GENDER DIFFERENCES AMONG VARSITY BASKETBALL AND VOLLEYBALL PLAYERS IN IMAGERY, ABILITY, FREQUENCY OF USE, AND FUNCTION

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GENDER DIFFERENCES AMONG VARSITY BASKETBALL AND VOLLEYBALL PLAYERS IN IMAGERY ABILITY, FREQUENCY OF USE, AND FUNCTION.

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ABSTRACT

The purpose of this study was to examine the influence of gender on varsity athletes' imagery ability, frequency of use and function. A total of 51 varsity basketball and volleyball players completed a sport-specific modified version of the Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) and the Sport Imagery Questionnaire (SIQ-1) (Hall, Mack, Paivio & Hausenblas, 1998) to assess athletes' imagery ability and function of imagery used, respectively. Two-way ANOVAs identified that gender differences existed in varsity athletes' imagery ability, frequency of use and function. Specifically, the results revealed that males used significantly more imagery during practices and game breaks than female varsity athletes. Additionally, males were more successful at using the kinesthetic component of imagery than females. Gender differences were also identified for athletes' function of imagery used, with males using more cognitive specific (CS) imagery compared to females. Two-way ANOVAs also examined main and interaction effects by gender and sport for imagery. The results of the study suggest that gender differences are present in varsity athletes' imagery ability, frequency of use and function, with males showing higher ability and use than female varsity athletes'.

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CHAPTER I

INTRODUCTION

Overview

Sports have been expanding worldwide, and are becoming a profitable business. In 1990, sport was a $63.1 billion dollar a year business (Comte & Stogel, 1990), and this figure was expected to increase to $152 billion by 1995 (Meek, 1997), and to $213 billion dollars by 1999 in the United States of America (Broughton, Lee & Nethery, 1999). NCAA university athletic programs are also showing a marked increase in profit. A press release from the NCAA on November 6th, 2000, reported that Division I-A university sport programs averaged a total revenue of $21.9 million dollars per institution in 1999, this was a 23 percent increase from 1997 (Jakowski, 2000).

As sport grows and evolves, emphasis is focused on helping athletes reach their athletic potential and gaining an edge over other competitors. Increased interest, attention, and research has focused on the role of *imagery* in achieving sporting excellence (Hausenblas, Hall, Rodgers & Munroe, 1999). Consequently, imagery and its relationship with sport performance has been examined extensively. Numerous studies have demonstrated the powerful and effective nature of imagery with regards to performance enhancement (Atienza, Balaguer & Garcia-Merita, 1998; Bohan, Pharmer & Stokes, 1999; Carboni, Burke, Joyner, Hardy & Blom, 2002; Cumming & Ste-Marie, 2001; Davis IV, 1990; Garza & Feltz, 1998; Glisky, Williams & Kihlstrom, 1996; Groslambert, Candau, Grappe, Dugué & Rouillon, 2003; Hardy & Callow, 1999; Housner, 1984; Lee & Hewitt, 1987; Lejeune, Decker & Sanchez,

1994; Meyers & Schleser, 1980; Meyers, Schleser & Montgomery Okwumabua, 1982; Millard, Mahoney & Wardrop, 2001; Rodgers, Hall & Buckolz, 1991; Ryan & Simons, 1981; Ryan & Simons, 1982; Savoy & Beitel, 1996; Thelwell & Greenless, 2001; Ungerleider & Golding, 1991; Van Gyn, Wenger & Gaul, 1990; Weinberg, Seabourne & Jackson, 1981; Zervas & Kakkos, 1995; Ziegler, 1987).

Imagery is defined as mental rehearsal of a sport skill or activity without physical practice (Weinberg & Gould, 2003). White and Hardy (1998, p. 389) described imagery as *"...an experience that mimics real experience. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing"*. Imagery is a real sensory experience that includes the five senses of touch, taste, sight, smell and hearing. It can be used to create or recreate sporting experiences, making imagery an effective tool to relive a successful experience, and consequently strengthening an athlete's belief in their ability to achieve similar success in future performances. Creating positive images of future events allows athletes to develop confidence and self-efficacy in their abilities even though they have not experienced the particular situation (Garza & Feltz, 1998; McKenzie & Howe, 1997; Short et al., 2002). The popularity of imagery has emerged because of its simple nature. Imagery is practiced in the mind and may be practiced anywhere, making it appealing to athletes who have rigorous schedules which include training, competitions and travel. Additionally, everyone has the ability to image.

Researchers studying imagery have demonstrated the numerous benefits and uses of imagery in a variety of areas that include enhancing motivation (Martin & Hall, 1995), building confidence and self-efficacy (Beauchamp, Bray & Albinson,

2002Callow & Hardy, 2001; Garza & Feltz, 1998; Mckenzie & Howe, 1997; Short et al., 2002; Vadocz, Hall & Moritz, 1997), reducing competitive anxiety (Cai, 2000; Fletcher & Hanton, 2001; Gal-Or, Tenenbaum & Shimrony, 1986; Hale & Whitehouse, 1998; Page, Sime & Nordell, 1999; Vadocz et al., 1997), acquiring and practicing sport skills (Creelman, 2003; Grouios, Kouthouris & Bagiatis, 1993; Ryan & Simons, 1981; SooHoo, Takemoto & McCullagh, 2004; Waskiewicz & Zajac, 2001) and coping with pain and injury (Antall & Kresevic, 2004; Brewer, Jeffers, Pettipas & Van Raalte, 1994; Evans, Hardy & Fleming, 2000; Green, 1992; Halpin, Speir, CapoBianco & Barnett, 2002; Ievleva & Orlick, 1991; Johnson, 2000; Roffe, Schmidt & Ernst, 2004; Sordoni, Hall & Forwell, 2000;).

Although imagery has been studied extensively in sport, gaps still exist in imagery research, particularly in the area of gender differences. The few existing studies on imagery that have explored gender differences have found that gender differences exist in imagery use, specifically the function of use (Cumming & Hall, 2002; Gammage, Hall & Rodgers, 2000; Weinberg, Butt, Knight, Burke & Jackson, 2003) and imagery frequency (Barr & Hall, 1992; Weinberg et al., 2003). Although gender differences were found in the *function of imagery use* and frequency, research has yet to explore gender differences in *imagery ability*. Therefore, the extent of these gender differences warrants further exploration, and will be the primary focus of this thesis. Determining the degree to which gender differences influence athletes' imagery ability, frequency of use and function would add to the existing literature, and may potentially lead to new ideas and strategies to developing specialized imagery-training programs.

Gender differences relate to "*any characteristics that occurs in different frequencies, likelihoods, or degrees in one gender when compared to the other*" (Blick Hoyenga & Hoyenga, 1993. p.1). Studies exploring gender differences have established that gender differences do exist in a variety of contexts related to mental skills, including but not limited to, perception (Barber, 1998; Borman & Kurdek, 1987; Carvalho, Smith & Hunter, 1990; Dixon, 2002; Hayes, Crocker & Kowalski, 1999; Lintunen, 1998; Malcolm & Mobily, 1990; Shapiro & Ulrich, 2002), value orientation (Dubois, 1990), attitudes (Brenner & Cunningham, 1992; Croxton, Chiacchia & Wagner, 1987; Luke & Sinclair, 1991; Shropshire, Carroll & Yim, 1997), competitive state anxiety (Jones, Swain & Cale, 1991), aggression (Archer, Pearson & Westeman, 1988; Bettencourt & Miller, 1996; Gladue, 1991; Graham, Plant & Plant, 2004; Henning & Feder, 2004; Hubbard, 2001; Knight, Fabes & Higgins, 1996; Knight, Guthrie, Page & Fabes, 2002; Krakowski & Czobor, 2004; Liu & Kaplan, 2004; McCann, Woolfolk, Lehrer & Schwarcz, 1987; McKenzie, Jackson & Dunstan, 1993; Nixon II, 1997; Ostrov & Keating, 2004; Rys & Bear, 1997; Salmivalli & Kaukiainen, 2004; Tapper & Boulton, 2004; Towson & Zanna, 1982; Tucker & Parks, 2001; Zeichner, Parrott & Frey, 2003), stress/ coping (Anshel, Williams & Hodge, 1997; Crocker & Graham, 1995; Hammermeister & Burton, 2004; Henert, 2001; Kolt, Kirkby & Lindner, 1995; Madden & Kirkby, 1995; Smallman, Sowa & Young, 1991), competence/ motivation (Amorose & Horn, 2000; Bruce & Johnson, 1996; Flood & Hellstedt, 1991; Gernigon, d'Arripe-Longueville, Debove & Puvis, 2003; Granleese, Trew & Turner, 1988; Lee, Fredenburg, Belcher & Cleveland, 1999), and self-confidence (Bailey, Moulton & Moulton, 2001;Clifton & Gill, 1994; Corbin, 1981; Corbin, Landers, Feltz & Senior, 1983; Godin & Sheppard,

1985; Lirgg, 1991; Vealey, 1988). Understanding how gender differences are created is essential to fully understanding their impact. Understanding gender requires discussing nature (innate, genetics) versus nurture (environment and upbringing). The discussion challenges whether gender differences are innate or created through upbringing, learning and experience. Naturists believe that biological differences (hormones, sex chromosomes, genes) are accountable for the differences between the sexes, whereas, nurturists believe that experiences/ environment are responsible for gender differences. Children are taught to act a certain way through punishment and rewards and this is how nurturists believe gender differences are created (Lippa, 2002). Regardless of how gender differences are created, their existence is a prominent issue in society and sport. Within the context of sport, gender affects every aspect of sport participation, including the type of sport chosen, the perceived value of sport, perceived competence levels and even aggressive behaviors.

Gender differences have further been studied in other important areas related to sport, such as leisure activity (Bruce & Johnson, 1996; Carvalho et al., 1990; Kirkcaldy & Athanasou, 1995; Malcolm & Mobily, 1990; Philipp, 1998), sport participation (Borman & Kurdek, 1987; Bungum & Morrow Jr, 2000; Dubois, 1990; Eccles & Harold, 1991; Gill, 1988; Greendorfer & Ewing, 1981; Harrison, Lee & Belcher, 1999; Li, Harrison & Solmon, 2004; Manktelow, Farrell & McAuliffe, 2001) and motor skills (d'Arripe-Longueville, Gernigon, Huet, Winnykamen & Cadopi, 2002; Garcia, 1994; Thomas & French, 1985). Although, gender research is extensive, few studies have examined gender differences in imagery ability, frequency of use and function in the realm of sport and athletics.

The intent of this research study was to explore gender differences in varsity athletes' imagery ability, frequency of use and function. Varsity basketball and volleyball players competing in the 2004-2005 season served as participants for the research study.

Purpose of The Study

The purpose of this exploratory study was to examine gender differences in varsity athletes' imagery ability, frequency of use and function. Specifically, the study examined varsity athletes' imagery ability (vividness, clarity of sounds, kinesthetic feel, emotional state, controllability of images) as well as frequency of use and function (*cognitive specific (CS), cognitive general (CG), motivational specific (MS), motivational general-arousal (MG-A) and motivational general-mastery (MG-M)*) to examine gender differences.

Research Questions

The present thesis sought to investigate the following research questions:

1. Do gender differences exist in varsity athletes' imagery ability?
2. Do gender differences exist in varsity athletes' frequency of imagery use?
3. Do gender differences exist in the function of imagery used by varsity athletes?

Limitations of The Study

A major limitation in this exploratory study is generalizability. The study is limited in generalizability, since the participants were restricted to female and male varsity athletes who competed in team sports, specifically basketball and volleyball, for Memorial University in Atlantic University Sport (AUS) competition during the 2004-2005 season. The small sample size is also a limitation in this exploratory study. Finally, this study employed only quantitative methods. Qualitative methods, such as interviews, could have provided valuable information and understanding of varsity athletes' imagery ability, frequency of use and function, and could have potentially identified noteworthy gender differences.

Justification for the Study

The few studies that have explored the topic of gender differences in frequency of use and function of imagery, have identified that minor gender differences are present. The benefits of further exploring gender differences in imagery use are numerous. This study will attempt to determine the extent of gender differences in imagery ability, frequency of use and function among varsity athletes. The results of this study may be utilized to educate sport psychologists, athletes, coaches, physiotherapists and trainers on the development of personalized, gender appropriate imagery programs. The study's results may potentially offer guidelines and suggestions for the development of imagery training programs to benefits all varsity athletes, regardless of gender.

Assumptions

It was assumed that the participants of the study honestly answered the questionnaires. Another key assumption in this study was that varsity athletes use imagery to some extent in their sport participation.

Definition of Terms

The following terms will be used throughout the study and will be defined below:

Gender Terms:

Gender Differences: *Any characteristics that occur in different frequencies, likelihoods, or degrees in one gender when compared to the other* (Blick Hoyenga & Hoyenga, 1993, p. 1).

Gender Roles: *Are those expected of, prescribed for, or proscribed (prohibited) for a given sex in a given society* (Blick Hoyenga & Hoyenga, 1993, p. 9).

Gender Stereotypes: *Used to describe the sociological/ anthropological/ cultural aspects of masculine versus feminine roles* (Blick Hoyenga & Hoyenga, 1993, p. 9).

Imagery Terms:

Debilitative Imagery: *Any imagery designed to have a negative effect on (or to impede) an individual's ability to learn and perform skills and strategies, modify conditions (confidence and motivation), and to regulate arousal and anxiety* (Short et al., 2002).

Exercise Imagery: *Imagery employed by exercisers. Exercise imagery has three primary functions: energy (images that are energizing or relieve stress), appearance (imagery that relates to both physique and fitness), and technique (imaging the correct form and body position).*

External Imagery: *Imaging the execution of a skill from the perspective of an external observer. Ex: watching a videotape of yourself performing a skill* (Weinberg & Gould, 2003).

Imagery: *Imagery is the mental rehearsal of a sport skill or activity without physical practice. Imagery is a simulation, which is similar to a real sensory experience, but the experience is in the mind* (Weinberg & Gould, 2003).

Imagery Ability: *Imagery ability will be operationally defined as the ability to create vivid and controllable images, which incorporate all five senses and emotional states* (Weinberg & Gould, 2003).

Internal Imagery: *Refers to imaging the execution of a skill from your vantage point. Ex: seeing and feeling what you would see if you were performing the skill* (Weinberg & Gould, 2003).

Functions of Imagery: *Imagery has both cognitive and motivational functions, which operate on two levels, specific and general to mediate behavior (Weinberg & Gould, 2003). The five functions of imagery are:*

> ***Cognitive General Imagery (CG):*** *Imagery of the strategies related to a competitive event* (Martin et al., 1999).
>
> ***Cognitive Specific Imagery (CS):*** *Imagery of specific sport skills* (Martin, Moritz & Hall, 1999).

Motivational General-Arousal (MG-A): *Imagery which represents feelings of relaxation, stress, arousal and anxiety in combination with competition* (Martin et al., 1999).

Motivational General-Mastery Imagery (MG-M): *Imagery that represents effective coping and mastery of challenging situations, such as mental toughness, confidence and staying focused* (Martin et al., 1999).

Motivational Specific Imagery (MS): *Imagery that represents specific goals and goal oriented behaviours, such as, winning a particular competition or being congratulated for a good performance* (Martin et al., 1999).

Guided Imagery: *Involves verbal instructions which lead to a state of total well-being so that the body, mind and emotions enter a state of peace* (Cai, 2000).

Visuomotor Behavior Rehearsal (VMBR): *Imagery combined with relaxation, VMBR involves an initial relaxation phase, followed by visualizing performance (imagery) during a specific stressful situation and finally followed by performing the skill during a simulated stressful situation* (Weinberg et al., 1981).

"O*ther*" Terms:

Autogenic Training: *A technique of self-hypnosis designed to produce sensations of warmth and heaviness* (Weinberg & Gould, 2003).

Facilitative Anxiety: *Viewing anxiety symptoms as positive and helpful to performance* (Weinberg & Gould, 2003, p. 91).

Sport Socialization: *The study of factors that contribute to one's initial engagement, persistence and intensity of involvement in sport, and socialization via sport, or the*

analysis of the value, attitudinal and/or behavioural consequences of sport involvement (Dubois, 1990, p. 4).

Summary

Chapter one provided a brief overview on the research and background information on gender differences and imagery ability, frequency of use and function. Presented within the chapter were the purpose and justification for conducting this study, the research questions to be answered, the limitations and assumptions were also outlined. This chapter concluded with a list of definitions of terms.

Chapter two will provide an extensive review and discussion of the research studies conducted on imagery and gender differences as well as the theoretical framework to provide the basis for understanding the research study.

CHAPTER II

REVIEW OF LITERATURE

The previous chapter provided a brief overview of gender differences and imagery. The present chapter will review the literature and research available on gender differences and imagery use, while providing a brief overview of the theoretical framework that will be used to examine and analyze this topic. The chapter will review the models and theoretical framework for imagery, imagery research, theoretical frameworks for gender differences, gender research and will conclude with a summary.

Overview: Imagery

The intent of this literature review was to examine the research conducted in the field of imagery and gender differences. An additional purpose of this review was to determine if inadequacies existed in previous research and to identify areas of imagery and gender differences that could warrant further investigation.

Mental imagery and its relationship to sport performance has been examined extensively. Although, the earliest formal published reports began during the 1930's (Jacobson, 1932; Perry, 1939; Sackett, 1934, 1935), extensive research on the many uses of imagery began in the 1980's (Murphy & Martin, 2002). The research ranges from the acquisition of motor skills (Creelman, 2003; Grouios et al., 1993; Ryan & Simons, 1981; Waskiewicz & Zajac, 2001), to coping with pain and injury rehabilitation (Antall & Kresevic, 2004; Brewer et al., 1994; Evans et al., 2000; Green, 1992; Halpin et al., 2002; Ievleva & Orlick, 1991; Johnson, 2000; Roffe et al., 2004; Sordoni et al., 2000) and imagery use to improve self-confidence (Beauchamp

et al., 2002; Callow & Hardy, 2001; Garza & Feltz, 1998; Mckenzie & Howe, 1997; Short et al., 2002; Vadocz et al., 1997), to only name a few. The research findings are sometimes contradictory, with the vast majority of studies concluding that imagery is beneficial, while others studies found no benefit. Generally, the majority of the studies have demonstrated the powerful nature of imagery for enhancing athletic performance.

Models and Theoretical Framework for Imagery

The literature indicates that imagery functions in various ways to enhance performance. Several theories and frameworks have proposed an explanation of how imagery works and functions. It is beyond the scope of this thesis to discuss every theory and model which has been developed to explain how imagery works to enhance athletic performance, therefore, an overview of the theories will be presented. The most relevant theories will be discussed in more depth. Specifically, six theories and models will be discussed to provide an understanding of how imagery functions.

The first theory, developed by Sackett (1934) is the Symbolic Learning Theory, which dealt with the cognitive effects of imagery. The theory states that imagery facilitates the understanding of movement patterns (Weinberg & Gould, 2003). Additionally, imagery functions as a coding system that helps comprehension and acquisition of movement patterns. These movement patterns are stored as a mental blueprint of the correct movement pattern, which athletes can draw upon to improve athletic performance. The movement, therefore, becomes more familiar and automatic. The Symbolic Learning Theory only addressed the cognitive aspects of

the movement and tasks that are primarily characterized by muscle movements are not influenced by this theory (Hecker & Kaczor, 1988).

The second theory, the Psychoneuromuscular Theory, was developed by Carpenter (1894) and describes the benefits of imagery in physical terms. This theory is based on the ideomotor principle, which stated that imagery facilitates the learning of motor skills because of the neuromuscular patterns activated during the imagery process (Weinberg & Gould, 2003). Vivid imagery produces neuromuscular patterns identical to those produced during the physical performance of the skill, although they are reduced in magnitude. Even though the impulses are identical to those produced during physical performance, no movement occurs during the imaging process. This theory described an important aspect of imagery, muscular activation. The theory neglects the cognitive aspects involved with imagery rehearsal.

The third theory called the Bioinformational Theory, developed by Lang (1977, 1979) is based on the assumption that an image is an organized set of propositions stored in the brain, specifically stimulus and response propositions. Stimulus propositions are statements describing the scenario being imagined (e.g. basketball player imagining the crowd). Response propositions are statements that describe the imager's response to the scenario being imagined (e.g. increases in heart rate) (Weinberg & Gould, 2003). A strength of this theory is that it identified that images cause psychological, emotional and physiological changes in the imager.

The fourth model is the Triple Code Model (Ahsen, 1984), identifies three essential aspects of imagery: the image, the somatic response and the meaning (ISM). The triple code model suggests that images and their meanings are powerful determinants of the success of an imagery-training program. Since no two individuals

will have the same imagery experience, it is important to develop personalized programs.

The fifth framework was proposed by Paivio (1985) to develop a better understanding of how and why athletes use imagery. The theory purports that imagery plays a significant role on both cognitive and motivational functions. The theory defined imagery as operating on two levels, specific and general. Paivio's five functions of imagery: (1) *motivational specific* (MS), (2) *motivational general-mastery* (MG-M), (3) *motivational general-arousal* (MG-A), (4) *cognitive specific* (CS), and *cognitive general* (CG). (For specific definitions of these terms refer to Chapter 1). These five functions of imagery can operate independently from one another or athletes can imagine a situation using two or more of the imagery functions. The different functions of imagery and reasons why they are used, help to develop an understanding of several different factors involved in the imagery process, as well as offering insight into athletes' use of imagery.

The sixth framework was developed by Martin et al. (1999), and is referred to as an Applied Model of mental imagery in sport. The Applied Model of mental imagery in sport attempted to encompass the many different uses of imagery in sport (Callow & Hardy, 2001). This model was developed to influence imagery research in the direction of establishing a theoretical explanation of the effects of imagery. The model centers on the five functions of imagery identified by Paivio (1985). Moreover, the model included variables, which influence the use of imagery (e.g. sport situation and imaging ability) with the predicted effects/outcomes of using specific functions of imagery. This model attempts to incorporate the Triple Code Theory and the Bioinformational Theory in that images have different meanings to

different athletes, which are associated with different cognitive, affective and behavioural reactions (Martin et al.). This model was developed to illustrate athletes' use and effects of imagery on achieve athletic success.

In summary, the many explanations and theories of how imagery works suggest that imagery can help athletes' both physically and mentally enhance their athletic performance. The following section will review the research that has been conducted on imagery, and includes the subtopics of performance enhancement, mental skills training packages, athletes' use of imagery, self-confidence and self-efficacy, motivation, motor skill acquisition, anxiety and arousal control and internal and external imagery.

Imagery Research

Performance Enhancement

Imagery provides athletes with the vision they need to "reach for the stars" and achieve their athletic potential (Williams, 2001). Several studies have explored the effect that imagery has on athletic performance (Atienza et al., 1998; Bohan et al., 1999; Carboni et al., 2002; Cumming & Ste-Marie, 2001; Davis IV, 1990; Garza & Feltz, 1998; Glisky et al., 1996; Groslambert et al., 2003; Hardy & Callow, 1999; Housner, 1984; Lee & Hewitt, 1987; Lejeune et al., 1994; Meyers & Schleser, 1980; Meyers, Schleser & Montgomery Okwumabua, 1982; Millard et al., 2002; Rodgers et al., 1991; Ryan & Simons, 1981; Ryan & Simons, 1982; Savoy & Beitel, 1996; Thelwell & Greenless, 2001; Ungerleider & Golding, 1991; Van Gyn et al., 1990; Weinberg, Seabourne & Jackson, 1981; Zervas & Kakkos, 1995; Ziegler, 1987).

Carboni et al. (2002) explored the effect that brief imagery sessions had on concentration style and free throw shooting performance of intercollegiate basketball players. Participants included current and former Division I basketball players (N= 10) from a south-eastern university, ranging in age from 18 to 23 years old (M= 20.3 years). Five participants were placed in the intervention group and the sixth player served as a control for the study. The participants included female basketball players (n= 4), current (n= 2) and former (n= 2), as well as current male (n= 2) basketball players. Results showed no consistent changes in the Basketball Concentration Survey (BCS) and an increase in some scores on the Free Throw Efficacy Questionnaire (FTEQ). Results demonstrated an increase in participants' self-efficacy in estimating free throw attempts. Several participants did show percentage increases in free throw shooting. The five participants in the imagery intervention group reported feeling that imagery helped them, and two participants reported that they would continue using imagery.

A study conducted by Zervas and Kakkos (1995) examined the effect of *visuomotor behavior rehearsal (VMBR)* on archery shooting performance. The study hypothesized that the treatment groups would show significantly greater performance increases than the control group. The subjects were male volunteers (N= 46) from undergraduate physical education classes, ranging in age from 19 to 22 years of age (mean age and standard deviation not provided). The subjects were assigned (based on matched pre-test scores) to a physical practice group (n=12), a combined practice (physical practice plus VMBR in a 50:50 ratio) group (n=12), a VMBR group (n=10) and a control group (n=12). The study's results indicated that all experimental groups, showed significant improvements in the post-test shooting performance.

Therefore, it appears that VMBR may be a valuable and effective technique for enhancing shooting performance in beginner archers.

A further study by Weinberg et al. (1981) explored whether imagery combined with relaxation (VMBR) was more effective than either imagery or relaxation alone in facilitating karate performance. Subjects were males (N= 32) enrolled in the North Texas State University karate club, ranging in age from 18 to 24 years old (mean age and standard deviation were not provided). All participants were assigned to one of four experimental conditions, a relaxation group (n= 8), imagery group (n= 8), a VMBR group (n= 8) or a placebo group (n=8). Findings indicated that all four-treatment groups exhibited a decrease in trait anxiety over the intervention. No differences were found between treatment conditions and between groups pre- and post-test heart rates. Results also demonstrated significantly less pre-competitive state anxiety for the relaxation and the VMBR group, when compared to the imagery and attention-placebo control groups. Performance was broken down into three sub-areas, which consisted of skill, combinations and sparring (actual competition). Results only showed an effect for sparring, with the VMBR group exhibiting better performance results than all other groups. It appeared that relaxation, combined with imagery, allowed athletes to relax and focus on relevant cues, which lead to performance increases.

Van Gyn et al. (1990) investigated the effect of imagery in conjunction with non-specific training on the transfer of training to performance. To investigate this, undergraduate students (N= 40), females (n= 21) and males (n= 19) were recruited from the University of Victoria (subjects' mean age and range were not provided). Subjects were assigned to one of four groups: imagery training (IT) (n= 10), power

training (PT) (n= 10), imagery and power training (IPT) (n=10) and control (C) (n= 10). The study's results indicated that imagery training could facilitate the transfer of physiological training to performance. The findings also demonstrated that both the IPT group and PT group significantly improved peak performance on the ergometer, yet only the IPT group significantly improved on the sprint. These results suggest that imagery in combination with power training increased performance more than power training alone, signifying that mental training may be a valuable component of power training success.

Blair, Hall and Leyshon (1993) explored the effect of an imagery training program on the performance of a soccer task by skilled and novice players. The participants included females (N= 44), whom were varsity soccer team members at the University of Western Ontario (n= 22) and participant volunteers from an introductory soccer class at the same university (n=22). The participants ages ranged from 18 to 28 years of age (M= 20 years). The results of this study indicated that the imagery participants improved their performance, specifically response time from pre- to post-test, however accuracy did not significantly change. The control group failed to show performance improvements. Both novice and skilled performers benefited from the imagery-training program, suggesting that imagery may be beneficial to any performer regardless of their skill level.

In addition, Davis IV (1990) examined whether the cognitive style of developing imagery of success and action outside the sport context affected elite ice hockey players performance. The subjects were professional ice hockey players (N= 31) playing in the NHL for the Calgary Flames, forwards (n= 21) and defensemen (n= 10) (M= 23.1 years) (age range not provided). Results demonstrated a positive

relationship between nonsport imagery experience and athletic performance. The study's findings suggested that point scoring in ice hockey is facilitated by developing achievement imagery, which in turn can facilitate performance success.

Millard et al. (2001) explored mental practice, physical practice, combined mental and physical practice and no practice on the performance of a kayak wet exit skill by young novices. To investigate this, post-primary schoolgirls (N= 60) aged 11 to 16 years old (M= 13.5 years, SD= 1.53 years) served as participants. Each participant was randomly assigned to one of four experimental groups: the mental practice group (n= 15), the physical practice group (n= 15), the combined group (n= 15) or a no practice group (n= 15). The results demonstrated that the mental practice group had higher wet exit ratings when compared to the no practice group. The results also demonstrated that a combination of mental and physical practice is more effective than any single practice strategy investigated in the study. In the combined practice groups' diaries, participants' also noted reduced anxiety and increases in confidence levels. Overall, the study's results show that the wet exit from a kayak can be improved by physical practice, mental practice, or a combination of physical and mental practice, all which promote the acquisition and performance of the skill.

Lejeune et al. (1994) explored the effects of mental rehearsal on two measures of table tennis performance, counterattack forehand and counterattack backhand. The participants included male and female students or staff members at the University of Liège (N= 40), ranging in age from 19 to 27 years of age (M= 22 years). Subjects were assigned to one of four treatment groups: a control group, a physical practice group, a group provided with a combination of physical and observational learning and a group provided with physical, observational and mental practice. The study's

findings show an improvement in forehand and backhand performance in the physical, observational and imagery group as well as in the physical training and physical plus observational groups. The study's results demonstrated that imagery in combination with physical practice could considerably improve performance.

Groslambert et al. (2003) investigated the effects of *autogenic training* and imagery training on the shooting performance in biathlon. Specifically, the aim was to examine the effects of a shooting training program, which included autogenic and imagery training on the stability hold, heart rate and the standing shooting performance of biathletes after heavy physical exercise. The study hypothesized that biathlon shooting accuracy performed under exercise conditions should be improved after a program combining both physical shooting practice and mental training. The participants were expert biathletes (N= 16), male (n= 12) and female (n=4) belonging to the French National Team (M= 21.5 years). The participants were randomly assigned to an experimental group (n=8) or to a control group (n=8). The study's results suggested that biathletes who received the autogenic and imagery program showed significant improvements on their stability hold compared to those in the classical shooting training program. The results suggested that an improvement in postural control results in time gains, which may in turn produce performance enhancement.

Bohan et al. (1999) examined the effect of the timing of the introduction of imagery practice during the learning process on the performance of a motor task. The participants were students in an introductory psychology class or were university staff members (N= 30), males (n= 19) and females (n=11) ranging in age from 18 to 41 years of age (M= 20.8 years, SD= 4.2 years). Participants were randomly assigned to

one of three treatment groups: early learning, intermediate or late learning. The results of the study found that imagery was more beneficial during the early stages of learning, demonstrated by the gain in movement speed by subjects in the early learning group. In addition, the results indicated that the imagery practice subjects in the early learning group gained proficiency equal to that of the intermediate and late learning groups following physical practice. Overall, imagery practice led to gains in movement speed comparable to those of physical practice, specifically in early learners.

Ziegler (1987) explored the effects of three different types of imagery techniques on the performance of foul shooting in basketball. A sample of female university students (N= 93) (age range and mean age not provided) were randomly assigned to one of five conditions: control (n=18), physical practice only (n=18), imagery training (n=17), imagery and cueing (n=19) and imagery and physical practice (n=20). The study's results demonstrated that the imagery/cueing and the imagery groups achieved considerable gains in performance from pre-test to post-test, whereas the physical practice group remained relatively stable. The study's results suggested that imagery might be more beneficial to performance than physical practice alone.

Mental Training Packages

Several studies have examined the use of a mental training package on athletic performance (Kendall, Hrycaiko, Martin & Kendall, 1990; Mamassis & Doganis, 2004; Meyers & Schleser, 1980; Meyers et al., 1982; Thelwell & Greenless, 2001; Weinberg, Chan & Jackson, 1983). Imagery was a valuable component of these

mental training packages. Even though it was impossible to define the role that imagery plays in these packages, it appears that it is an important component to achieving athletic success.

Kendall et al. (1990) explored the effects of an imagery rehearsal, relaxation, and self-talk package on the performance of a basketball skill during competition. The sample for this study included female intercollegiate varsity perimeter players (N= 4), ranging in age from 18 to 22 years of age (mean age not provided). The skill that was assessed was the defensive skill of cutting off the baseline. The results of this study indicated that the combination of imagery, relaxation and self-talk training enhanced the performance of the specific defensive skill. The results cannot be directly compared to studies that examined imagery treatments only, since it is impossible to determine the effects of imagery alone compared to the other psychological components. However, the study demonstrated that imagery in combination with other components could lead to enhanced performance.

Weinberg et al. (1983) investigated whether combining two mental preparation strategies would be more valuable in enhancing free throw performance than a single strategy. The subjects included male students (N= 40) enrolled in a required physical education class at North Texas State University, ranging in age from 18 to 23 years of age (mean age not provided). The subjects were randomly assigned to one of four groups: relaxation, imagery, relaxation plus imagery or a control group. The study's results did not support the argument that a combination of techniques is better than a single technique. Results also indicated that the imagery group made the highest percentage of free throws. Even though no significant differences existed between the three treatment groups, it was established that imagery improved

performance. The study appears to be flawed, since participants were not given ample time to learn the mental preparation skill. Previous studies have shown that the effects of imagery on performance was dependent on imagery ability, with greater imagery ability reflecting better performance (Housner, 1984; Highlen & Bennett, 1983; Meyers, Cooke, Cullen & Liles, 1979). Imagery ability was developed through practice (Hall, 1985; Goss, Hall, Buckolz & Fishburne, 1986; Isaac, 1992; Orlick & Partington, 1988; Rodgers et al., 1991).

A further study conducted by Mamassis and Doganis (2004) investigated the impact of a season long mental training program (MTP) on elite junior tennis players performance. The mental training program consisted of five different psychological skills: positive thinking and self-talk, goal setting, concentration and routines, arousal regulation techniques, and imagery. The participants included male (n= 3) and female (n= 6) elite junior tennis players (N= 9) (M= 14.1 years, SD= 1.57 years), who were separated into two groups, the MTP group (n= 5) and the other group that did not follow the MTP (n=4). The results demonstrated that in the second tournament all participants of the MTP group exhibited greater performance. Self-confidence showed the greatest difference between the pre- and post-test. Specifically, all the athletes in the MTP group scored higher in the intensity and direction of pre-match self-confidence at the second tournament compared to the first tournament. Additionally, the members of the MTP group perceived both their pre-match bodily signs and their thoughts as being facilitative to their performance. Overall, the results indicated that a season long mental training program-assisted athletes in developing a facilitative interpretation of their pre-competition anxiety, while in turn, enabled them to enhance their performance by reducing the debilitating effects of anxiety.

Meyers and Schleser (1980) identified the cognitive-coping strategies used by champion athletes and then presented them to a 22-year-old highly skilled college basketball player (*N*= 1). The cognitive-coping strategies introduced to the athlete included relaxation, imagery and coping orientations. The study's results demonstrated that the utilization of cognitive-coping strategies corresponded with significant increases in the athlete's points scored per-game, shooting percentage and percentage of team scoring, which demonstrated the benefits of a mental training package on performance. The limitations of this study included the fact that no measures were used to certify that the athlete had adopted the cognitive-coping strategies. Also, outside factors were uncontrolled and could have accounted for the performance improvements. Although this study did not investigate the use of imagery alone, it demonstrated that in conjunction with other psychological skills training, imagery increased performance.

Meyers et al. (1982) examined a cognitive behavioural intervention for improving basketball performance, which included imagery. The subjects included members of an intercollegiate athletics association for women varsity basketball team (*N*= 2). The first subject was a 19-year old sophomore center, who experienced anxiety and concentration problems. The second subject was a 21-year old junior forward with reported concentration difficulties and shooting anxiety. The study's results demonstrated that a cognitive behavioural intervention was useful in improving basketball performance. The center's free throw shooting percentage improved from 41.3% to 54.8% during the intervention phase and decreased to 28.6% following the intervention. Also, the forwards' field goal percentage increased from 36.7% to 52.2% during the intervention. The overall findings demonstrated that

cognitive behavioural interventions were associated with improvements in the competitive performance of highly skilled athletes.

Thelwell and Greenless (2001) examined the effects of a mental skills training package, including goal setting, relaxation, imagery and self-talk (administered in that order) on gymnasium triathlon performance. The participants included male recreational members of a local gymnasium (N= 5) in the south of England, ranging in age from 20 to 32 years of age (M= 24.2 years, SD= 4.56 years). The results indicated that a mental skills package enhanced gymnasium triathlon performance, which was measured by time to complete the circuit. All the participants improved their performance times following the introduction of the mental skills training package. Similarly, all participants' usage of mental skills increased considerably throughout the intervention. The results of the study support the use of mental skills packages, including imagery, to increase performance.

Athletes' Use of Imagery

Although research has demonstrated that imagery use enhances athletic performance, it is important to investigate the function of imagery and where and when imagery is utilized by athletes. The following studies explored athletes' specific use of imagery.

An important study conducted by Munroe, Giacobbi, Hall and Weinberg (2000) set out to identify and describe the four Ws of athletes' imagery use: where, when, why and what. The participants included varsity athletes (N= 14), males (n= 7) and females (n= 7) (M= 19.5 years) (age range not provided), representing seven different sports: golf (n=2), softball (n=2), swimming (n=4), tennis (n=2), track (n=2),

volleyball (n=1) and wrestling (n=1). The measurement tool included an in-depth interview to examine the four Ws of imagery. The "where" indicated that athletes use imagery in both training and competition, however, more in conjunction with competition. Athletes also seem to use imagery more just prior to competition than at any other time. The "when" of imagery was composed of five categories: during practices, outside practice, pre-competition, during competition and post-competition. "Why" athletes used imagery was composed of the five cognitive and motivational functions identified by Paivio (1985) (CS, CG, MG-M, MG-A, MS). The "what" of imagery, specifically imagery content, included characteristics of length and frequency, effectiveness, nature, surroundings and controllability. Overall, the study provided a better understanding of athletes' imagery use, which in turn, facilitated the development of more effective imagery training programs.

A study conducted by Orlick and Partington (1988) examined the common elements of success for Canadian Olympic Athletes. The participants included Olympic athletes (N= 235) who participated in the 1984 Olympic games in Sarajevos and Los Angeles (age range and mean age were not provided). Participants were split into two groups, the interview sample and the survey sample. The interview sample included male (n=37) and female (n= 38) athletes, while the survey sample included the remainder of the Olympic athletes (n= 160). The study's findings demonstrated several important elements of athletic success, including quality training, clear daily goals, imagery training, simulation training, mental preparation for competition and that they were taught the elements of success. The survey also identified that readiness, helpfulness to others, mental imagery and attentional focus were all tools that enhanced their athletic success. Overall, the study identified several mental

components of excellence necessary to perform to their athletic potential at the Olympics, one of which was imagery.

Hall, Rodgers and Barr (1990) sought to better understand the use of imagery by athletes, by identifying when and how imagery was used. The subjects included male and female athletes (N= 381) from six sports; football (n=85) (M= 20.2 years), ice hockey (n= 107) (M= 18.8 years), soccer (n=61) (M= 19.1 years), squash (n=32) (M=26.6 years), gymnastics (n=50) (M= 14.7 years) and figure skating (n=46) (M= 14.2 years). The instrument used to explore imagery use was the Imagery Use Questionnaire (IUQ). The study's results demonstrated that athletes in the study used imagery quite extensively, specifically in conjunction with competition. The results also suggested that athletes felt that imagery was important for enhancing their performance. Athletes used imagery to visualize themselves winning and receiving an award but seldom imagined themselves losing or performing poorly. Athletes also reported using internal and external imagery perspectives equally, as well as kinesthetic imagery. Athletes at higher competitive levels used imagery to a greater extent both in training and competition, demonstrating that top athletes were willing to put the time and effort into imagery because of their commitment to their sport. Athletes at all competitive levels reported that it was fairly easy to visualize and experience themselves performing their skills.

Salmon, Hall and Haslam (1994) examined the use of imagery by soccer players. The study aimed to explore the motivational and cognitive functions of imagery use by soccer players of various skill levels. Three groups of Canadian athletes participated in the study. The first group included national soccer players (n= 90), the second group consisted of provincial soccer players (n= 112) and the third

group included a sample of non-elite soccer players (n= 161). The participants' ages in the first two groups ranged from 15 to 30 years of age (mean not provided), while the age range and mean were not provided from the third group. The instrument used in the study was the Imagery Use Questionnaire for Soccer Players (IUQ-SP). The soccer players used the motivational general (MG) function of imagery the most, suggesting that they used imagery to energize themselves to play and practice soccer. Provincial players indicated feeling more motivated and excited to practice and play their best when compared to local players. Results indicated that soccer players used goal-oriented images frequently for motivation. The study's results also suggested that soccer players used imagery more for its motivational function than for its cognitive function. Additionally, the results revealed that athletes' imagery use could be distinguished by their competitive level, with elite athletes reporting using more imagery in conjunction with competition than practice. The study established that imagery use is affected by athletes' competitive level.

McCaffrey and Orlick (1989) examined mental factors related to excellence among top professional golfers. Subjects included top professional golfers (n= 14) who competed in the Professional Golf Association (PGA) and the Ladies Professional Golf Association (LPGA) as well as club pros (n= 9) (age range and mean were not provided). Data collection was completed by using in-depth interviews about golfers' personal mental strategies. The results indicated that there were common mental factors used by the top touring pros. The common mental factors identified included commitment, mental preparation for quality practice, goal setting, imagery training, practice and tournament planning, tournament focus control, distraction control and tournament evaluation. Club pros differed from the top

touring pros on these factors, suggesting that mental factors including imagery were essential keys to elite athletic success.

Munroe, Hall, Simms and Weinberg (1998) examined the influence of type of sport and time of season on athletes' use of imagery. The study hypothesized that athletes would use imagery early in the season for cognitive specific purposes and later on in the season for motivational uses. Participants included varsity athletes (N= 350), males (n= 239) and females (n= 111) from a Canadian University (M= 20.43 years, SD= 1.79 years). Participants participated in ten different sports including badminton (n=13), basketball (n=23), field hockey (n=14), fencing (n=8), football (n=52), ice hockey (n=26), rugby (n=66), soccer (n=42), volleyball (n=32) and wrestling (n=69). The measure used to assess imagery use was the Sport Imagery Questionnaire (SIQ). Participants completed the SIQ on two separate occasions, at the beginning of the season (T1) and at the end of the season (T2). The study's results indicated that imagery was used differently from the beginning of the season to the end of the competitive season. For the cognitive specific (CS) imagery function, five sports showed a significant increase throughout the competitive season, which was not predicted, since it was expected that cognitive specific (CS) imagery would be used to facilitate skill acquisition, and would therefore be used early in the season. Athletes from all sports, except badminton, reported an increase in cognitive general (CG) imagery use later in the season. Most sports also demonstrated a significant increase in motivational specific (MS) imagery use during the competitive season. The study's results demonstrated that athletes change imagery use during the season but that the nature of the change was dependant on the sport. All five functions of imagery increased from T1 to T2 for soccer, whereas only cognitive general (CG) and

motivational specific (MS) significantly increased for basketball, while cognitive specific (CS) and motivational general-arousal (MG-A) imagery did not significantly change and motivational general-mastery (MG-M) decreased. Team sport athletes reported a greater use of motivational specific (MS) and motivational general-mastery (MG-M) functions of imagery. In general, athletes changed their use of imagery throughout the competitive season; therefore, sport psychologists and coaches need to be cognizant of these changes to maximize the benefits of imagery use throughout the entire season.

A study conducted by White and Hardy (1998) examined the ways in which imagery was used by high-level slalom canoeists and artistic gymnasts using a qualitative methodology. Participants included male (n= 1) and female (n= 2) members of the British Junior canoe slalom team (n= 3) and from the British women's artistic gymnastics team (n= 3), ranging in age from 15 to 18 years of age (mean age was not provided). Information from the athletes was gathered in interviews, conducted in the athletes' training environment. The study's results demonstrated that the cognitive functions of mental rehearsal were used by the gymnasts and canoeists both in training and competition. Slalom canoeing used imagery at a cognitive specific (CS) level to rehearse difficult moves and at a cognitive general (CG) level to prepare and rehearse movement plans through the slalom course. Gymnasts have only one chance at each routine and, imagery was found to have a more important role before performance. Canoeists noted that they used imagery specifically to develop automatic movement patterns for competition and training. All athletes reported using imagery to improve self-confidence and motivation. Gymnasts and canoeists also both reported using imagery to control

anxiety levels in competition and training. Half of the sample also reported using imagery to replicate competitive situations in training. The differences in imagery use between the sports demonstrated that imagery use varies depending on the task demands of each sport.

Self-Confidence and Self-Efficacy

Research has demonstrated that imagery increased an athlete's self-confidence, which in turn, increased their sport performance. Confidence in one's athletic ability can be very valuable to enhancing athletic performance. Researchers have examined whether imagery content varies between high confident athletes and low confident athletes.

Moritz, Hall, Martin and Vadocz (1996) explored the specific image content of confident athletes. The subjects consisted of male (n= 34) and female (n= 23) elite roller skaters (N= 57), ranging in age from 12 to 18 years of age (M= 15.39 years, SD= 1.58 years). The measures used to assess sport confidence levels and imagery content were the State Sport Confidence Inventory, the Sport Imagery Questionnaire (SIQ) and the Movement Imagery Questionnaire (MIQ). The study's results identified that confident athletes had different image content when compared to lower confident athletes. Confident athletes imagined mastery and arousal during competition. Highly confident elite roller skaters were also more likely to imagine mastery, coping with challenging situations and emotions, handling stress associated with sports competitions, specifically the motivational general-mastery (MG-M) and motivational general-arousal (MG-A) functions of imagery use. Results identified that imagery content varied depending on athletes' confidence levels. An interesting

question emerges from this study and is worthy of further investigation. The question is, does imagery cause the increase in confidence or does confidence affect the use of imagery?

A study conducted by Abma, Fry, Li & Relyea (2002) attempted to expand on the research conducted by Moritz et al. (1996) and Vadocz et al. (1997), and explored whether confidence levels affect imagery use. Their study explored the differences between high and low trait sport confident track athletes in imagery content and imagery ability. The study hypothesized that high trait sport confident athletes would report using more motivational general-mastery (MG-M) imagery compared to other functions of imagery and would also use more motivational general-mastery (MG-M) imagery compared to low trait confident athletes. It was also hypothesised that high trait sport confident athletes would demonstrate higher kinesthetic and visual imagery ability than low trait sport confident athletes. The participants were NCAA Division I track (N= 111) and field athletes, males (n= 44) and females (n= 67) (M= 20.5 years, SD= 1.61 years). The measures used included the Trait Sport Confidence Inventory (TSCI), the Sport Imagery Questionnaire (SIQ) and the Movement Imagery Questionnaire-Revised (MIQ-R). Athletes were first classified as "high sport confident" or "low sport confident" by using the TSCI. The results demonstrated that high sport confident athletes used more motivational general-mastery (MG-M) and motivational general-arousal (MG-A) imagery compared to low sport confident athletes. These findings also demonstrated that high sport confident athletes used significantly more motivational specific (MS), cognitive general (CG) and cognitive specific (CS) imagery than low sport confident athletes, which was not found in the Moritz et al. (1996) study. Additionally, the results demonstrated that motivational

general-mastery (MG-M) was used most often by all athletes and that high sport confident athletes used all functions of imagery significantly more than low sport confident athletes.

A study conducted by McKenzie and Howe (1997) studied the effect of imagery on self-efficacy for a motor skill. The study investigated the effect of successful imagery on subjects' ratings of self-efficacy for a dart-throwing task. The study hypothesized that subjects who were exposed to a mental imagery-training program would improve their ratings of self-efficacy. The subjects included female (n= 3) and male (n= 3) students, ranging in age from 22 to 33 years of age (mean age not provided). The results showed that two of the subjects demonstrated an increase in their self-efficacy levels as a result of imagery training. All subjects reported an improvement in their overall ability to use imagery for the related task. The study also demonstrated that imagery enhanced self-efficacy for the dart-throwing task in subjects who were high ability imagers, had previous dart throwing experience, believed in imagery, as well as for subjects who had been previously exposed to relaxation and imagery procedures. In summary, the study demonstrated that improvements in self-efficacy and performance were found from the use of imagery.

Garza and Feltz (1998) explored the effectiveness of mental practice for improving figure skating performance, self-efficacy and self-confidence for competition. The study investigated female competitive figure skaters (N= 27) whose ages ranged from 10 to 18 years old (M= 12.37 years, SD= 2.19 years). The measures used to evaluate the effects of selected mental practice were the skaters' performance ratings, self-efficacy and self-confidence for competition subscale. The results illustrated that the self-efficacy for spins improved significantly with the mental

training program, while the efficacy for jumps and connecting moves did not show improvements. The study's results indicated that mental practice increased figure skating performance ratings and self-perceptions of performance.

A study conducted by Callow and Hardy (2001) aimed to assess whether or not confident athletes of different skill levels used different functions of imagery. The study also examined whether the use of cognitive specific imagery was related to sport confidence in team players. The study's participants included female netball players (N= 133) from four different countries. The participants were then split into two sample groups: sample one consisted of participants (n= 56) from the lowest ranked netball teams (M= 14.02 years, SD= 1.23 years) while sample two consisted of players (n= 68) from the two countries with the highest ranked teams (M= 16.6 years, SD= 4.6 years). The measures used included the Sport Imagery Questionnaire (SIQ) and the State Sport Confidence Inventory (SSCI). The analysis was conducted on subjects from sample one (n= 50) and subjects (n=60) from sample two. Results indicated that netball players of differing skill level use different functions of imagery. Lower skilled athletes with high confidence levels used more motivational general-mastery (MG-M) and cognitive general (CG) imagery, while less confident athletes used more motivational general-arousal (MG-A) imagery. Higher skilled athletes used more goal-oriented imagery (MS) compared to less confident athletes. The study identified that it may not be what was being imagined that influenced confidence but the function of imagery being imagined. This may be a possible explanation as to why both samples varied in the function of their imagery use. The study confirmed that skill level influences imagery use.

A study conducted by Short et al. (2002) eliminated both of the reoccurring limitations in the previous study. The study examined the interactions between two imagery functions (cognitive specific (CS) and motivational general-mastery (MG-M)) and two imagery directions (facilitative and debilitative) on self-efficacy and performance. The participants included volunteers (N= 83), males (n=47) and females (n= 36) (M= 21.44 years, SD= 1.95 years) recruited from two courses. The measures used in this study were the revised Movement Imagery Questionnaire (MIQ-R) and the Self-Efficacy Measure. The results supported the hypothesis that golfers that imagined themselves performing poorly (*debilitative imagery*) would negatively affect their performance and cause them to perform poorly. The study also hypothesised that those groups using motivational general-mastery (MG-M) imagery would experience larger gains in self-efficacy compared to those using cognitive specific (CS) imagery. This hypothesis was only partially supported, with males showing higher self-efficacy when using cognitive specific (CS) imagery whereas, females showed higher self-efficacy when using motivational general-mastery (MG-M) imagery. The findings suggest that further research is needed to determine whether *gender roles* affect imagery.

Beauchamp et al. (2002) investigated the relationship between self-efficacy, pre-competition imagery use and performance. The participants included male varsity golfers (N= 51) (M= 20.8 years, SD= 2.1 years) competing in a Canadian Provincial University Championship. A revised copy of the Sport Imagery Questionnaire (SIQ) and the Golf Self-Efficacy tool were used for data collection. The hypothesis was supported when athletes with high self-efficacy reported more frequent use of pre-competition motivational general-mastery (MG-M) imagery. Additionally, pre-

competition motivational general-mastery (MG-M) imagery use was also associated with successful golf performance.

Motivation

Imagery has also been shown to affect athlete's motivation, which has been linked to athletic success. Motivation has been defined as "*the direction and intensity of one's effort*" (Weinberg & Gould, 2003, p. 52).

Martin and Hall (1995) examined the use of imagery for enhancing intrinsic motivation. The researchers hypothesized that subjects who used imagery would have higher task specific self-efficacy than the control group. The subjects included volunteers (N= 39) from a university community, females (n= 24) and males (n= 15) (M= 27.23 years, SD= 5.6 years). The measures used included the Task Reaction Questionnaire (TRQ), the Physical Self-Efficacy Scale (PSES), the Task-Specific Self-Efficacy (TSSE), the Movement Imagery Questionnaire (MIQ) and the Manipulation Check. The subjects were randomly assigned to one of three groups: performance plus outcome imagery, performance imagery or a control group, with each group consisting of the same number of males and females. It was found that during the performance-oriented phase, subjects in the performance imagery group practiced more than subjects in the control group, yet the performance imagery group did not differ from the control group on self-efficacy. Subjects, who used imagery were found to set higher goals, had more realistic self-expectations and were more adherent to their training programs outside of the laboratory. The results supported imagery use to enhance motivation to practice and to persist in the face of adversity.

Cumming, Hall, Harwood and Gammage (2002) aimed to examine whether different motivational profiles reflects the use of different functions and amounts of imagery. Participants included male (n= 41) and female (n= 64) competitive swimmers (N= 105)(M= 14.2 years, SD= 2.46 years) who were evaluated using the Sport Imagery Questionnaire (SIQ) and the Task and Ego Orientation in Sport Questionnaire (TEOSQ). From the data, three cluster groups emerged; cluster one low-task/ moderate-ego, cluster two moderate-task/ low-ego and cluster three moderate-task/ high-ego. The results indicated that individuals with a balance between task and ego orientations were more motivated to use imagery and its functions to help maximize athletic performance.

In a supplementary study, Harwood, Cumming and Hall (2003) examined the motivational profiles of elite youth athletes to determine whether differences in goal orientations related to different levels of imagery. The participants included male (n=88) and female (n=202) elite British youth sport athletes (N= 290) (M= 16.6 years, SD= 1.48 years) across a broad range of sports including athletics (n=40), badminton (n=50), basketball (n=14), field hockey (n=17), football (n=48), goal ball (n=16), lacrosse (n=17), netball (n=16), rugby (n=42) and volleyball (n=30). The measures used included the Perceptions of Success Questionnaires (POSQ) and the Sport Imagery Questionnaire (SIQ). From the Perceptions of Success Questionnaires (POSQ), the athletes were classified under three clusters; lower task/ moderate ego, moderate task/ lower ego and higher task/ higher ego. The results demonstrated that the higher task/ higher ego cluster reported higher levels of imagery use across all functions of imagery. The results also demonstrated no significant differences between moderate task/ lower ego and lower task/ moderate ego athletes on any

imagery function. These findings contradicted the hypothesis that cognitive and motivational imagery functions would vary according to different task and ego orientation levels. If motivation affects imagery use, it is important to research how to increase motivation levels to increase performance.

Motor Skill Acquisition

The effects of imagery on motor skill acquisition and performance has been studied extensively. The main question explored in these studies is whether imagery training will enhance the learning and performance of a motor skill.

Ryan and Simons (1981) investigated two perceptual motor tasks across a cognitive motor continuum. Participants were placed in one of three treatment conditions: physical practice, mental practice and no practice. The subjects were male college students (N= 39) (age range and mean age were not provided). For the novel perceptual tasks, a stabilometer was used as well as a dial-a-maze. All subjects were tested on both motor tasks. The results showed that mental practice enhanced the motor task near the cognitive end of the continuum. Additionally, the results indicated that neither vividness nor controllability of images were significant factors in stabilometer performance. Furthermore, no conclusion was drawn regarding the frequency or quality of imagery needed to improve performance of motor skills. This study demonstrated the importance of the nature of the task on performance enhancement when using imagery.

The previous study's research findings were further investigated by Ryan and Simons (1982). This study explored the efficacy of mental imagery in enhancing mental rehearsal of motor skills. The subjects included male traffic officers (N= 80),

ranging in age from 23 to 57 years of age (M= 36 years). The task was to balance on the stabilometer. The results indicated that vivid images enhanced performance after mental rehearsal. Participants that reported stronger visual and kinesthetic imagery performed better, compared to those reporting weaker images. The mental rehearsal group improved performance more on the stabilometer compared to the no practice group.

Yamamoto and Inomata (1982) explored the effects of subjects' mental rehearsal, part or whole rehearsal on the acquisition of the back crawl swimming stroke. Undergraduate students (N= 36) (age range and mean age were not provided) were randomly assigned to one of three groups: mental rehearsal with a whole model demonstration (n= 12), mental rehearsal with a progressive part model demonstration (n= 12) and a control group (n= 12). The results concluded that physical and mental practice increased vividness and accuracy of imaging swimming the backstroke. The imager's acquisition rate was related to the learner's general ability to use imagery under the whole but not under the part modelling. The results also showed no difference between the two demonstrations on motor performance and imagery formulation in the acquisition of swimming skills.

A further study conducted by Lovell and Collins (1997) investigated the role of sex on the relationship between movement imagery ability and the rate of motor skill acquisition. The subjects included right-handed (N=28), males (n= 14) and females (n= 14) (M= 21.57 years, SD= 1.48 years) who were categorized as high or low imagers using the Movement Imagery Questionnaire (MIQ). The motor skill included reproducing a stimulus movement pattern that was presented on a computer monitor. The results indicated a positive relationship between imagery ability and

acquisition rate for males and a negative relationship for females, which diminished as practice continued. The results suggested that males and females used differing cognitive strategies when learning visual-spatial skills, which needed to be considered when new motor skills were learned through mental practice.

Lovell and Collins (2001) investigated the speed of image manipulation, imagery ability and motor skill acquisition. The subjects used in this study were male right-handed university students (N= 36) (M= 23.08 years, SD= 4.69 years). The measures used in this study were two different subscales of the Movement Imagery Questionnaire (MIQ). The results indicated that lower movement mental imagery groups' acquisition performance were negatively affected by time pressures as mental practice increased, compared to the higher movement mental imagery ability groups. The rate of image manipulation seemed to be the key factor in the relationship between imagery ability and acquisition rate. Motor skill acquisition and psychological skills were important during athletic competitions, to optimise performance.

Waskiewicz and Zajac (2001) examined the effect of mental training on skill acquisition in students (N= 36) (M= 22.6 years, SD= 1.9 years) from the Academy of Physical Education in Katowice. The subjects were randomly assigned into experimental groups: a mental-physical practice group or physical-practice groups. It was found that experimental groups that incorporated physical and mental practice performed significantly better on a balancing task. Additionally, the results demonstrated that mental practice allowed for a significantly faster rate of skill acquisition in the early stages of motor development.

Grouios et al. (1993) examined the effects of physical, mental and video-demonstration practice on the acquisition of skiing skills. The study hypothesized that the mental practice (MP) group and the video-demonstration practice (VDP) group would facilitate the learning of skiing skills by allowing the skier to make cognitive patterns of the correct movement. The participants included volunteer physical education students (N= 40), all of whom were novice skiers (age range and mean were not provided). The participants were randomly assigned to one of four experimental groups: physical practices (PP) (n= 10), mental practice (MP) (n= 10), video-demonstration practice (VDP) (n= 10) and no-practice (NP) (n= 10). The study's results supported the hypothesis that MP and VDP can positively affect the learning of skiing skills. The PP group had superior performance to both the MP and VDP, demonstrating that actual practice enabled the performers to identify and establish correct movement patterns. The study also found that MP was superior to VDP, indicating that imagery facilitated the learning of movement patterns necessary for actual performance.

Anxiety and Arousal Control

Anxiety, defined as "*a negative emotional state characterized by nervousness, worry and apprehension and associated with activation or arousal of the body*" (Weinberg & Gould, 2003, p. 79). Anxiety is a prevalent issue in sports and can negatively influence athletic performance. Excessive anxiety is detrimental to performance causing muscle tension and distracting thoughts and cognitions (Weinberg & Gould). Imagery has been proposed to be an effective strategy for controlling competitive anxiety.

Vadocz et al. (1997) examined if there was a relationship between imagery use and competitive anxiety. A secondary purpose examined the relationship between imagery use and imagery ability. The researchers hypothesized that the motivational use of imagery would be related to competitive anxiety. It was also hypothesized that athletes with greater imagery ability would utilize imagery more than those with lower imagery ability. The subjects were male (n= 34) and female elite roller skaters (n= 23), ranging in age from 12 to 18 years of age (M= 15.39 years, SD= 1.58 years). The measures used were the Competitive State Anxiety Inventory-2 (CSAI-2), the Sport Imagery Questionnaire (SIQ) and the Revised Movement Imagery Questionnaire (MIQ-R). The results indicated that athletes using motivational general-arousal (MG-A) imagery experienced higher levels of cognitive anxiety. Moreover, athletes with higher self-confidence levels used motivational general-mastery (MG-M) imagery. This study demonstrated that imagery use could decrease or increase cognitive anxiety levels depending on the function of imagery used. This had a significant implication on imagery use, since most of the research had demonstrated that imagery use decreased anxiety levels. Further research was suggested to investigate and confirm whether or not the function of imagery did significantly affect the levels of anxiety.

Lee and Hewitt (1987) examined female gymnasts who were high and low in *facilitative anxiety* and who were classified at either a beginner or intermediate competitive performance skill. They were each assigned to one of the treatment conditions. The three treatment groups were visual imagery practiced while on a mat, visual imagery in a floatation tank or a control group. The subjects were female gymnasts (N= 36), ranging in age from 9 to 17 years of age (no mean provided). The

researchers used an adapted version of the Alpert and Haber's Achievement Anxiety Test to apply to gymnastics. The results indicated that the subjects in the floatation tank treatment condition had the best performance scores and the best health record of the three treatment groups.

A study conducted by Cai (2000) investigated the effects of *guided imagery* on college students' anxiety and depression levels. The subjects consisted of college (N= 71) students, females (n= 42) and males (n= 29) (age range and mean age were not provided). Three treatment groups were investigated: group one experienced guided imagery (n= 18), group two's treatment was tai chi chuan (n= 18) and the third group was the control group (n=35). Tai chi chuan and guided imagery had a positive influence on students' anxiety and depression levels.

Internal and External Imagery

Research has explored *internal* and *external imagery* on athletic performance. Studies have looked at whether internal or external imagery is better for learning different skills (cognitive or motor) and whether imagery perspective produces greater EMG recordings. Slade, Landers and Martin (2002) examined muscular activity during imagery and found that EMG recordings of muscular activity increased significantly from the baseline measures. Therefore, it was accepted that internal and external imagery can produce significant increases in muscular activity levels, however it is unknown which imagery perspective was more effective at producing higher levels of EMG activity.

Harris and Robinson (1986) investigated whether muscular innervations during imagery were specific to those muscles needed for actual performance. The

study also examined whether imagery perspective, internal or external, affected the amount of muscle activity in individuals of different skill levels. The subjects that participated in the study were beginner (n= 18) and advanced karate (n= 18) students (N= 36) (age range and mean age were not provided). The results of this study indicated that advanced athletes elicited greater amounts of EMG activity when compared to beginner athletes, demonstrating that advanced athletes produce more muscular efference during imagery and were better able to follow imagery instructions. Moreover, higher levels of EMG activity were noticed during internal imagery compared to external imagery, although the differences were not significant. The results demonstrated that the skill level of athletes affected the degree to which the muscles were activated during imagery. In the study, athletes acknowledged switching back and forth between internal and external imagery, making it difficult to examine the effects of one perspective alone, possibly affecting the study's results.

Glisky et al. (1996) explored two variables that contributed to the efficacy of mental practice, imagery perspective (internal or external) and task type (kinesthetic and visual). Additionally, the study examined how subjective ratings of kinesthetic and visual images differed depending on the imagery perspective and tasks. The study hypothesised that the use of internal imagery would result in the greatest improvement on the motor/kinesthetic task and that there would be no difference between internal and external imagery on the cognitive/visual task. The subjects were undergraduate students (N= 42) (age range and mean age were not provided). The participants were assigned to either an external (n= 21) or an internal imagery group (n= 21). The subjects completed the Imagery Assessment Questionnaire to determine which type of imagery each subject preferred, prior to place them into groups. The

results indicated that the external imagery group on the motor task and the internal imagery group on the cognitive task differed significantly on performance from the control group. The hypothesis was not supported, since external imagery produced greater results on the motor task, which was not predicted. As well, internal imagery produced greater results on the cognitive task, which was also not predicted. Since the hypothesis for this study was not supported, future research was suggested to evaluate the use of internal and external imagery on different types of performance tasks.

Hardy and Callow (1999) examined the efficacy of different imagery perspectives on the performance of tasks where form was important. The first experiment looked at experienced male (n= 17) and female (n= 8) karate athletes (N= 25) (M= 24.95 years, SD= 6.29 years) learning a new kata, utilizing either internal, external imagery or stretching. The results indicated that external imagery lead to greater performance increases compared to internal imagery when form was important. The second experiment examined the manipulation of both visual imagery and kinesthetic imagery on the effects of internal and external imagery when combined with kinesthetic imagery. The subjects were sport, health and physical education degree students (N= 76) (age range and mean were not provided). The third experiment replicated the second experiment by using male expert rock climbers (N= 20) (M= 23.35 years, SD= 3.54 years). The results from these three experiments strongly supported the proposed hypothesis that external imagery was superior to internal imagery for the acquisition and performance of tasks that relied heavily on form for success. Results from experiment two identified that kinesthetic imagery may only be beneficial to experienced performers. Experiment three identified that

the combination of kinesthetic and external imagery can be beneficial to performance. Imagery was not only used to enhance skill execution imagery, it was also used to control psychological aspects of sports performance.

Overview: Gender Differences

Gender differences have been studied extensively in sport psychology, and studies have found differences between males and females in a number of different areas related to sport and everyday life. The number and extent of gender differences, the nature of the differences, and the reasons for their existence is still under ongoing investigation (Talbert Johnson, Cartledge & Fellows Milburn, 1996). A number of the gender differences discussed in this chapter are socially created, through societal views of what is acceptable behavior and beliefs for males and females. Gender differences have been demonstrated in a variety of contexts, including aggression (Archer et al., 1988; Bettencourt & Miller, 1996; Gladue, 1991; Graham et al., 2004; Henning & Feder, 2004; Hubbard, 2001; Knight et al., 1996; Knight et al., 2002; Krakowski & Czobor, 2004; Liu & Kaplan, 2004; McCann et al., 1987; McKenzie et al., 1993; Nixon II, 1997; Ostrov & Keating, 2004; Rys & Bear, 1997; Salmivalli & Kaukiainen, 2004; Tapper & Boulton, 2004; Towson & Zanna, 1982; Tucker & Parks, 2001; Zeichner et al., 2003), self-confidence and self-efficacy (Clifton & Gill, 1994; Corbin, 1981; Godin & Sheppard, 1985; Jones et al., 1991; Lirgg, 1991; Vealey, 1988), perceptions and attitudes (Barber, 1998; Borman & Kurdek, 1987; Brenner & Cunningham, 1992; Carvalho et al., 1990; Croxton et al., 1987; Dixon, 2002; Hayes et al., 1999; Lintunen, 1998; Luke & Sinclair, 1991; Malcolm & Mobily, 1990; Shapiro & Ulrich, 2002; Shropshire et al., 1997), coaching (Barber, 1998; Eitzen &

Pratt, 1989; Everhart & Chelladurai, 1998; Marback, Short, Short & Sullivan, 2005; Pastore, 1992; Pastore & Judd, 1993; Robinson, Tedrick, Carpenter, 2001), motor skills (d'Arripe-Longueville et al., 2002; Garcia, 1994; Greenwood, Larkin & Parker, 1997; Meeuwsen & French, 1993; Thomas & French, 1985; Toole & Kretzschmar, 1993), leisure activities (Bruce & Johnson, 1996; Carvalho et al., 1990; Kirkcaldy & Athanasou, 1995; Malcolm & Mobily, 1990; Philipp, 1998), body image and eating behaviors (Brenner & Cunningham, 1992; McDonald & Thompson, 1992), patterns of knowledge and learning (Honigsfeld & Dunn, 2003; Rosén, 1995; Rosén, 1998; Sizoo, Malhotra & Bearson, 2003), gambling (Hraba & Lee, 1996; McDaniel & Zuckerman, 2003; Potenza, Steinberg, McLaughlin, Rounsaville & O'Malley, 2001), memory (Colley, Ball, Kirby, Harvey & Vingelen, 2002; Guillem & Mograss, 2005; Lowe, Mayfield & Reynolds, 2003; Pillemer, Wink, DiDonato & Sanborn, 2003), motivation (Amorose & Horn, 2000; Flood & Hellstedt, 1991; Gernigon et al., 2003; Lee et al., 1999), role stress and coping (Anshel et al., 1997; Crocker & Graham, 1995; Hammermeister & Burton, 2004; Kolt et al., 1995; Madden & Kirkby, 1995; Smallman et al., 1991), and personality (Bourke, 2002; Costa, Terracciano, & McCrae, 2001; Fehr & Broughton, 2001; Fernández-Aranda et al., 2004). Considerable research has been conducted on a wide array of gender topics, and it is beyond the scope of this study to provide a comprehensive review of every study conducted, therefore only topics that are specifically relevant to the present study will be discussed. The following review will examine the impact of gender differences in relation to sport by discussing sport participation motives and imagery. An overview of the theoretical framework related to gender differences will also be presented and

the chapter will conclude with a summary of the main issues related to gender differences in imagery.

Theoretical Framework for Gender Differences

Several gender theories have been introduced to explain the development of gender differences. The theories introduced to explain gender differences include biological theories, cognitive theories, social learning theories and social psychological theories of gender. It is beyond the scope of this thesis to explore all the theories related to the development of gender, therefore the gender theory which is relevant to the thesis will be discussed extensively, specifically Bandura's (1977) Social Learning Theory.

Biological gender theories identify that gender differences are innate, such as genes, hormones and several physical characteristics. Biological theories to some degree depict that individuals are born either male or female (Lippa, 2002). Cognitive theories of gender view gender development as not just a matter of genes, hormones and social conditioning, but as a cognitive process, which occurs in the mind (Lippa). Social psychological theories of gender focus on the current social setting and its effects on behavior. Emphasis within social psychological theories of gender are placed on how *gender stereotypes* and role beliefs affect people's interactions and behaviors, and particularly how this leads to a self-fulfilling prophecy (Lippa).

Social learning theory emerged as a dominant approach to understanding sex-role socialization (Bandura, 1977). The Social Learning Theory emphasizes the importance of observational learning, reinforcement and punishment, modelling and classical conditioning, on the development of learning gender-related thinking, gender

development and gender standards. In order to understand the Social Learning Theory, it is important to discuss Skinner's (1950) traditional view of learning, principally operant conditioning, which focuses on learning and behavior modification through reinforcement and punishment. Social Learning Theory views gender and gender development as a learned behavior, where social interactions and observation serve as tools for learning. Observations of models, particularly same-sex models, provides individuals with opportunities to learn specific gender related behaviors appropriate for boys and girls (Brannon, 2002). Traditional sex-roles are also reinforced through role models, such as parents, peers, the media, athletes, teachers and coaches (Trew & Kremer, 1998). Learning behaviors results from observing punishment and rewards. Any behavior which is rewarded is likely to be repeated, while any behavior that results in punishment, will be avoided (Weinberg & Gould, 2003). In general, Social Learning Theory explains how individuals learn to identify themselves as male or female, through the observation and modelling of daily social influences (Brannon).

Related to with Bandura's (1977) Social Learning Theory is how individuals are socialized into sport participation, as well as socialization through sport. *Sport socialization* is defined as "*the study of factors that contribute to one's initial engagement, persistence and intensity of involvement in sport...*" (Dubois, 1990, p. 4). Socialization is an interactive process between a teacher and a learner, where important cultural and behavioural content is passed on from one generation to the next (Greendorfer & Hasbrook, 1991). The three main elements of socialization include, significant others, who serve as role models, social situations, and role learners (Luschen & Sage, 1981). Family members, particularly parents, play an

important role in providing children with gender appropriate sporting opportunities, shaping sporting beliefs, maintaining sport involvement and influencing withdrawal from sport. (Greendorfer, 1980; Greendorfer, 1983; Greendorfer, 2002). Other social factors which have an affect on learning sport roles, include particularly same-sex peers, parents, teachers, athlete role models and coaches (Greendorfer & Ewing, 1981). Socialization into sport examines how social influences affect individuals' choices and sport participation.

Research in the area of socialization in sport seeks to understand how social factors affects sports participation, frequency, duration and intensity of involvement (Greendorfer, 2002). It is also important to also understand how socialization occurs through sport. Socialization through sport is defined as *"...the analysis of the value, attitudinal and/or behavioural consequences of sport involvement"* (Dubois, 1990, p. 4), and is thought to be an essential component to the overall socialization process, where sport participation allows learning of socially appropriate behaviors, including global values and behavior outcomes, such as leadership, competition, character development and cooperation and sport organizational structures (Greendorfer).

In summary, the many explanations and theories of how gender is created demonstrates that gender is complex, involving biological, social psychological and social factors. The following section will review the research that has been conducted on gender differences in sport, and will include the subtopics of sport and exercise participation motives and gender differences in imagery use. A summary will follow the review of literature.

Gender Research in Sport

Gender Differences in Imagery Use

Through extensive research, imagery has been demonstrated to be an effective performance enhancement tool for athletes. However, to date, few research studies have examined the impact of gender on overall imagery ability, frequency of use and function. Overall, the research studies that have examined gender differences in imagery use have found some gender differences, which are worth further exploration (Barr & Hall, 1992; Cumming & Hall, 2002; Gammage et al., 2000; Weinberg et al., 2003).

A study conducted by Weinberg et al. (2003) explored the relationship between the use and effectiveness of imagery. The study's purpose was threefold. The study attempted to enhance the Sport Imagery Questionnaire (SIQ) by adding an effectiveness component, to assess when and under what conditions athletes use imagery and to analyze the impact of gender and type of sport on athletes imagery use. The participants included male (n=241) and female (n=282) NCAA Division I athletes (N=523) competing in individual or team sports. The participants ranged in age from 19 to 24 years of age (M= 19.3 years, SD= 2.1 years). The research found that athletes used imagery primarily before competition. Imagery was also found to be used to deal with high-pressure difficult situations. The results of the study revealed that there were significant gender differences. Male athletes were found to use imagery more frequently and to view imagery as being more effective when compared to female athletes. Also, male athletes felt that the cognitive specific (CS) function of imagery was more effective than did female athletes. Overall, the study

identified that significant gender differences existed in athletes' frequency of use and also in the perception of imagery's effectiveness.

A study conducted by Barr and Hall (1992) further examined gender differences. The study examined imagery use by high school, college and national team rowers. Specifically, the study investigated gender and age differences in imagery use, the affect of other mental training techniques on the use of imagery and differences in imagery use between novice and elite rowers. Participants included male (n= 211) and female (n= 137) rowers (N= 348), ranging in age from 15 to 54 years of age (M= 21.7 years), who represented 23 clubs from Canada and 15 from the United States of America. Participants completed the Imagery Use Questionnaire (IUQ) to examine rowers use of imagery. The results of the study identified that the age of the rowers was related to their level of competence and number of years of rowing. Older and more experienced rowers incorporated significantly more feeling (kinesthetic feel) in their imagery use compared to younger rowers. Less experienced rowers utilized more of an external visual imagery perspective compared to older, more experienced rowers. Gender differences were also established with women in the study tending to have rowed longer and at a higher level compared to the men in the sample, this may potentially explain women's greater reported use of imagery. Men were found to have better control of their external imagery and also had more vivid internal imagery compared to females. Interestingly, results indicated that rowers who utilized other mental training techniques also utilized more imagery. Generally, the results revealed that gender, age and level of competence affect the use of imagery in rowers.

Cumming and Hall (2002) examined the influence of competitive level on athletes' use of imagery in the off-season. The first purpose of the study was to examine the functions of imagery (CS, CG, MS, MG-M and MG-A) used by athletes during the off-season. The secondary purpose was to examine the influence of gender and competitive level on imagery use during the off-season. The final purpose was to examine whether athletes' imagery use was related to the amount of physical and technical preparation during the off-season. Participants included athletes (N= 324), males (n= 186) and females (n= 138), ranging in age from 17 to 31 years of age (M= 21.38 years, SD= 2.06 years) who participated in ten different sports; basketball (n=52), baseball (n=22), field hockey (n=24), football (n=41), hockey (n=36), rowing (n=21), rugby (n=28), soccer (n=47), swimming (n=27) and volleyball (n=26). The instruments used included the modified Sport Imagery Questionnaire (SIQ-Off-Season). Additionally, participants were asked to rate to what degree they were physically and technically preparing for the upcoming season. Results identified that higher-level athletes indicated using more imagery, regardless of the function when compared to lower level athletes, possibly reflecting their greater commitment to the sport. Athletes also identified that they engaged in both physical and technical preparation during the off-season. The research also identified that athletes reported using motivational general-mastery (MG-M) the most, followed by cognitive specific (CS). In this study, a significant gender difference was found for the use of motivational specific (MS) imagery, with males using more of this function of imagery when compared to females. A limitation of this study was that the study did not account for whether athletes were early or late into their off-season or the length of their off-season. This may have affected the amount of imagery used and the

amount of time spent preparing for the upcoming season, which could potentially have a significant affect on the results of this study.

Gammage et al. (2000) examined *exercise imagery*. The study aimed to examine the cognitive and motivational roles of exercise imagery, and how these roles vary with gender, frequency of exercise, and activity type. The study hypothesized that high frequency exercisers would use more imagery compared to low frequency exercisers. It was also hypothesized that imagery use would differ depending on the type of exercise activity that participants engaged in. Participants included male (n= 264) and female (n= 312) exercisers (N= 577) (M= 22.22 years, SD=4.54 years). Participants' physical activities included weight training (n=248), aerobic exercise classes (n=114), running (n=119), cardiovascular equipment (n=111), swimming (n=23) and individual and/or team recreational activities (n=23). Imagery use was assessed using the Exercise Imagery Questionnaire (EIQ), which evaluates the primary uses of exercise imagery: appearance, energy and technique. The study's findings demonstrated that the three variables, gender, frequency, and activity types significantly influenced exercise imagery use. Regardless of gender, frequency or type of activity examined, all participants showed the same pattern of results, with appearance imagery being used most often, followed by technique and then energy imagery. Findings also indicated that gender influenced exercise imagery use. As hypothesized, women used appearance imagery more frequently than men did. Men reported using more technique imagery compared to women. There were no differences in men and women's use of energy imagery. Also, as hypothesized, high frequency exercisers used all three types of imagery more compared to their low frequency counterparts. Differences in imagery were additionally found regarding the

type of activity, supporting the third hypothesis. Runners used less appearance imagery, while weight training exercisers used significantly more technique imagery. The study's limitations included the fact that some of the results were based on relatively small sample sizes. In addition, participants were asked to list their primary activities, and they were allowed to list as many as they wished; yet individuals who listed multiple activities were excluded from the study. The exclusion of these participants may have influenced the results.

Gender Differences in Exercise and Sport Participation Motives

An individuals' sport participation is strongly influenced by social factors such as family, peers, teachers, and community, otherwise known as socialization into sport (Greendorfer & Ewing, 1981). Specifically, socialization in sport is defined as "*the study of factors that contribute to one's initial engagement, persistence and intensity of involvement in sport, or the analysis of the value, attitudinal and/or behavioural consequences of sport involvement*" (Dubois, 1990, p. 4).

Greendorfer and Ewing (1981) examined race and gender differences in children's socialization into sport. The study explored five hypotheses, two of importance to the current research project. It was hypothesized that white males would be more influenced by their fathers and teachers, while white females would be more influenced by their peers. It was hypothesized that regardless of race, males would value sport more compared to females. The participants (N= 413) included black (n= 46) and white (n= 147) males, and black (n= 69) and white females (n= 153), ranging in age from 9 to 12 years of age (mean age was not provided). The findings indicated that race and gender play a significant role in socializing children

into sport. The study's hypothesis could not be verified, since white males did not receive stronger influence from teachers compared to white females and white females did not receive stronger peer influence. The second hypothesis was not supported, in that values toward sport were identified to be more significant for black individuals regardless of gender rather than for males regardless of race. The results established that gender differences appear to be a function of same-sex agents of socialization.

Borman and Kurdek (1987) investigated school, grade (freshman and sophomore vs. junior and senior), and gender differences associated with participation in high school varsity soccer. The participants included students (N= 65) from two high schools. The first high school's participants included male (n= 20) and female (n= 15) students with a long involvement in soccer. The second high school's participants included male (n= 16) and female (n= 14) students on teams with spotty records (age range and mean age were not provided). The study's results revealed that for boys, overall motivation to play soccer was related to valuing academics, participating on a varsity athletic team, and getting into college/university, whereas girls' involvement in soccer was associated with valuing having a lot of friends. Generally, soccer involvement for boys was connected to low personal stress, while girls' involvement was related to high personal stress. For boys, extensive soccer knowledge was associated with greater empathy, while girls knowledge was non-significantly related to empathy. Occupational interests were affected by soccer involvement for both genders. Girls' involvement in sports related to an interest in sports, business/management, office work, sales, computational, skilled trade and social service occupations. Boys who valued interpersonal interactions were

disinterested in farming and labour occupations. Boys who valued competition were disinterested in biological science occupations but were interested in sports occupations. Finally, boys who valued athletic facets were interested in sales and computational occupations but not in farming or ranch work, social service or labour occupations. Boys with extensive soccer knowledge tended to devalue ethics/morality, while girls devalued future preparation. Soccer participation for boys resulted in a concern for academics, a focus on preparation for the future and a disinterest in ethical/moral issues. For girls, soccer represented an interpersonal focus, and an opportunity to learn empathy. The results revealed that soccer participation had different meaning and value for boys and girls.

Dubois (1990) examined gender differences in value orientation towards sports. The purpose of the study was twofold. The first purpose was to overcome methodological weakness in most socialization studies, while the second purpose was to extend the research on gender differences in value orientations from sport participation. The study's participants included males (n= 61) (M= 8.5 years) and females (n= 49) (M= 8.3 years) who participated in two separate soccer programs for 8 to 10 year olds. Data was collected using a 13-item interview protocol, which dealt with sport value orientations including winning, game etiquette, personal performance, affiliation, competing, having fun, playing time and social status. The results revealed that by the end of the season, males regarded winning as significantly more important compared to females. The results identified that gender affected athletes' value orientations towards sports. Male athletes were implanted with the message from adults that winning is the only thing, while females were delivered the message that winning is of little importance.

Similarly, Gill (1988) examined gender differences in competitive orientation and sport participation. Gender differences were explored by using three separate samples. The first sample included males (n= 110) and females (n= 108) enrolled in competitive and non-competitive activities classes. The second sample included male (n= 126) and female (n= 140) high school students (N= 266) in grades nine through 12. The third sample included male (n= 34) and female (n= 52) university students (N= 86) who were enrolled in a summer session physical activity skills class. The study's results revealed that there were consistent gender differences in achievement orientation. Across all sample groups males had higher scores on competitiveness and win orientation toward sport compared to females. Females scored just as high on sport orientation as males, and in some cases higher for goal orientation. These results suggested that females were just as likely to value achievement and enjoy sport, however they are less interested in competition and winning and more interested in achieving personal goals.

Summary

The reviewed studies provide an understanding of the research and the body of knowledge available on imagery and its benefits to athletic performance, as well as gender differences and their effects on sport participation motives. The review highlighted the impact that imagery has on performance and the impact that gender has on cognitive and behavioural aspects of sport.

Although imagery has been studied extensively, some gaps still exist in the research. A major inadequacy exists in the imagery research with regards to whether possible gender differences exist. The few studies that have examined gender

differences in imagery have found minor differences, which could impact athletes' imagery ability, frequency of use and function.

Overall, imagery research had found some minor gender differences in imagery use in athletes (Cumming & Hall, 2002; Barr & Hall, 1992; Gammage et al., 2000; Weinberg et al., 2003). Further studies have also found gender differences, which were so minor that gender was not included as a variable for statistical analysis (Salmon et al., 1994; Munroe et al., 1998 as cited in Hall, 2001). With few imagery studies examining gender differences, it is important to fully explore the extent and impact of gender differences on overall imagery use. Therefore, this exploratory study will examine whether there are gender differences in imagery ability, frequency of use and function. Fully understanding gender differences in athletes' imagery ability, frequency of use and function will allow for the development of specialized imagery training programs aimed at helping all athletes reach their athletic potential.

The following chapter will discuss the methodology employed within this exploratory study.

CHAPTER III

METHODOLOGY

Overview

The previous chapter reviewed the literature and research available on gender differences in imagery ability, frequency of use and function, as well as providing an overview of the theoretical framework that will be used to examine and analyze this topic.

The following chapter describes and outlines the methodology used in this research study. The chapter is divided into several sections including research design, participants, data collection, instruments, coding and data analysis. This chapter concludes with a summary.

Research Design

To study gender differences in imagery ability, frequency of use and function, the study employed a two by two research design.

The main purpose of this study was to investigate gender differences in imagery ability, frequency of use and function in varsity athletes, and therefore will be descriptive and exploratory.

Participants

The study's participants consisted of varsity athletes (N= 51), males (n= 30) and females (n= 21), who competed in the 2004-2005 AUS season for Memorial University of Newfoundland. In particular, the participants competed in two varsity

sports, basketball (n= 25) and volleyball (n= 26), with a mean year of eligibility of 2.06 years (SD= 1.10 years). Specifically, the sample consisted of male basketball (n= 16), female basketball (n= 9), male volleyball (n= 14) and female volleyball (n= 12) players. The participants' ages ranged from 17 to 26 years of age (M= 19.8 years, SD= 1.66 years). Specifically, male participants age ranged from 18 to 26 years of age (M= 20.10 years, SD= 1.77 years), while female athletes ranged in age from 17 to 22 years of age (M= 19.38 years, SD= 1.43 years). All of the participants volunteered to be involved in the study and were informed of the general purpose of the study prior to participation.

Ethics Approval

The study entitled "Gender Differences Among Varsity Basketball and Volleyball Players in Imagery Ability, Frequency of Use, and Function" received ethics approval from Memorial University of Newfoundland's Interdisciplinary Committee on Ethics in Human Research on June 25, 2004.

Data Collection

A letter describing the purpose and the procedure of the study was forwarded to the coaches of varsity teams from Memorial University of Newfoundland. The sports teams that were approached about participating in the study included the swimming, basketball, volleyball, cross-country, soccer and the wrestling teams. The letter requested the coaches' permission for the investigator to meet with their athletes to explain the study and request athletes' involvement (Appendix 1). The male and

female volleyball and basketball teams expressed a willingness to participate in the study.

Upon varsity coaches' expressing an interest in participating in the study, they were contacted to arrange a meeting time with their respective team. The meeting was for athletes only and the coaches were not present. Specifically, the purpose of the meeting was to provide athletes with information about the purpose of the study and request their participation. Athletes were advised that the study was being conducted as part of a master's thesis at Memorial University of Newfoundland. At the meeting, each athlete received an Information Letter (See Appendix 2) outlining the study in detail, as well as the questionnaire package. The information letter informed the athletes that their participation was voluntary and that they could withdraw from participating if they wished. The study did not utilize consent forms; participants were informed that completion of the questionnaire indicated that they were consenting to participate in the study. Additionally, athletes were informed that they would not be penalized should they decide not to participate in this study. The Information Letter also included contact information should participants have any questions or concerns regarding their participation in the study.

Each willing participant was then instructed to complete the questionnaires in the questionnaire package, which included the two separate Sport Imagery Questionnaires and the Demographic Information Form. The Demographic Information Form was used to collect background information that included age, gender, ethnicity and general imagery information. The two Sport Imagery Questionnaires (SIQ) were administered to determine the participant's imagery ability and the functions of use. The questionnaires were completed with the researcher in

attendance to answer any questions or concerns about the questionnaires or the research study in general. Participants were instructed to complete the questionnaires independently. Following the completion of the questionnaires, the participants were instructed to return the questionnaires to the researcher in an attached envelope, to ensure that confidentiality and anonymity was maintained.

Instruments

This quantitative study included the administration of two independent Sport Imagery Questionnaires and a Demographic Information Form (See Appendix 3). Permission to administer these Sport Imagery Questionnaires was received from Human Kinetics Publishers (SIQ-2) (Martens, 1982) and from the authors of the questionnaire (SIQ-1) (Hall et al., 1998). Written permission to copy and administer this scale was granted prior to the distribution of the questionnaires (See Appendix 4).

The first Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) was designed to evaluate athletes' use of the different imagery functions (Appendix 5). The Sport Imagery Questionnaire (SIQ-1) (Hall et al.) is a 30-item self-report instrument that asks participants to rate on a 7-point likert scale (1= *rarely* and 7= *often*) how often they utilize the five different functions of imagery (subscales): cognitive general imagery (CG), cognitive specific imagery (CS), motivation general mastery imagery (MG-M), motivation general arousal imagery (MG-A) and motivation specific imagery (MS). Each of the five subscales contains six items. Factor analysis supported the five-factor structure of the instrument and inter-scale correlations were shown to be low to moderate (-0.45 to 0.32), demonstrating that the functions of imagery are related but independent of one another. The Sport Imagery Questionnaire

(SIQ-1) internal consistency estimates for its subscales, ranges from .70 to .88 (Hall et al., 1998).

The second Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) was administered to evaluate the athletes' imagery ability (Appendix 6) and was minimally revised by the researcher to be volleyball and basketball specific. The revisions made to the questionnaire were reviewed and approved by the thesis supervisor. This questionnaire is designed to measure ability related to the vividness of the images, controllability of images, mood/emotions, kinesthetic feel and sounds. The revised version of the Sport Imagery Questionnaire (SIQ-2) (Martens) described four sport specific scenarios and asked the participant to visualize each and then rate how well they imagined the scenario on a 5-point likert scale (1= *very poor* to 5= *very well*).

The demographic form was created by the investigator and requested general information about the participants such as age, gender, year of Canadian Interuniversity Sport (CIS) eligibility, ethnicity, imagery experience and use.

Coding

Completed questionnaires were coded by the investigator and entered into the Statistical Packages for the Social Sciences, SPSS version 11.0 for Windows. To minimize human error in the data entry process, the investigator entered all the items into SPSS and verified them on two separate occasions, to ensure that the data had been entered correctly.

The responses on the demographic questionnaire which were not numerical, such as sport, ethnicity, imagery use, age the athlete started using imagery, when the

athlete was most likely to use imagery and how often they used imagery were assigned a numerical value. For example, gender was coded for data entry, "male" was assigned the value 1 and "female" was assigned the 2.

Data Analyses

The scores of the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) was calculated within each of the five subscales: cognitive specific (CS), cognitive general (CG), motivational specific (MS), motivational general-mastery (MG-M) and motivational general-arousal (MG-A). The responses for individual items within each subscale were totalled and a mean was established, with a maximum possible score of 7.0. A total mean score for all the subscales was also calculated to determine athletes overall imagery use. A high score demonstrated a high frequency of use, whereas a low score indicated minimal use of the particular imagery function. It is important to note, that the Sport Imagery Questionnaire (SIQ-1) (Hall et al.) does not take into consideration an individual's ability to image, and only examines the functions of imagery used.

The Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) was used to assess athletes overall imagery ability. This questionnaire is scored by adding all of the individual items within each of the five subscales together. The minimum possible score for each of the subscales is 4.0 and the maximum score is 20.0. A total score was also tabulated by adding each of the subscale scores together to assess athletes overall imagery ability. A higher score on each of the five subscales of the Sport Imagery Questionnaire (SIQ-2) (Martens) indicates a high imagery ability, whereas a low score on the subscales indicates a low imagery ability.

Analysis of the data was conducted using SPSS 11.0 for Windows. Demographic data were analyzed using descriptive statistics, as well as descriptive crosstabs. Descriptive statistics were also calculated for each of the five subscales of the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) and for the five subscales of the Sport Imagery Questionnaire (SIQ-2) (Martens, 1982), as well as the means and standard deviations. Two-way Analysis of Variance (ANOVA) were performed on each of the subscales and the total scores or averages on the Sport Imagery Questionnaires by gender and sport. The significant main and interaction effects will be presented in the following chapter. Given the exploratory nature of the study, the level of significance was set at a liberal alpha level of $p < .10$.

Summary

Chapter three has outlined the methodology employed in the thesis "Gender Differences Among Varsity Basketball and Volleyball Players in Imagery Ability, Frequency of Use, and Function". This chapter has also described the participants and the procedures that were used in the study. Additionally, this chapter discussed the instrumentation used, data collection and data analysis.

Chapter four will present the results obtained from this thesis study. The three research questions outlined in Chapter one will be answered, specifically: (1) Do gender differences exist in varsity athletes' imagery ability, (2) Do gender differences exist in varsity athletes' frequency of imagery use and (3) Do gender differences exist in the function of imagery used by varsity athletes?

CHAPTER IV

RESULTS

Introduction

This study examined gender differences in imagery ability, frequency of use and function in varsity basketball and volleyball athletes. The collected data may assist sport psychologists, coaches, athletic trainers, and in general, the sporting world, to develop gender appropriate imagery-training programs. Specifically, the purpose of the study was to examine whether gender differences exist in imagery ability (vividness, clarity of sounds, kinesthetic feel, emotional state, controllability of images), frequency of use and function (CS, CG, MS, MG-M and MG-A).

This chapter begins with a demographic description of the participants. It also provides a description of the participants through a discussion of the demographic variables, and presents descriptive statistics, specifically means, standard deviations, and frequencies for various behaviours explored, including previous imagery use, the age participants started using imagery, frequency of imagery use, and situations when participants used imagery.

Two-way Analysis of Variances (ANOVAs) were performed on each of the imagery subscales and totals or averages for the two Sport Imagery Questionnaires by gender and sport. The significant main effects will be identified and interaction effects will be presented. The chapter concludes by presenting the relationships between gender and imagery ability, frequency of use and function.

Demographic Variables

The study's participants consisted of varsity athletes (N= 51), males (n= 30) and females (n= 21), who competed in the 2004-2005 Atlantic University Sport (AUS) season for Memorial University of Newfoundland. The participants competed in two varsity sports, basketball (n= 25) and volleyball (n= 26), with a mean year of eligibility of 2.06 years (SD= 1.10). Specifically, the sample consisted of male basketball (n= 16), female basketball (n= 9), male volleyball (n= 14) and female volleyball (n= 12) players.

The participants' ages ranged from 17 to 26 years of age (M= 19.8 years, SD= 1.66). Of all the participants, 35.3% (n= 18) were 20 years of age, 23.5% (n= 12) were 18 years of age, 15.7% (n= 8) were 19 years of age, 9.8% (n= 5) were 21 years of age, 7.8% (n= 4) were 22 years of age, 3.9% (n= 2) were 23 years of age, 2.0% (n= 1) were 17 years of age and 2.0% (n= 1) were 26 years of age. (See *Figure 1*). Specifically, male participants age ranged from 18 to 26 years of age (M= 20.10 years, SD= 1.77 years), while female athletes ranged in age from 17 to 22 years of age (M= 19.38 years, SD= 1.43 years).

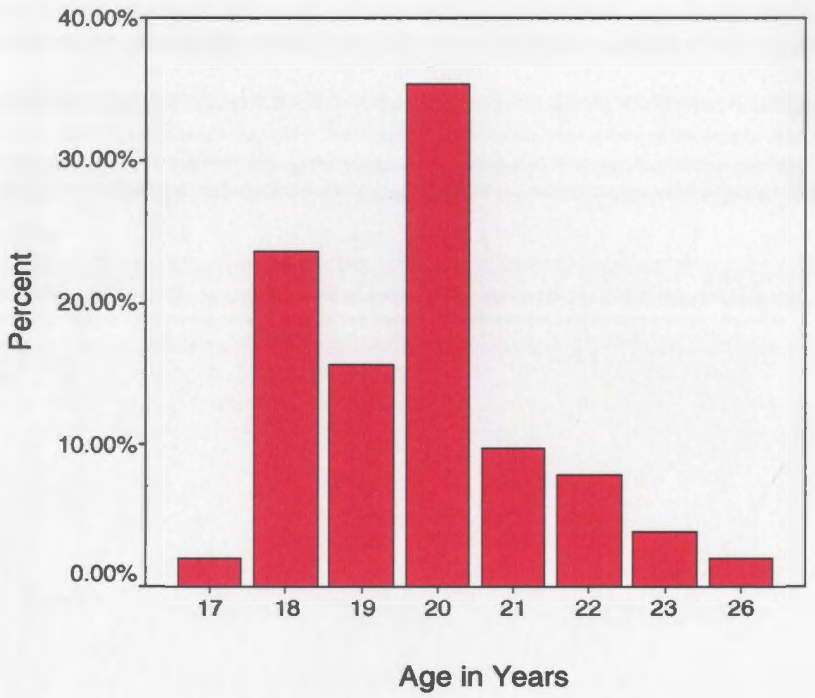

Figure 1. Percentage of Participants by Age

Participants' year of eligibility ranged from one to five years (M= 2.06 years, SD= 1.10), with 41.2% (n= 21) being in their first year of varsity competition. Of the remaining participants, 23.5% (n= 12) were in their second year, 27.5% (n= 14) were in their third year, 3.9% (n= 2) were in their fourth year and 3.9% (n= 2) in their fifth year of varsity competition. (See Table 1)

Table 1

Frequency, Percent, and Cumulative Percent for Athletes' Year of Eligibility

Year of Eligibility	Frequency	Percent	Cumulative Percent
1st Year	21	41.2	41.2
2nd Year	12	23.5	64.7
3rd Year	14	27.5	92.2
4th Year	2	3.9	96.1
5th Year	2	3.9	100.0
Total	51	100.0	

Participants represented a variety of ethnic backgrounds, the majority of the participants, 84%, were Caucasian (n= 43). Other ethnic backgrounds included Black (2%, n= 1), Bi-racial (2%, n= 1), Innu (2%, n=1), Aboriginal (4%, n= 2) and Malaysian (2%, n= 1). Note that two participants did not provide their ethnicity on the demographic questionnaire. (See *Figure 2*)

Of the 51 participants included in the study, 96.1% (n= 49) of the participants had previously used imagery, with only 3.9% (n= 2) of the participants stating that they had not previously used imagery. Of the participants who had previously used imagery, 90.2% (n= 46) indicated that they used imagery to prepare for games. Additionally, 29.4 % (n= 15) indicated that they used imagery during practices, 29.4% (n= 15) used imagery during games, 23.5% (n= 12) used imagery to prepare for practices, 21.6% (n= 11) used imagery during game breaks and 5.9% (n= 3) used imagery during practice breaks. Some participants (n= 7) identified other times that they used imagery, 8.0% (n= 4) identified using imagery before bed, 2.0% (n= 1) used imagery before competition, 2.0% (n= 1) used imagery outside of the gym on their

own time and 2.0% (*n*= 1) used imagery to image a sport specific skill, such as shooting a foul shot. (See Table 2)

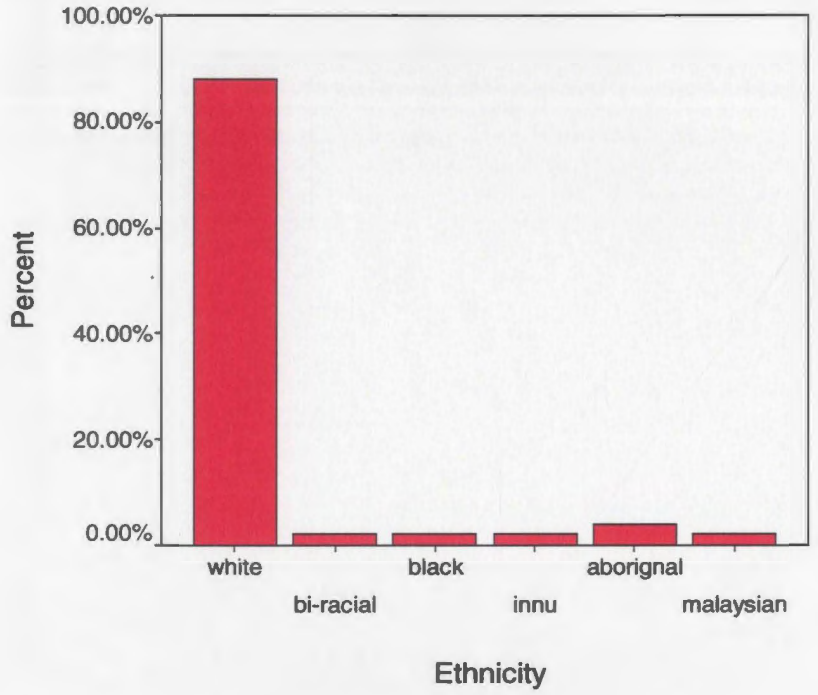

Figure 2. Participants Ethnicity in Percent

With regards to the age that participants started using imagery, 23.5% (*n*= 12) started using imagery at 16 years of age and 21.6% (*n*= 11) started using imagery at 15 years of age. In addition, 15.7% (*n*= 8) identified that they started using imagery before 12 years of age, 9.8% (*n*= 5) started using imagery at 14 years of age, 9.8% (*n*= 5) started using imagery at 17 years of age, 9.8% (*n*= 5) started using imagery at 18 years of age, and 5.9% (*n*= 3) began using imagery at 13 years of age. While, 3.9% (*n*= 2) did not answer this question since they had not previously used imagery. (See *Figure 3*)

Table 2

Frequency, and Percent for Athletes' Imagery Use

Imagery Use	Frequency	Percent
Do Not Use	1	2.0
During Practices	15	29.4
Preparation For Practice	12	23.5
During Breaks in Practices	3	5.9
Preparation For Games	46	90.2
During Games	15	29.4
During Breaks in Games	11	21.6
Other	7	14.0

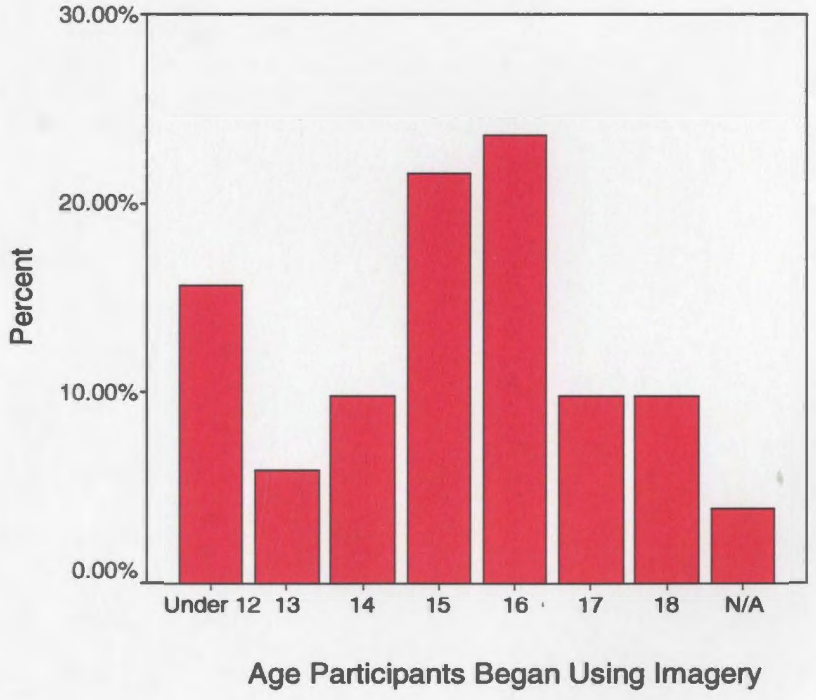

Figure 3. Participants Age When They Began Using Imagery in Percent

The time that participants spent using imagery varied, with 35.3% (n= 18) of the participants identifying that they used imagery "*often*". In Addition, 33.3% (n= 17) identified using imagery "*occasionally*", 13.7% (n= 7) used imagery "*regularly*", 9.8% (n= 5) identified using imagery "*rarely*", 5.9% (n= 3) identified using imagery "*always*", whereas 2.0% (n= 1) identified using imagery "*never*". (See *Figure 4*)

A two gender by two sport ANOVA was completed for each of the demographic variables, namely age, ethnicity, sport eligibility, the age when participants started using imagery and time spent using imagery, but no significant differences were observed at the $p < .10$ level. A two-way ANOVA could not be performed to examine gender and sport, and its relationship to participants "*other*" responses as to when they used imagery, since these results were presented as open-ended questions and few participants chose "*other*" to describe their imagery use.

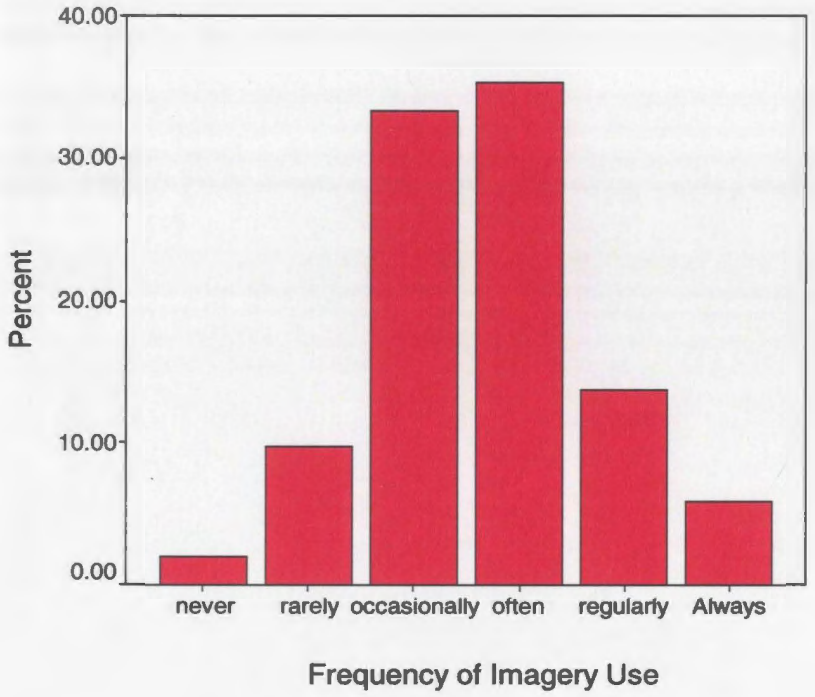

Figure 4. Time Participants Spent Using Imagery in Percent

Research Question 1: Gender Differences in Varsity Athletes' Imagery Ability

A two gender by two sport ANOVA was conducted to examine the main effects and interaction in the imagery subscales and total score on the Sport Imagery Questionnaire (SIQ-2) (Martens, 1982). Only significant gender differences will be discussed in this section, significant sport differences can be found in "other interesting research results". The analysis revealed a significant main effect for gender on the kinesthetic subscale of the Sport Imagery Questionnaire (SIQ-2) (Martens), $F(1, 47)= 3.55$, $p< .10$, with male varsity athletes showing significantly higher mean scores for kinesthetic imagery ability ($M= 14.80$, $SD= 2.55$) compared to female varsity athletes ($M= 13.45$, $SD= 2.71$). No further significant gender

differences were identified for the visual, auditory, mood, and control subscales or for the total score on the Sport Imagery Questionnaire (SIQ-2) (Martens). (See Table 3) Figure 5 represents the mean gender scores for the subscales and totals on the Sport Imagery Questionnaire (SIQ-2) (Martens).

Table 3

Means and Standard Deviations for The Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) Imagery Subscales Scores and Total Score by Gender

	Female (n= 21)		Male (n= 30)	
SIQ Subscales	*M*	*SD*	*M*	*SD*
Visual	15.7	2.73	16.5	2.10
Auditory	12.6	4.43	12.9	3.85
Kinesthetic	***13.4****	***2.71***	***14.8****	***2.55***
Mood	14.7	2.37	14.5	2.97
Control	14.7	2.27	14.8	3.02
Total Score	71.5	10.9	73.5	9.98

* $p < .10$

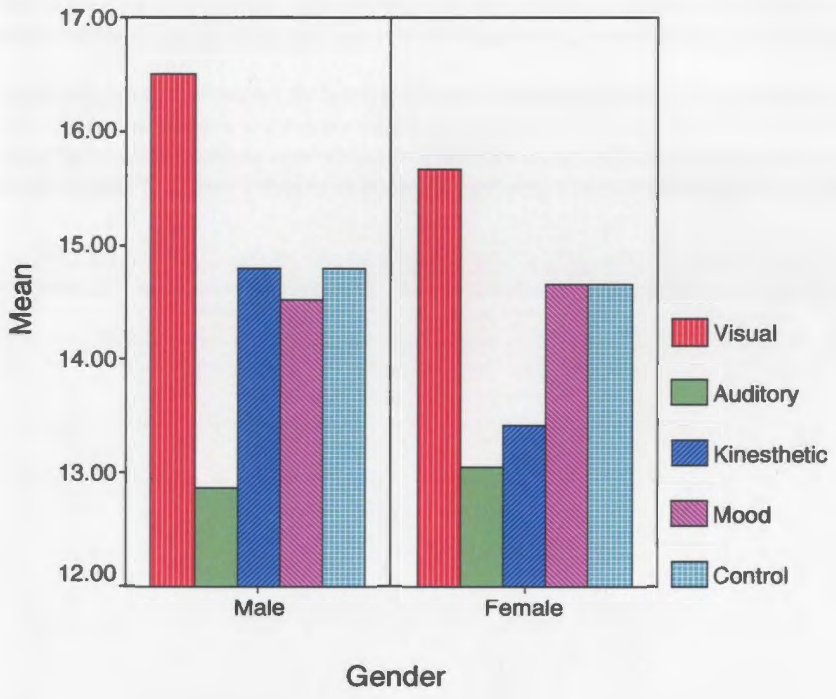

Figure 5. Mean For The Imagery Subscales on The Sport Imagery Questionnaire (SIQ-2) By Gender (Martens, 1982).

Research Question 2: Gender Differences in Varsity Athletes' Frequency of Imagery Use

A two by two ANOVA was conducted to examine if main effects and/or an interaction effect was present between the frequencies of when athletes used imagery by gender and sport. The analysis revealed a significant main effect for gender on athletes use of imagery during game breaks, $F(1, 47)= 3.32$, $p< .10$, with male varsity athletes ($M= 1.70$, $SD= 0.47$) using significantly more imagery during game breaks compared to female varsity athletes ($M= 1.90$, $SD= 0.30$). Analysis revealed a significant gender, $F(1, 47)= 6.30$, $p< .10$, and sport, $F(1, 47)= 8.31$, $p< .01$ effect, as well as a significant interaction, $F(1, 47)= 5.79$, $p< .10$ for athletes use of imagery

during games for gender and sport. Male volleyball players (M= 1.29, SD= .469) using significantly more imagery during games compared to the male (M= 1.87, SD= .342) or female (M= 1.89, SD= .333) basketball players and female volleyball players (M= 1.83, SD= .389) (See *Figure 6*). The two-way analysis of variance also revealed a significant gender effect for athletes use of imagery during practices, $F(1, 47)$= 13.17, $p< .001$, with male varsity athletes (M= 1.53, SD= .507) using significantly more imagery during practices than female varsity athletes (M= 1.95, SD= .218).

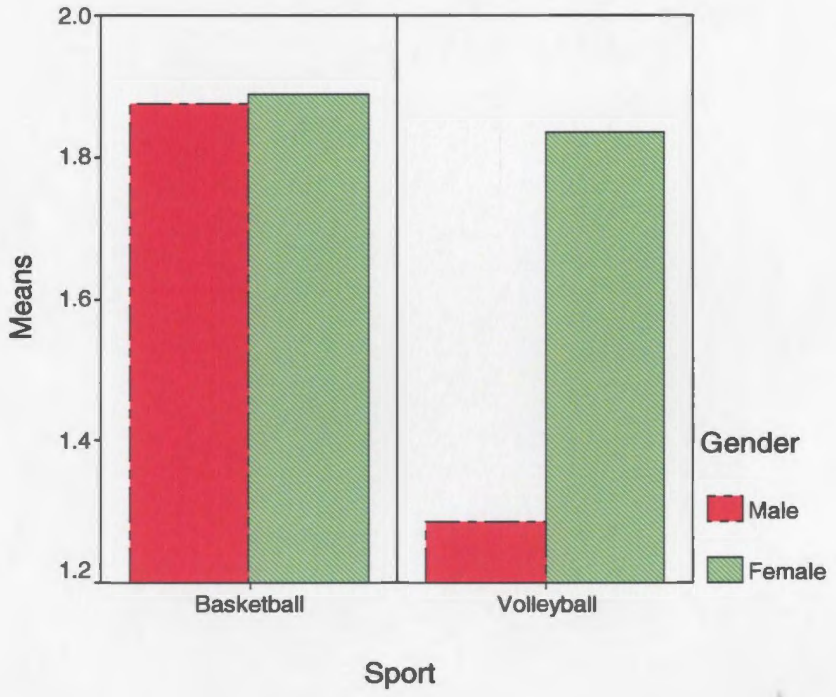

Figure 6. Interaction Effects for Gender by Sport For Imagery Use During Games

Research Question 3: Gender Differences in The Function of Imagery Used by Varsity Athletes'

A two-way ANOVA was used to examine main effects and interaction effects by gender and sport in relation to the imagery subscales and average score on the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) (See Table 4 and *Figure 7*). The analysis revealed a significant main effect for gender in the cognitive specific (CS) function of imagery use, $F(1, 47)= 3.80$, $p< .10$, with male athletes ($M= 5.11$, $SD= 1.12$) using significantly more cognitive specific (CS) imagery compared to female athletes ($M= 4.57$, $SD= 0.92$), however, no significant interaction effect was found. The analysis also revealed a significant gender, $F(1, 47)= 3.37$, $p< .10$, and sport, $F(1, 47)= 3.10$, $p< .01$ effects, as well as a significant interaction, $F(1, 47)= 3.14$, $p< .10$ for athletes use of cognitive general (CG) imagery, with male volleyball players ($M= 5.54$, $SD= .879$) using significantly more of the cognitive general (CG) function of imagery use compared to female ($M= 4.35$, SD= $SD= 1.21$) and male ($M= 4.41$, $SD= 1.33$) basketball players as well as female volleyball players ($M= 4.35$, $SD= .971$) (See *Figure 8*). The results also showed a significant sport by gender interaction for the motivational specific (MS) function of imagery, $F(1, 47)= 4.13$, $p< .10$., with male volleyball players ($M= 5.64$, $SD= 1.95$) using significantly more of the motivational specific (MS) function of imagery compared to female ($M= 5.07$, $SD= 1.19$) and male ($M= 4.28$, $SD= 1.95$) basketball players and female volleyball players ($M= 4.61$, $SD= 1.60$) (See *Figure 9*). No further main or interaction effects were revealed for the imagery subscales or the average total score for the Sport Imagery Questionnaire (SIQ-1) (Hall et al.).

Table 4

Means and Standard Deviations for The Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) Imagery Subscales Scores by Gender

	Female (n= 21)		Male (n= 30)	
SIQ Subscales	*M*	*SD*	*M*	*SD*
CS	***4.57****	***0.92***	***5.11****	***1.12***
CG	***4.35****	***1.05***	***4.93****	***1.26***
MS	4.81	1.43	4.92	1.76
MG-A	5.00	0.72	5.06	1.31
MG-M	5.77	0.83	5.69	1.09
Average Score	4.90	0.76	5.14	1.04

* $p < .10$

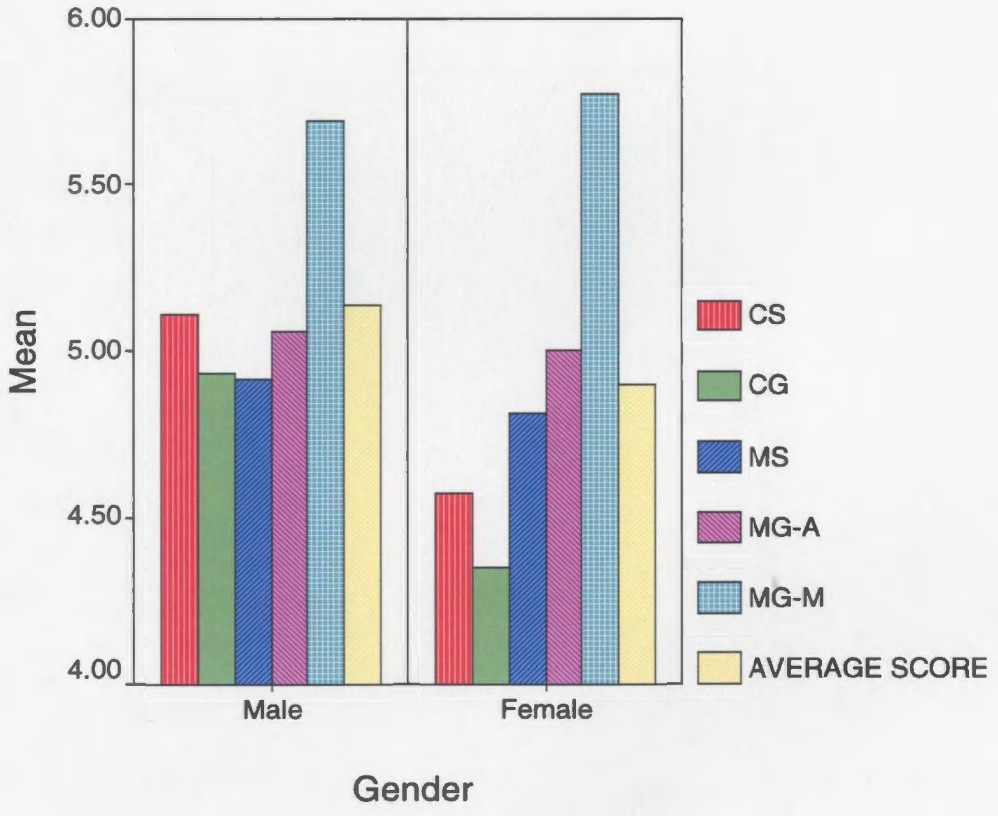

Figure 7. Mean Gender Scores For The Imagery Subscales and Average For The Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998).

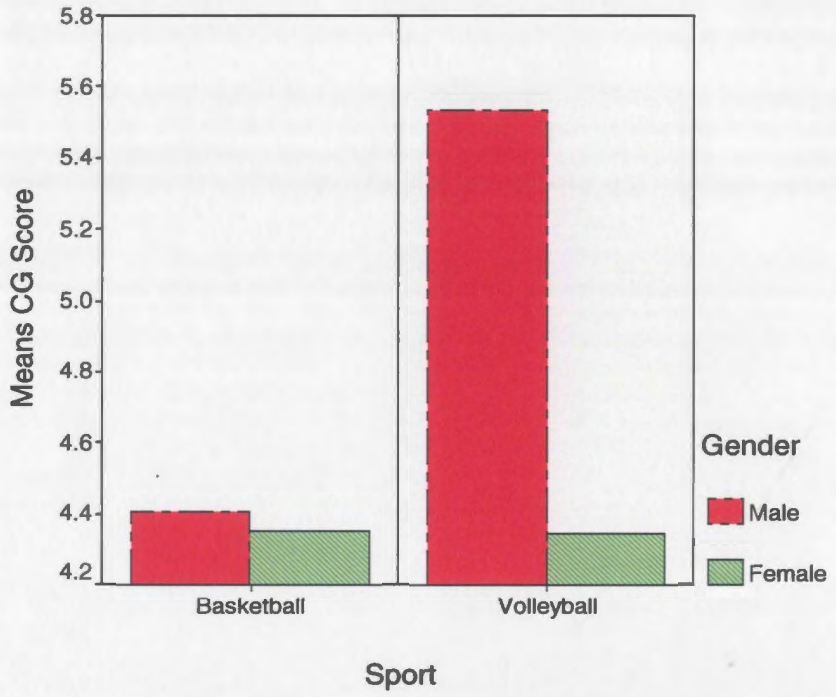

Figure 8. Interaction Effects for Gender by Sport For Mean Cognitive General (CG) Imagery Scores (SIQ-1) (Hall et al., 1998).

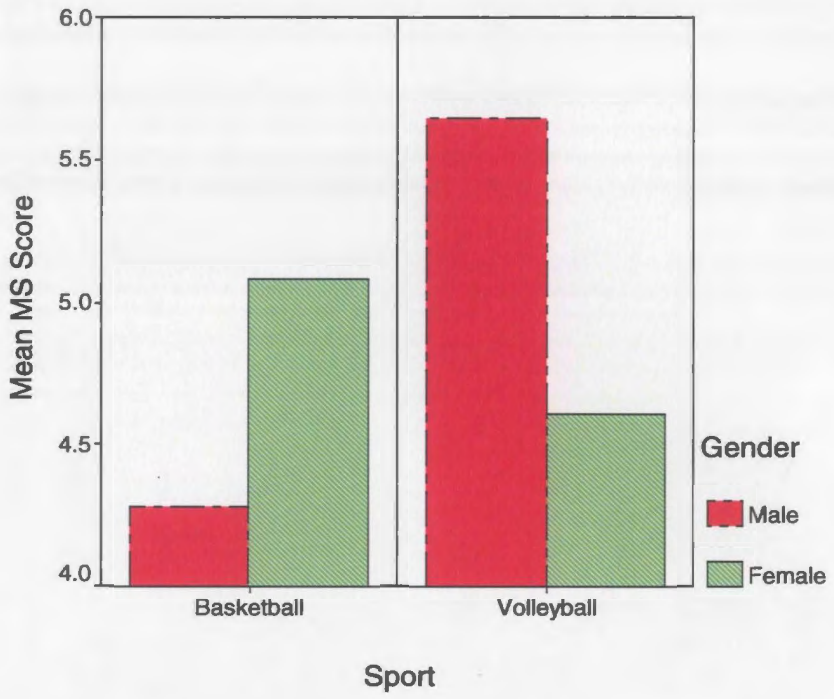

Figure 9. Interaction Effects for Gender by Sport For Mean Motivational Specific (MS) Imagery Scores (SIQ-1) (Hall et al., 1998).

Other Interesting Research Results

Sport by gender effects were evaluated for the Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) using a two-way ANOVA (See Table *5* and *Figure 10).* A significant sport main effect was revealed in the subscale of control, $F(1, 47)= 3.80$, $p< .10$, with volleyball players ($M= 15.46$, $SD= 2.47$) showing significantly higher mean scores for control of their images when compared to basketball players ($M= 14.00$, $SD= 2.80$). No further significant main or interaction effects were established for the visual, auditory, kinesthetic, mood subscales or for the total score of the imagery subscales.

Table 5

Means and Standard Deviations for The Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) Imagery Subscale Scores and Total Score by Sport

	Basketball (n= 25)		Volleyball (n= 26)	
SIQ Subscales	***M***	***SD***	***M***	***SD***
Visual	16.40	2.22	15.92	2.56
Auditory	12.64	4.17	12.85	4.03
Kinesthetic	14.16	2.81	14.31	2.60
Mood	13.8	2.82	15.27	2.48
Control	***14.00****	***2.80***	***15.46****	***2.47***
Total Score	71.5	10.7	73.8	9.96

* $p < .10$

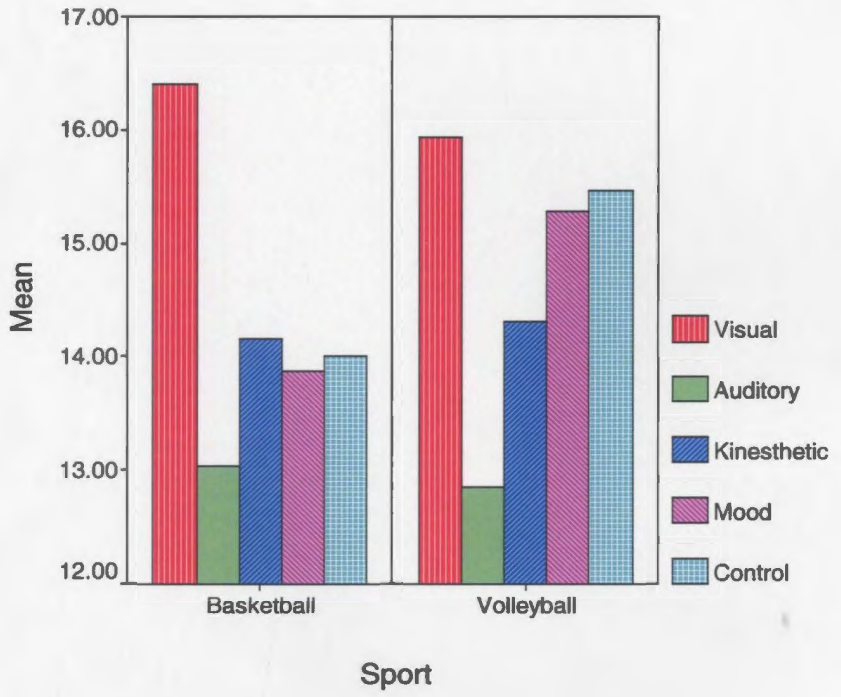

Figure 10. Mean Sport Scores For The Imagery Subscales on The Sport Imagery Questionnaire (SIQ-2) (Martens, 1982).

Two-way ANOVAs were also conducted to compare the imagery subscales of the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) (See Table 6 and *Figure 11*). A significant main effect for sport was found for the average score of all the imagery subscales, $F(1, 47)= 3.28$, $p< .10$, with volleyball players ($M= 4.96$, $SD= 5.63$) showing significantly higher mean scores compared to basketball players ($M= 4.37$, $SD= 5.18$), as well a significant sport by gender interaction for the average score of all the imagery subscales was revealed, $F(1, 47)= 3.81$, $p< .10$, with male volleyball players ($M= 5.64$, $SD= .725$) demonstrating a higher overall mean score on the Sport Imagery Questionnaire (SIQ-1) (Hall et al.) compared to female ($M= 4.92$, $SD= .795$) and male ($M= 4.70$, $SD= 1.09$) basketball players and female volleyball players ($M= 4.89$, $SD= .781$). (See *Figure 12*)

Table 6

Means and Standard Deviations for The Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) Imagery Subscales Scores and Average Score by Sport

	Basketball ($n= 25$)		Volleyball ($n= 26$)	
SIQ Subscales	*M*	*SD*	*M*	*SD*
CS	4.68	1.13	5.09	0.98
CG	4.39	1.26	4.99	1.09
MS	4.57	1.73	5.17	1.47
MG-A	4.79	1.24	5.26	0.89
MG-M	5.47	1.10	5.96	0.81
Average Score	***4.78****	***0.98***	***5.29****	***0.83***

* $p < .10$

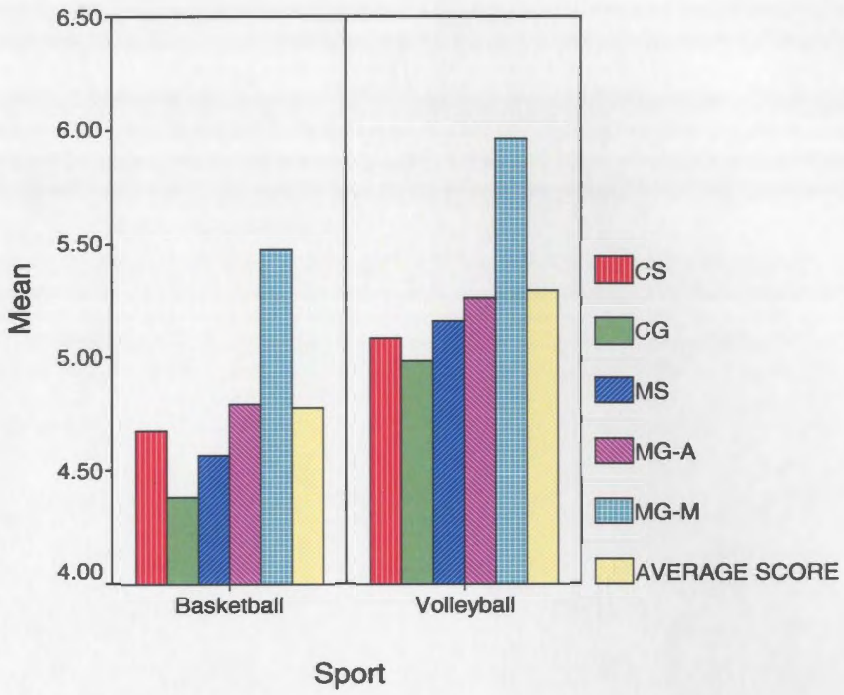

Figure 11. Mean Sport Scores For The Imagery Subscales and Average For The Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998).

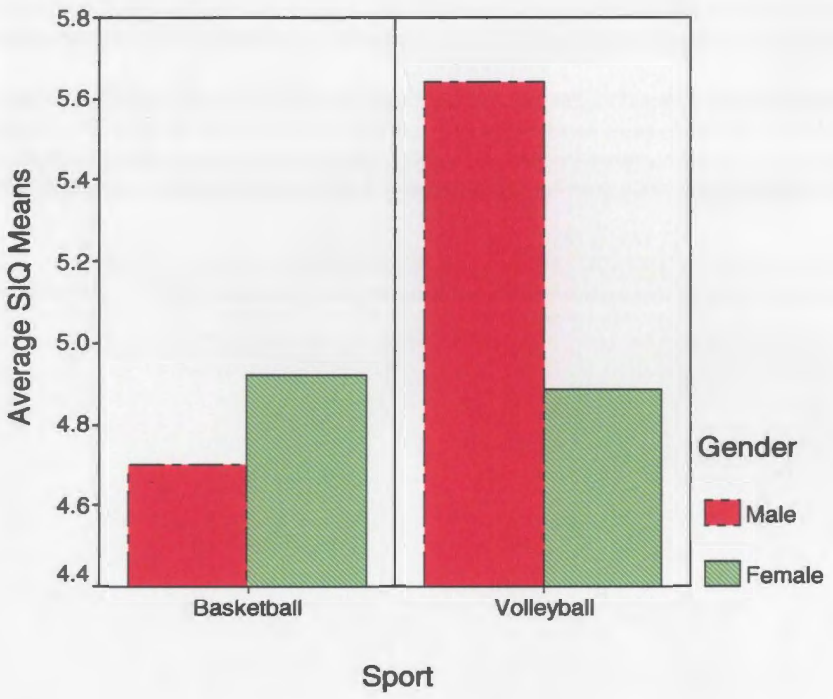

Figure 12. Mean Total Scores For The Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998).

Summary

This chapter highlighted the major research findings from this study. It described the participants' demographic information through frequency tables and bar graphs. Two-way ANOVAs were conducted on demographic variables and on each of the imagery subscales and total score or average scores for the Sport Imagery Questionnaires (Hall et al., 1998 (SIQ-1); Martens, 1982 (SIQ-2)) by sport and gender. Only significant findings were presented in graphs and discussed in the results section. The chapter concluded through the use of two-way ANOVAs that gender and sport differences are present in varsity athletes' imagery ability, frequency of use and function. Chapter five will discuss the study's research findings, recommendations for future research studies and a conclusion.

CHAPTER V

DISCUSSION

Introduction

The preceding chapters presented an overview of imagery ability, frequency of use and function and gender differences as reviewed in the literature, described the purpose and methodology of the study and provided the statistical results. The following chapter will discuss the findings with regards to identifying gender differences in imagery ability, frequency of use and function in varsity basketball and volleyball athletes. Particular emphasis will be placed on answering the following research questions: (1) Do gender differences exist in varsity athletes' imagery ability? (2) Do gender differences exist in varsity athletes' frequency of imagery use? and, (3) Do gender differences exist in the function of imagery used by varsity athletes? The chapter will begin by summarizing and explaining the study's findings. It will be followed by a discussion, future research recommendations and a conclusion.

Variables

Varsity Athletes' Imagery Ability

A major purpose of the study was to examine if gender differences existed in varsity athletes' imagery ability. To assess imagery ability, the Sport Imagery Questionnaire (SIQ-2) (Martens, 1982) was used to examine several components of imagery ability, including visual, auditory, kinesthetic, mood and control. The study's findings revealed a significant gender difference in the kinesthetic component

of imagery ability. Specifically, male varsity athletes' higher mean scores ($F(1, 47)= 3.55, p< .10$) identified that they were better at using kinesthetic feel in their imagery than female varsity athletes. This result is consistent with previous research (Barr & Hall, 1992), where male rowers identified having more vivid internal images than female rowers. Internal imagery relies heavily on feeling the movements as they are being imaged. A possible explanation for this finding is that the male athletes in the study were exposed to imagery at an earlier age than female varsity athletes, and continue to use and practice the skill. It may also be possible that the male varsity athletes' coaches emphasize, encourage and provide opportunities for their athletes to perfect and develop their imagery skills, which would lead to their better overall imagery ability. A further possible explanation is that male athletes may value kinesthetic imagery more because of its performance enhancement benefits, which may fulfil their competitive sport participation motives.

Varsity Athletes' Frequency of Imagery Use

A second major purpose of the study was to examine if gender differences existed in varsity athletes' imagery use. The study's findings revealed that there were significant gender differences when varsity athletes used imagery. Male varsity athletes used imagery significantly more during practices ($F(1, 47)= 13.17, p< .001$) and game breaks ($F(1, 47)= 3.31, p< .10$) compared to female varsity athletes. Significant gender ($F(1,47)= 6.30, p< .10$) and sport ($F(1,47)= 8.31, p< .01$) effects as well as a gender by sport interaction ($F(1, 47)= 5.79, p< .10$) for imagery use during games. The interaction effect revealed that basketball players, regardless of gender, did not seem to use imagery during games; whereas male volleyball players used

imagery significantly more during games compared to their female counterparts. These gender and sport differences in varsity athletes' imagery use may be caused by a variety of interacting factors, such as males competitive orientation, coaches' influence and past sporting and imagery experiences.

Gender differences in imagery use has been previously reported (Barr & Hall, 1992; Weinberg et al., 2003), however the study found conflicting results to the present study, with females using more imagery than males. Nevertheless, the current findings that male athletes use more imagery is not surprising, since imagery is an important tool for performance enhancement and males are more competitively oriented than females (Borman & Kurdek, 1987; Dubois, 1990; Gammage et al., 2000; Gill, 1988). It can, be surmised that since male and female varsity athletes' participation motives differ it may therefore influence frequency and overall imagery use.

The study's findings also indicated that regardless of gender, imagery was used most often as a preparation tool for competition, with 90.2% of the varsity athletes using imagery to prepare for competition. These findings are consistent with previous research (Barr & Hall, 1992; Hall et al., 1990; Munroe et al., 1998; Weinberg et al., 2003), in which athletes reported using imagery more in conjunction with competition than with practices. This result suggests that varsity athletes may be using imagery more to enhance their athletic performance, as opposed to using imagery for skill learning and development.

Some of varsity athletes in the present study indicated using imagery outside of competition and practice, specifically before bed and on their own time. These findings are consistent with previous research, which identified that athletes also used

imagery outside of practice and competition during breaks in daily activities, such as during school, work, at home, and before bed (Hall et al., 1990; Rodgers et al, 1991; Salmon et al., 1994).

A further interesting research finding was that of the varsity athletes examined in the present study, 96.1% had previously used imagery at some point during their sporting endeavours. This result is similar to a previous research study conducted by Orlick and Partington (1988), of 235 Canadian Olympic athletes who participated in the 1984 Olympic games, that identified that 99% of the athletes used imagery in combination with their physical preparation for the Olympics.

The amount of time that the athletes spent using imagery varied amongst athletes, however the majority (66.8%) of the varsity athletes used imagery "*often*" or "*regularly*" to accompany their physical training. The age at which athletes started using imagery varied from before the age of 12 to 18 years of age, it would be interesting for future research studies could examine the age that athletes began using imagery to examine how this influences overall athletic performance and future imagery use.

Varsity Athletes' Function of Imagery Use

The final purpose of the study was to determine if gender differences existed in varsity athletes' function of imagery use. The study's findings revealed that gender differences were present. Specifically, a significant gender difference in the cognitive specific (CS) function of imagery use, with males using this function of imagery more than female athletes ($F(1, 47)= 3.80, p< .10$) was found. A study conducted by Weinberg et al (2003) also identified that males used more of the cognitive specific

(CS) function of imagery and found it to be more effective. These findings may suggest that male varsity athletes use imagery more than female varsity athletes to maintain or improve their skill level (CS). Male varsity athletes' use of cognitive specific (CS) imagery may also be reflected in their participation motives and competitiveness.

A interaction between gender and sport for the cognitive general (CG) function of imagery use ($F(1, 47)= 3.14$, $p< .10$) was present. This effect revealed that basketball players, regardless of gender, showed similar mean scores for their use of the cognitive general (CG) function of imagery, whereas male volleyball players showed significantly higher mean scores than basketball players and than their female counterparts. This may be a reflection of the male volleyball players' competitive participation motives, past competitive and imagery experiences, as well as their coaches' sporting philosophy. Additionally the findings may suggest that male volleyball players' earlier exposure to imagery, although not statistically significant, may continue to influence their overall imagery use and the function of imagery used.

The interaction for the motivational specific (MS) function of imagery use ($F(1, 47)= 4.13$, $p< .10$) was also significant. Here, gender and sport affected the use of motivational specific (MS) imagery, with male and female basketball players, as well as female volleyball players using less of this function of imagery compared to male volleyball players. The research finding identifies that male volleyball players are using imagery to image themselves achieving specific goals and goal-oriented behaviors, such as winning a medal or a competition (MS). The gender and sport difference identified in the motivational specific (MS) function of imagery use may be

evidence that male volleyball players' competitive participation motives influence their imagery use.

Sport Differences

Other interesting research findings from the present study revealed that the sport seemed to influence the function of imagery used. Specifically, the study's findings identified that volleyball players used significantly more of the cognitive general (CG) ($F(1, 47)= 3.10, p< .10$) function of imagery than basketball players. The volleyball players in the study were also shown to have a significantly higher total mean scores than the basketball players on the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) ($F(1,47)= 3.28, p<.10$).

Further, the sport that varsity athletes participated in seemed to influence imagery ability. Volleyball players, regardless of gender were shown to have a significantly higher ability to control their images compared to basketball players ($F(1,47)= 3.80, p< .01$). According to Weinberg and Gould (2003), overall controllability of images is an essential component of effective imagery. Results also established that male volleyball players used significantly more imagery during games compared to basketball players ($F(1, 47)= 5.70, p< .10$) and their female counterparts.

The present findings also revealed a significant gender by sport interaction effect for the mean total score for the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998), such that male basketball players had lower mean scores for their imagery use when compared to male volleyball players ($F(1, 47)= 3.28, p< .10$). Also, female basketball and volleyball players had relatively similar mean scores for their overall imagery use, however, female volleyball players had slightly lower total mean scores.

The sport differences that were observed in the present study are potentially a reflection of innate sport differences, past sporting and imagery experiences and coaching styles. Volleyball is a sport with many breaks in action, which may give athletes more of an opportunity to use imagery during games, whereas basketball is a more continuous, ongoing sport. Additionally, the athletes past sporting experience (varsity, provincial, national or international) may also affect athletes' use of imagery, and even their exposure to imagery. Coaches' influence on athletes' imagery use cannot be overlooked. Athletes with a coach who encourages and offers opportunities to learn, practice and perfect imagery skills are more likely use imagery to enhance their athletic performance. Future studies should explore these sporting differences in imagery ability, frequency and function of use more extensively.

Discussion

The reviewed literature identified that imagery played an important role in athletes' development of sport specific skills and strategies and, in general, imagery has an important role in enhancing overall athletic performance (Hall, 2001). Many theories could be employed to explain the extent and impact of the gender differences that exist in varsity athletes' imagery ability, frequency of use and function. However, it is beyond the scope of the present study to explore every theory. The present study's findings will be discussed using a Social Learning Theory orientation and Sport Socialization perspective in an attempt to explain and fully understand the gender differences in athletes' imagery ability, frequency of use and function that were observed.

The Social Learning Theory (Bandura, 1977) and socialization perspective emphasizes the importance of observational learning, reinforcement and punishment, modelling and classical conditioning, on the development of learning gender-related thinking, gender development and gender standards. The Social Learning Theory describes how individuals learn to identify themselves as male or female, through social interactions, observations and modelling of daily social influences. Individuals gain valuable knowledge about how to be male and female through social learning experiences that begin at a very young age, through familial interactions, through educational systems, from peer groups and from the images and messages presented by the media. Society's ideals and values become ingrained in individuals and may extensively influence daily thoughts, values, perceptions, attitudes and beliefs about what it means to be male and female, and specifically what behaviors are accepted and appropriate. Males in society are taught to place a higher value on sport toughness (Nixon, 1997), creating an image that being "macho" and "tough" are male gender roles. The difference in the socialization process between males and females, may affect the activities engaged in, reasons for participation, beliefs in their ability and value of the activity, further perpetuating society's gender stereotypes. Since societal views and ideals have a significant influence on an individual's daily choices, it can therefore be surmised that society would also affect and influence an individual's sport participation and choice of sport involvement, as well as sport participation motives.

Sport participation refers to the factors that contribute to an individual's involvement in sport. In general, the process of socialization, specifically sport socialization, is strongly related to an individual's sports participation and motives for

participation. Research studies have identified that sport participation motives are very different for male and female athletes (Borman & Kurdek, 1987; Dubois, 1990; Ewing, 1981; Greendorfer & Gill, 1988). Male athletes have been found to be more competitively oriented and value winning in sport more than females, whereas, female athletes value being part of a team and are more socially oriented compared to male athletes. These differences in participation motives could potentially have a considerable effect on athletes' imagery ability, frequency of use and function. This may explain the gender differences in imagery use that were observed in the present study. Specifically, the study's findings identified that male varsity athletes used imagery more during game breaks and practices. Male varsity athletes also demonstrated higher ability to use kinesthetic imagery compared to female varsity athletes. Overall, the findings identified that male varsity athletes have higher imagery ability, use imagery more often in a variety of different contexts and use imagery significantly more for cognitive reasons than female varsity athletes. The study's findings may be caused by a variety of interacting factors. Athletes' sport participation motives, which are influenced by the socialization process may potentially play a substantial role. In a study conducted by Gammage et al. (2000), male and female exercisers' participation motives affected their imagery use, particularly the function of imagery used. Therefore, since male athletes are more competitively oriented, they may be more willing to use imagery to give them the edge over other competitors and enhance their performance, which in turn, will fulfil their competitive sport orientation.

Researchers have been striving to fully understand and investigate why athletes use imagery (Barr & Hall, 1992; Hall et al., 1990; Munroe et al., 2000;

Rodgers et al., 1991; Salmon et al., 1994; White & Hardy, 1998). Research has demonstrated that imagery serves athletes cognitively and motivationally, and functions at a specific and general level (Paivio, 1985). Learning and performance enhancement are related to the cognitive role of imagery, while specific goals and behaviors needed to reach goals are associated with the motivational role of imagery use. The present study identified that males used imagery particularly for its cognitive benefits. Specifically, male varsity athletes used more cognitive specific (CS) function of imagery compared to female varsity athletes. The findings suggest that male varsity athletes use imagery for skill development and skill execution (CS). Male athletes' cognitive use of imagery, allows them to perfect their skills in order to help them win against their competition and, therefore, their imagery use may be a reflection of their competitive orientation and sport participation motives. These findings were not consistent with previous research. Cumming and Hall (2002) identified that male athletes used more motivational specific (MS) imagery during the off-season than female athletes. However, this difference in the function of imagery used may be explained by the time of season (Munroe et al., 1998). Further research is required to examine gender differences in the function of imagery used.

It was beyond the scope and purpose of the present study to fully examine sport differences in imagery ability, frequency of use and function, however some important significant gender differences were observed. Overall, the findings revealed that volleyball players had a higher ability to control their images. Volleyball players in the study also had a significantly higher overall score on the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998) compared to the basketball players in the study. The differences revealed in imagery use and ability may

potentially be explained by independent and/or interacting factors. The sport differences may be reflected in coaching styles, with the volleyball players' coaches emphasizing and encouraging the use of imagery to enhance their athletes' athletic performance more so than the basketball coaches. Athletes past competitive and imagery experiences may also play a substantial role in their current imagery use.

Male volleyball players were also shown to use imagery significantly more during games than basketball players. This difference may be related to the fundamental game structure differences present in each sport. Since volleyball has breaks between points and games and is more self-paced, this may give athletes more opportunity to use their imagery skills during the game when compared to basketball, which is a more continuous sport with fewer breaks in action. This may potentially explain volleyball players' use of imagery during games. Volleyball and basketball players' use of imagery during game breaks was also explored and did not show a significant sport difference, indicating there may be other factors that are influencing volleyball players' use of imagery during games, such as coaching and past competitive and imagery experience. Specific explanations for these sport differences cannot be provided, since this was not fully explored in this study. It may be beneficial for future studies to explore sport differences in imagery ability, frequency of use and function.

Recommendations For Future Research Studies

This study, similar to the majority of the studies examining gender differences in imagery use, employed a quantitative research methodology. Although this methodology was appropriate for measuring gender differences in imagery ability,

frequency of use and function, a qualitative methodology may offer valuable information. Exploring gender differences in imagery use through a qualitative methodology, including in-depth interviews, could potentially provide added knowledge and insight into athletes' imagery use. A qualitative methodology may also provide insight into specific explanations as to why gender differences occur. Therefore, exploring the research questions through qualitative methods is recommended for future studies.

This study attempted to examine the influence of age, year of eligibility and ethnicity on gender differences in imagery ability, frequency of use and function. However, difficulty arose in determining their impact because of the relatively small sample. Repetition of this study is recommended with a larger sample size of varsity athletes to explore gender differences in imagery ability, frequency of use and function.

It is recommended that future research studies explore a variety of sports with similar or different task demands, to further examine gender differences in imagery ability, frequency of use and function. Increasing the number of sports examined will increase the generalizability of the research findings. Future studies should also explore both team and individual sports to determine whether sport type influences gender differences.

The literature has indicated that athletes' use of imagery, specifically the function of use, changes during the competitive season (Munroe et al., 1998). It is recommended that future research studies should track changes in athletes' imagery use over the course of the season. It is also recommended to study the timing of the competitive season and the win-loss record, since this may influence varsity athletes'

overall imagery use. Controlling or accounting for the athletes' stage of their competitive season and win-lose record may offer some valuable insight into gender differences in imagery use.

Due to the exploratory nature of this research study the level of significance was set at a liberal level of $p < .10$. Future studies examining gender differences in imagery ability, frequency of use and function should consider setting a higher level of significance.

Conclusion

Through extensive research, imagery has been shown to be an effective performance enhancement tool for athletes of all skill levels and athletic abilities. Imagery's benefits are extensive, and offer athletes an opportunity to perfect fundamental components necessary for athletic success. Imagery enhances sport specific skills and strategy development, improves confidence, focus, motivation, concentration, arousal regulation and emotional anxiety and the development of problem solving skills. Ensuring that imagery-training programs benefit every athlete is extremely important and essential for athletic success and development.

The present research study identified that gender differences are present in varsity athletes' imagery ability, frequency of use and function. Understanding how these gender differences affect the performance enhancement benefits of imagery is essential. The development of effective imagery-training programs is a complex process where an athlete's individual needs, wants, abilities, and interests must to be taken into account. The findings of the present research study identified that gender and the specific sport may influence varsity athletes' overall imagery use. Further

research is required to understand how these factors influence the effectiveness of imagery-training programs.

Future research studies should explore the extent and impact that gender has on imagery ability, frequency of use and function. In order to understand athletes' use of imagery, and specifically to understand how gender affects imagery use, is essential to the development of more effective gender-specific imagery-training programs. Future studies should also focus on exploring and developing gender and sport specific practical implications and attempt to provide recommendations that would ensure that imagery-training programs are tailored to the athletes' gender and the sport in which they participate.

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APPENDIX 1

INFORMATION MATERIAL FOR VARSITY COACHES

Erin McGowan
23B Lake Avenue
St. John's, NL
A1A 1H3

Dear Varsity Coach,

My name is Erin McGowan. I am a graduate student in the faculty of Human Kinetics and Recreation studying sport psychology. I am interested in conducting a research study examining imagery use and am interested in using your varsity team as participants. I have included an information sheet describing the study. Feel free to contact me if you have any questions or concerns at 726-7817 or by email at mcnolan8@hotmail.com. I will be contacting you within the next week to discuss your willingness to participate.

Thanks for you consideration,

Erin McGowan, BscHK, MPE candidate

Information Letter Sent To Varsity Coaches

Gender Differences In Imagery Ability and Use In Varsity Athletes

By: Erin McGowan

Rationale:

Gender differences have been studied extensively in varying contexts such as aggression, motivation, self-confidence and cognitive functions to only name a few. With extensive knowledge existing on gender differences in these areas the knowledge base would be enhanced by examining whether gender differences exist with regards to imagery use and imagery ability. A study in this area could potentially generate findings that would provide coaches, athletes and sport psychologists with additional knowledge needed to help individual athletes benefit from an imagery-training program.

Methodology:

The sample will include varsity teams from Memorial University of Newfoundland. Should you agree to allow your team to participate, your athletes will be asked to complete two questionnaires to determine their imagery ability, frequency and function of use. The questionnaires will take approximately 15-20 minutes to complete.

The Sport Imagery Questionnaires will be used to determine an athlete's current imagery ability, frequency and function of use. The research will examine gender differences in varsity athletes with regards to the function of imagery used, the amount of imagery used, the imagery perspective and the athletes imaging ability.

APPENDIX 2

INFORMATION LETTER

INFORMATION LETTER

Erin McGowan
School of Human Kinetics and Recreation
Memorial University of Newfoundland
St. John's, Newfoundland, Canada
A1C 5S7

Dear Participant,

I am writing to request your participation in a research study to determine imagery use and ability in varsity athletes. This study is being conducted by researcher Erin McGowan, as part of my master's thesis at Memorial University of Newfoundland.

Implied Consent: By completing both Sport Imagery Questionnaires and returning it to the researcher, you are agreeing to participate in this study.

Procedure: Should you agree to participate, you will be asked to complete two questionnaires to determine your imagery ability, frequency and function of use. Each questionnaire will take approximately 10-15 minutes to complete. Once the questionnaires have been completed, please seal them in the envelopes provided. Do not write your name on the questionnaires to ensure your anonymity. Your student number is required and will only be used as identifying information, to match your questionnaires.

Risks and Benefits: The risks of participating in this study are negligible. The benefits include increasing your knowledge about your imagery use and ability.

Confidentiality: Completed questionnaires will be confidential and will be stored in a secure location. Upon completion of this study and in agreement with Memorial University of Newfoundland's guidelines for the preservation of data, the questionnaires will be destroyed.

Voluntary Participation: Your decision to participate or not to participate will have no negative consequences on your place on the team (playing time). Your coach will not be attending the sessions; and therefore will not be aware of who is attending the sessions. This study is being done independently of your team and, consequently, you may withdraw, at any point in the study without prejudice or penalty.

Publication of Results: The results of this research will be made public in thesis form at the Queen Elizabeth II Library on the campus of Memorial University of Newfoundland, in St. John's. The research may also be presented or published provincially, nationally or internationally.

Contacts and Inquiries: Should you have any questions or concerns regarding this research study, please feel free to contact myself, Erin McGowan at mcnolan8@hotmail.com or my supervisor, Dr. Basil Kavanagh by email at basilk@mun.ca.

Researcher's Qualifications: I have a Bachelor of Science in Human Kinetics from the University of Ottawa. I am currently a third year graduate student studying Sport Psychology at Memorial University of Newfoundland. I have been trained in using and teaching Mental Training Skills by Dr. Kavanagh over the past three years. Additionally, I have worked on refining mental skills with individuals and teams from a variety of sports.

Approval Process: This research proposal has been approved by The Interdisciplinary Committee on Ethics in Human Research at Memorial University of Newfoundland. If at any time during the research study you have any ethical concerns that need to be addressed you may contact Dr. Tim Seifert, Chairperson of the ICEHR at icehr@mun.ca or by phone at 737-8368.

Thanks for your consideration.

Sincerely,

Erin McGowan, BscHK, MPE Candidate

APPENDIX 3

DEMOGRAPHIC FORM

Student ID: _____

DEMOGRAPHIC INFORMATION

Please complete the following sheet by placing an "X" in the slot that is most applicable to you or by filling in the information requested. Please be as honest as possible when completing the information sheet. Please place the completed sheet in the envelope provided and seal the envelope before returning it to the researcher.

1. **Age**: _____

2. **Ethnicity**: _____

3. **Gender**: _____

4. **What is your current year of Atlantic University Sport eligibility?**

   _____ 1st year
   _____ 2nd year
   _____ 3rd year
   _____ 4th year
   _____ 5th year

5. **Have you used imagery before (Y/N)?** _____
   If yes, please respond to following question.
   If, no, please move directly to question 7.

6. **At what age did you begin using imagery?**

   _____ Under 12 years old
   _____ 13 years old
   _____ 14 years old
   _____ 15 years old
   _____ 16 years old
   _____ 17 years old
   _____ 18 years old

7. **Indicate when you are most likely to use imagery.**

_____ Do not use imagery
_____ During Practices
_____ Preparation for Practice
_____ During breaks in practices (e.g. water break)
_____ Preparation for games
_____ During Games
_____ During breaks in games (e.g. timeout)
_____ Other: please specify: _____

8. **Indicate how much time you spend imaging yourself executing sport specific skills?**

_____ Never
_____ Rarely
_____ Occasionally
_____ Often
_____ Regularly
_____ Always

APPENDIX 4

WRITTEN PERMISSION TO USE SPORT IMAGERY QUESTIONNAIRES (SIQ)

A copy of written permission received via email from Dr. Craig Hall to use the Sport Imagery Questionnaire (SIQ-1) (Hall et al., 1998).

Dear Erin

You have my permission to use the Sport Imagery Questionnaire. Good luck with your research.

Craig Hall

A copy of written permission received via email from Human Kinetics to use the Sport Imagery Questionnaire (SIQ-2) (Martens, 1982).

Dear Ms. McGowan,

I am sorry it has taken so long to respond to your request. We are short staffed at the moment and everything is taking longer to complete. I am writing to let you know I have approved your permissions request and you should be receiving an official letter stating such next week. Again, I'm sorry for the delay. Please let me know if you have any questions.

Sincerely,

John Laskowski
Knowledge Management Coordinator
Human Kinetics Publishers

See the following page for the letter from Human Kinetics.

HUMAN KINETICS

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January 23, 2004

Erin McGowan
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Canada

Dear Ms McGowan:

Thank you for your inquiry concerning use of material from Gould and Weinberg's Foundations of Sport and Exercise Psychology Study Guide published by Human Kinetics. We are pleased to grant you permission for this one-time use, for non-exclusive rights in all languages, based on the following condition: the use of the designated credit line.

BOOK

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FEE: **Waived**

Sincerely,

John Laskowski
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APPENDIX 5

SPORT IMAGERY QUESTIONNAIRE (SIQ-1)
(Hall et al, 1998)

Student ID: _____

THE SPORT IMAGERY QUESTIONNAIRE (SIQ-1)
(Hall et al, 1998)

Please note that completion of this questionnaire indicates consent to participate in this research study.

Please read each statement below and rate the degree to which the statement applies to you when you are practicing or competing in volleyball/ basketball. Do not be concerned about using the same numbers repeatedly if you feel that they represent your true feelings. Remember, there are no right or wrong answers, so please answer as accurately as possible. Once you have completed this questionnaire please place it in the envelope provided.

Rarely			**Moderately**			**Often**
1	2	3	4	5	6	7

Cognitive Specific

1. I can easily change an image of a skill. _____
2. When imaging a particular skill, I can consistently perform it perfectly in my mind.___
3. I can mentally make corrections to physical skills. _____
4. Before attempting a particular skill, I imagine myself performing it perfectly. _____
5. When learning a new skill, I imagine myself performing it perfectly. _____
6. I can consistently control the image of a physical skill. _____

Cognitive General

1. I make up new plans/strategies in my head. _____
2. I image alternative strategies in case my event/game plan fails. _____
3. I image each section of an event/game (e.g., offense vs. defense, fast vs. slow). _____
4. I image myself continuing with my event/game plan, even when performing poorly. _____
5. I image executing entire plays/programs/sections just the way I want them to happen in an event/game. _____
6. I image myself successfully following my event/game plan. _____

Motivational Specific

1. I image the atmosphere of winning a championship (e.g., the excitement that follows winning, etc.) _____
2. I imagine other athletes congratulating my on a good performance. _____
3. I image the atmosphere of receiving a medal (e.g., the pride, the excitement, etc.) _____
4. I image the audience applauding my performance. _____
5. I image myself winning a medal. _____
6. I image myself being interviewed as a champion. _____

Motivational General-Arousal

1. I can re-create in my head the emotions I feel before I compete. _____
2. I imagine myself handling the stress and excitement of competitions and remaining calm. _____
3. I imagine the stress and anxiety associated with competing. _____
4. When I image a competition, I feel myself getting emotionally excited. _____
5. When I image an event/game that I am to participate in, I feel anxious. _____
6. I image the excitement associated with competing. _____

Motivational General-Mastery

1. I image giving 100% during an event/game. _____
2. I image myself being mentally tough. _____
3. I imagine myself appearing self-confident in front of my opponents. _____
4. I image myself to be focused during a challenging situation. _____
5. I imagine myself being in control in difficult situations. _____
6. I image myself working successfully through tough situations (e.g., a power play, sore ankle, etc.) _____

APPENDIX 6

REVISED SPORT IMAGERY QUESTIONNAIRE (SIQ-2)
(Martens, 1982)

Student ID: _____

SPORT IMAGERY QUESTIONNAIRE (SIQ-2)
(Martens, 1982)

Please note that completion of this questionnaire indicates consent to participate in this research study.

Directions: Please complete this questionnaire by imagining four sport specific imagery situations. Imagine each situation and provide as much detail from your imagination as possible to make the image seem real. You will then be asked to rate your imagery in these five ways:

- How vividly you saw or visualized the image
- How clearly you heard the sounds
- How vividly you felt your body movements
- How clearly you were aware of your state of mind or mood or felt the emotions of the situation
- How well you were able to control the images

Now close your eyes and take a few deep breaths to become as relaxed as you can. Put aside all other thoughts. Keep your eyes closed and try to imagine the situation described. Be sure to think of specific examples of the skill, the people involved, the place, the time, and so on. There are, of course, no right or wrong images. However, your accurate appraisal of your images will help you determine what aspects of imagery you need to focus on in the development of your imagery skills. After imaging each situation, rate the five dimensions by circling the appropriate responses: 1 = Very poor, 2 = Poor, 3 = Moderate, 4 = Well, and 5 = Very Well. (Adapted from ACEP, 1987).

<u>Situation 1:</u> Select a specific skill or situation in your sport (serve, foul shot). Imagine yourself in the gym where you would normally practice. Now close your eyes for about a minute. Try to see yourself at this place: hear the sounds, feel the body movements, and be aware of your mood.

1. Rate how well you saw yourself performing the activity.	1	2	3	4	5
2. Rate how well you heard the sounds.	1	2	3	4	5
3. Rate how well you felt yourself performing the activity.	1	2	3	4	5
4. Rate how well you were aware of your mood.	1	2	3	4	5
5. Rate how well you controlled your image.	1	2	3	4	5

<u>Situation 2:</u> You are performing the same activity as in Situation 1, but this time you make a mistake that everyone notices. Now close your eyes for about a minute and imagine making the error and what occurs immediately afterward.

1. Rate how well you saw yourself performing the activity. 1 2 3 4 5
2. Rate how well you heard the sounds. 1 2 3 4 5
3. Rate how well you felt yourself performing the activity. 1 2 3 4 5
4. Rate how well you were aware of your mood. 1 2 3 4 5
5. Rate how well you controlled your image. 1 2 3 4 5

<u>Situation 3:</u> Think of a teammate performing a specific activity unsuccessfully in a game (missing a serve, missing a shot, being passed by other runners, etc). Now close your eyes for about a minute to imagine watching your teammate performing this skill or activity unsuccessfully in a critical part of the game as vividly and realistically as possible.

1. Rate how well you saw your teammate. 1 2 3 4 5
2. Rate how well you heard the sounds. 1 2 3 4 5
3. Rate how well you felt your own physical presence or movement. 1 2 3 4 5
4. Rate how well you felt your own emotions. 1 2 3 4 5
5. Rate how well you controlled your image. 1 2 3 4 5

<u>Situation 4:</u> Imagine yourself performing the same activity that you imagined your teammate performing in Situation 3. Imagine yourself performing the activity very skillfully. Spectators and teammates show their appreciation. Now close your eyes for about a minute and imagine the situation as vividly as possible.

1. Rate how well you saw yourself. 1 2 3 4 5
2. Rate how well you heard the sounds. 1 2 3 4 5
3. Rate how well you felt yourself making the movements. 1 2 3 4 5
4. Rate how well you felt the emotions. 1 2 3 4 5
5. Rate how well you controlled your image. 1 2 3 4 5

APPENDIX 7

TABLES REPRESENTING PARTICIPANTS DEMOGRAPHIC INFORMATION

Table 7

Frequency, Percent, and Cumulative Percent for Athletes' Age

Age in Years	Frequency	Percent	Cumulative Percent
17	1	2.0	2.0
18	12	23.5	25.5
19	8	15.7	41.2
20	18	35.3	76.5
21	5	9.8	86.3
22	4	7.8	94.1
23	2	3.9	98.0
26	1	2.0	100.0
Total	51	100.0	

Table 8

Frequency, Percent, and Cumulative Percent for Ethnicity

Ethnicity	Frequency	Percent	Cumulative Percent
Caucasian	43	84.3	87.8
Bi-Racial (Black/ White)	1	2.0	89.8
Black	1	2.0	91.8
Innu	1	2.0	93.8
Aboriginal	2	3.9	98.0
Malaysian	1	2.0	100.0
Subtotal	49	96.1	
Missing	2	3.9	
Total	51	100.0	

Table 9

Frequency, Percent, and Cumulative Percent for The Age Athletes Began Using Imagery

Age Began Using Imagery	Frequency	Percent	Cumulative Percent
Under 12 years old	8	15.7	15.7
13 years old	3	5.9	21.6
14 years old	5	9.8	31.4
15 years old	11	21.6	52.9
16 years old	12	23.5	76.5
17 years old	5	9.8	86.3
18 years old	5	9.8	96.1
Not Applicable	2	3.9	100.0
Total	51	100.0	

Table 10

Frequency, Percent, and Cumulative Percent for Time Spent Using Imagery

Time Spent Imaging	Frequency	Percent	Cumulative Percent
Never	1	2.0	2.0
Rarely	5	9.8	11.8
Occasionally	17	33.3	45.1
Often	18	35.3	80.4
Regularly	7	13.7	94.1
Always	3	5.9	100.0
Total	51	100.0	