supportive and caring climate (Pensgaard and Roberts, 2002). Club culture and structures are important as they convey an implicit message that affects athlete motivation. Young, elite athletes often develop strong athletic identities through their involvement in sport (Sparkes and Smith, 2002). A culture of pre-dominantly self-improvement encouraged through: professionalism in training; a desire to be the best you can be; and a positive attitude to winning is likely to promote higher levels of intrinsic motivation, internal regulation and consequently enjoyment (Vallerand, 2007). The culture of the club towards physical training and S & C training specifically will be important in shaping players' perceptions and understanding of S & C. A greater understanding of S & C training and the benefits of improved performance and injury reduction through participation will lead to increased internal regulated behavior and player adherence to S & C training.

Perceptions can also be constructed in a multiple of other cultural sites including school and the home (Symes, 2010).

5.4 Future Innovations to Reduce the Negative Factors Associated with Strength and Conditioning Training

A number of factors were highlighted as reasons against participation in S & C training in young elite female hockey players. These can be classed into three broad categories: attitudes and perception associated with S & C training (including gender identity), time commitments, and the enjoyment factor.

A number of the athletes perceived S & C training as mainly consisting of weight training, especially those participants in the 'invincibles' group. Their attitude to weight training held negative inclinations. This can have implications on attitudes towards participation in S & C training due to the cultural contradictions between femininity (never masculinity) and athleticism. Cohen (1999) suggested that some individuals still think that women who engage in strenuous training will develop unsightly, bulging muscles and lose their femininity. It is thought that this would be of even more significance to younger players and those not reaching the elite level, since they receive less advice from coaches, specialised S & C coaches, national governing bodies and to a certain extent parents. They are also less likely to have suffered an injury so therefore it is likely their knowledge and understanding would be even further limited. The study by Stevenson et al. (2000) highlighted how the incidence of injury was 55% greater in participants aged between 26 and 30 years compared to those aged less than 18 years.

It is clearly evident that young, elite players must be educated in the types and benefits of S & C training, through coaches, club culture, teachers and parents. In addition it was suggested that different training types and increased focus on a range of fitness components could be incorporated into the training to reduce the negative perceptions of S & C, and hopefully help to increase motivation levels

The second factor highlighted as a reason against participating in S & C training is that of time commitments. This is in line with a number of studies that indicate work commitments being the main factor in the reduction in participation levels (Finch, 2000; Palmer et al., 2005). It important that the coach and significant others, discusses with players there time commitments and schedule training to allow for maximum participation.

The third factor is that of enjoyment, with a number of participants highlighting this as a reason for not participating in S &C training. Research by Butcher et al. (2002) indicates that one of the main reasons for withdrawal from various sports at a young age was 'lack of enjoyment'. A study by Ferguson et al. (2009) concurs with this. It denotes that programs that create a pleasant experience and explain the specific benefits of the training can influence participation and can enhance students sense of self-esteem, both of which may increase future exercise behavior. The coach and club culture are also important in ensuring that the climate promoted is motivational, task-orientated and promotes internally regulated behavior (Vallerand, 2007; and Pensgaard and Roberts, 2002).

In order to increase enjoyment in S & C training, participants suggested a number of other innovations. Training as part of a group was discussed. The researcher Forsyth suggested "cohesive groups are often more enjoyable but are not always more productive" (1990, p.87). In contrast Summers et al. states "cohesion increases productivity" (1988, p. 82). Also it has been indicated that setting realistic goals and recording progress in reaching these goals, ensures motivation among young athletes (Cockerill, 1990; Cox, 1998). A number of participants suggested these ideas as an innovation to improve motivation.

5.5 Chapter Conclusion

The discussion of the research explored the key findings of this study and related them to

previous research and theoretical frameworks associated with elite, young, female hockey players' understanding and perceptions of S & C training.

In the final chapter conclusions will be drawn on the study, implications for future practice considered, and ideas for future research suggested.

Chapter 6: CONCLUSION

6.1 Introduction to the Chapter

The final chapter of the research will conclude the findings of the study. It will initially begin by re-addressing the research question. It will then discuss the implications of the methodology employed, summarise the key findings of the study and highlight some key implementations for increased participation in S & C training in elite young females. It will conclude by highlighting limitations of the study and ideas for potential future research in the field

6.2 The Research Question

This study looked to address the research question 'What are elite female hockey players' perceptions and rationale for participation_in S & C training?' The interview consisted of two principal topics a) Athletes understanding of S & C training, b) Athletes rationale for participation in S & C training:

a) What do you perceive S & C training to be?

What types of training and exercises are involved?

What are the positive/negative effects of this type of training?

Where and who was the advice received from?

b) What is your rationale for participation in strength and conditioning training?

Do you always follow your program? Why/ Why not?

What could be done to help motivate you to do the sessions in the future?

In addition two extra questions were asked to determine the participants training schedule and past injury history: c) general training information; d) injury history and injury prevention methods. Within these topics the following questions were asked:

c) What training do you do each week during the hockey season?

What types of training are involved?

What quantity of training?

Why do you do this type of training?

Who do you do the training with?

Where does the training take place?

d) Have you been injured in the past?

When? How? Where?

How long did you not play for?

Did you seek specialised help?

What did they do?

Did they recommend any short term/long term treatment?

6.3 Summary of Research Findings

The findings of this study concluded that the participants' understandings of S & C training were similar to previous research in the area (Rutherford and Jones, 1987; Carpinelli and Otto, 1998; Bompa, 1999; Holm et al., 2004; Atkinson, 2007; and Dorgo, 2009), although there were some notable exceptions. Previous research had highlighted a range of physical fitness components that were developed through S & C training. For example, numerous studies indicate that S & C training involves a broad repertoire of exercises, including many variations of drills, movements, and techniques in an effort to improve a wide range of fitness components including strength, speed, agility, flexibility, cardiovascular and muscular endurance, power, explosiveness development, balance, core stability and others (Dorgo, 2009; Rutherford and Jones; Carpinelli and Otto, 1998). The

participants in this study, but to varying degrees understood that S & C training can improve strength, speed, core stability, power and to a limited extent flexibility.

The study interestingly highlighted that three participants' in the 'invincibles' group perceived their engagement in this type of training was only in strength training, with all of them only referring to 'weight training' when asked what exercises their S & C training incorporated. This highlights a narrow participant understanding of the different fitness components and exercises that can be incorporated into S & C programs. It also indicates a need for better participant education from coaches and specialist trainers of the types of fitness components involved and the exercises that can be incorporated.

The participants showed differing knowledge of the benefits of S & C training. Overall the 'recoverers', but significantly the 'recurrent recoverers' showed a greater understanding and more positive attitude to S & C training, all highlighted the benefits to performance and injury reduction. They also showed a more internally regulated attitude and this is thought to promote athlete participation in training. Whereas the 'invincibles' only pointed out the benefits to performance and seemed to be more externally compelled to participate, for example due to pressure from the coach or fear of being found out.

A number of reasons were cited for reduced participation in S & C training. The four main factors were a) athletes' perceptions of strength and conditioning as weight training and the effects this has in relation to gender identity; b) for a number of participants the lack of knowledge of the benefits of strength and conditioning training, this is especially significant for the participants in the 'invincibles' group; c) time commitments; c) enjoyment factor.

In relation to these factors a number of future interventions were discussed that could help improve participation in S & C training in elite, young, female athletes. The fact that the terminology

used ‘strength and conditioning’ has a number of negative connotations among elite, young female athletes. These include: a) that five of the participants perceive S & C training as mainly consisting of weight training; b) that four of the participants feel that by participating in weight training they will become muscular and masculine, which could originate from their understanding of gender roles and views of the typical feminine stereotype; and c) that three of the participants thought that due to the nature of S & C training it is not suitable for female athletes. It is evident from the findings that female athletes should be comprehensively educated on a range of S & C training disciplines, the physical adaptations that will occur, and the benefits they will incur by participating. Education is of even greater relevance when dealing with younger and less elite athletes, as they will have not been exposed to what S & C training incorporates and the benefits it has on performance and in reducing the risk of injury. Future research on the implication of the use of the term ‘strength and conditioning training’, and specifically on the perceptions young, female athletes have of this terminology, would be beneficial.

In addition several participants discussed a number of innovations that could be implemented to increase enjoyment and reduce the effects of time constraints. These included working in small groups, continual tracking and feedback, continual variation of exercises to avoid repetition, shorter training sessions done on a more regular basis, and training programs that can be done at home.

6.4 Implications of the Study

The findings of the study highlight that elite, young, female athletes have a reasonably good understanding of S & C and the benefits incurred. However, this knowledge has only been developed in the past few years, either due to younger athletes not being educated in S & C training or that it is a modern phenomenon in female elite sport. However, their perceptions of what it involves are often

distorted towards a weight/strength criteria and a number of them saw it as un-feminine and of a male domain. These perceptions could be changed and improved through both education and a change of terminology. Other factors that could be implemented to increase participation through increasing enjoyment and reducing the effect of time commitments, include working in small groups, continual tracking and feedback, continual variation of exercises to avoid repetition, shorter training sessions done on a more regular basis, and training programs that can be done at home.

The researcher does take into consideration that the resulting findings are likely to be affected in some way by the questions asked by the researcher (Crouch and McKenzie, 2006; Denzin and Lincoln, 2000) and the beliefs that the researcher brings with them to the subject area as these may work to guide the way the researcher collects and interprets data. According to Creswell (1998) all qualitative research is carried out by researchers who bring with them "basic set of beliefs that guide their inquiries'" (Creswell, 1998, p.74). As Atkinson and Hammersley suggest the research findings should be read as text, understood and interpreted on the values they hold (2004). At every possible point this has been the researchers aim during the study.

6.5 Recommendations for future research

The findings of the study provide a view of the understanding and perceptions of young elite female hockey players' participation in S & C training. Participation in S & C by young females is a recent occurrence in women's sport, specifically hockey. For many years women athletes were not expected to incorporate S & C training into their overall training programs and coaches of women's teams did not put emphasis on strength training (Poiss et al., 2004). As suggested by Dorgo (2009) S & C training is a relevantly young and constantly growing area of sport coaching and training. It is evident that S & C training has a wide range of benefits for performance and injury prevention.

Therefore it is important that further research is done on the topic area in order to understand whether the perceptions athlete's hold on S & C is important in determining their participation levels. This needs to be done not only with elite athletes, but also with sub-elite and younger athletes.

Furthermore, one of the key questions emerging from the research is how we can promote participation in S & C in the future to increase performance levels and reduce injury. To be explored further is if due to societal norms the perceived meaning of the terminology S & C, as mainly weight training, has detrimental effects on female athlete's participation levels. Even when the athlete is aware of the benefits the training bestows.

Finally, it would be interesting to discover the perceptions male elite hockey players have of S & C training and their participation levels of S & C training in order to be able to correlate the findings with this study.

5.6 Chapter Conclusion

This chapter re-capped the research questions, which set the basis of this study and research direction. The findings of the study were summarised and potential limitations of the study and research methodology were highlighted. Implications for future research on athletes' perceptions, attitudes and participation in S & C training are suggested, that could potentially lead the direction of future research.

6.7 Concluding remarks

This thesis set out to address the question 'What are elite, female hockey players perceptions and rationale for participation in S & C training?'

The participants showed a good understanding of the benefits of S & C for their sport. However,

there was a very one-dimensional idea of the training methods and fitness components developed. This highlights a need for further education on the topic, and also highlights a number of factors that explain the lack of participation among young, female athletes. These included identity and gender roles in relation to strength training, the use of the terminology ‘strength and conditioning’, time commitments of athletes, and the enjoyment factor of the training. These need to be addressed in the future.

Chapter 7: APPENDICES

7.1 Appendix A: Consent Form

Consent Form

Name ---------- (please print name)

Please read the paragraph in bold below:

The study is on 'elite, female hockey players' perceptions and reasons for and against participation in strength and conditioning training'. The study will be carried out by Claire Mackinder who is a student at the University of Birmingham and it is part of her MPhil(B) dissertation. The procedure involves the participant being asked to answer a range of questions on their experiences of hockey training and playing. The anticipated time of the interview is 1hr. Consent is completely voluntary and participants may withdraw at any time. All information provided will be kept confidential and will not be released to anyone.

Please now read the statements below and sign if you give consent to participating in the study.

I certify that the objectives of the study and the procedures to be carried out have been explained clearly to me by Claire Mackinder and that the choice to participate in the study is completely my own.

I understand that I can withdraw from the study at any time and if I withdraw all data will be destroyed. I also understand that all data will be kept confidential and results will only be accessible to the researcher to ensure my identity is kept hidden.

I consent to taking part in the study on 'elite, female hockey players' perceptions and reasons for and against participation in strength and conditioning training' conducted by Claire Mackinder from the University of Birmingham as part of her MPhil dissertation.

Signature of the participant _____ Date _____

Witness (other than the researcher) _____ Date

Any queries about your participation in this research project may be directed to the researcher or to her supervisor at the University of Birmingham, Dr. Martin Toms.
The researchers email address is: clairemack147@hotmail.com Tel no: 07881 922024
The researchers supervisor email address is: m.r.toms@bham.ac.uk

7.2 Appendix B: Interview Questions

Interview Questions:

General information

1. What training do you do each week during the hockey season?

Probe: Types of training? Quantity of training? Why this type of training? Who do you do the training with? Where does the training take place?

Athletes perceptions of strength and conditioning training

2. What do you perceive strength and conditioning training to be?

Probe: What types of training? What do you see as the positive and negative effects of this type of training? Where and who was the advice received from?

Rationale for participation in strength and conditioning training

3. What are you reasons for doing this/not doing this?

Probe: Do you always follow your program? Why/ Why not? What could be done to help you/motivate you to do the sessions in the future?

Injury history and injury prevention (extra topic)

4. Have you been injured in the past?

Probe: When? How? Where? How long did you not play? Did you seek specialised help? What did they do? Did they recommend anything short term/long term?

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