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Mental Imagery and Body Image in Female Varsity Rowers

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MENTAL IMAGERY AND BODY IMAGE IN FEMALE VARSITY ROWERS

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by

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CERTIFICATE OF APPROVAL

MASTER OF SCIENCE THESIS

This is to certify that the Thesis of

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ABSTRACT

This study explored the relationship between body image perceptions and mental imagery among female collegiate varsity rowers. More specifically, the study investigated the body image perceptions and use of mental imagery between high skilled and low skilled rowers. It was hypothesized that rowers with a positive body image would use a more external imagery perspective while those with a negative body image would employ more of an internal imagery perspective. It was also hypothesized that those having a higher skill level would be more likely to image themselves internally whereas those at a lower skill level would be more likely to image themselves externally. Finally, it was hypothesized that there would be no difference in imagery perspective between genders.

A total of 24 subjects volunteered and completed the study: nineteen females and five males. Due to the few males that participated, the male data were omitted from all analyses. All subjects were sophomore, junior, or senior varsity rowers on a collegiate rowing team. Following informed consent, each rower completed three body image measures, two mental imagery measures, and a demographics questionnaire over a three day period. They also had anthropometric measurements taken of height, weight, skinfolds, and body circumference measures. The head coach completed a questionnaire, which asked the coach to rate each athlete's technique, compare the athlete to previous athletes, and rank them in comparison to their current teammates. Athletes were then classified as high skilled or low skilled athletes based on their coach's perception of technique rating and ranking as well as their ergometer performance on the rowing machine.

After splitting the athletes into high and low skilled groups, a one-way analysis of variance (ANOVA) with two levels was run. The results of this study found that the high and low skilled groups did not differ significantly in imagery perspective except for the

kinesthetic portion of the Movement Imagery Questionnaire-Revised (MIQ-R). On two of the body image measures – the Body Esteem Scale (BES) and the Body Awareness Questionnaire (BAQ) – the groups did not significantly differ in any areas of body image. The third body image measure, the Physical Self Description Questionnaire (PSDQ), did show significance in one of the subcategories – PSDQ flexibility – but the other subcategories and the total score were not significantly different between groups. There were selected significant correlations between imagery scores and body awareness scores. In conclusion, the higher skilled rowers differed from the lower skilled group in only the MIQ-R kinesthetic scale and on the PSDQ flexibility scale. These results indicate only minimal differences between higher and lower skilled rowers in body image and a complex association among body image measures and imagery ability.

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CHAPTER 1

INTRODUCTION

Rowing is a year-round sport enjoyed at many levels, from youth to master, and novice to Olympic. Despite the popularity of rowing, most rowers are not introduced to the sport until they reach college age. At the college level, schools with rowing teams offer interested individuals the chance to participate on their novice teams against other collegiate novices. Novice rowers learn basic technique, rules, and strategy as well as the motivation and determination it takes to succeed. Novices who stick with the rigorous training may be able to move up to compete at the varsity level.

At the collegiate level rowing is broken up into fall and spring seasons. The fall season consists of long distance races covering 5,000 meters, whereas the spring consists of sprint races lasting 2,000 meters. Most collegiate teams prefer sweep rowing, which is when each athlete has one oar. In contrast, in sculling, each athlete has two oars with one on each side of the boat. Collegiate teams typically race in eights, which consists of eight rowers and one coxswain, or fours, which consists of four rowers and one coxswain. There are other size boats for both sculling and sweep rowing, however, at the collegiate level, the eights and fours are more widely used.

Because rowing is a fall and spring season sport, rowers are not allowed to hold official team practices during the winter due to National Collegiate Athletic Association (NCAA) regulations. Cold weather conditions also limit outdoor training, but most athletes train on rowing ergometers on their own. Ergometers are stationary rowing machines that enable rowing-specific training and thereby provide a way for athletes to monitor their performance.

The greatest challenge for many rowers is learning the correct technical aspects of the rowing stroke. The rowing stroke consists of two phases: the recovery and the drive. The recovery occurs while the athlete is moving up the slide and the oar blade is out of the water. The drive consists of the power part of the stroke where the athlete is pulling the blade through the water and pushing with his or her legs. After the basic movements are learned, the different phases of the stroke can be strengthened and refined through practice. Unfortunately, the amount of time collegiate athletes can spend practicing on the water with their coaches is limited by the NCAA. Therefore, athletes must find alternative ways to improve their stroke technique. This often comes in the form of mental training. One mental training strategy that can be used to improve stroke technique is mental imagery. Mental imagery has been shown to have a positive effect on learning and performing various sport skills (Feltz & Landers, 1983; Martin, Moritz, & Hall, 1999). Within rowing, athletes have used mental preparation to enhance learning and help with performance (Beale, 1985).

Because no two people are alike, the way an individual uses imagery can differ greatly from one person to the next. For instance, some people can be more of the visual type of imager, some can be more of the kinesthetic type, and some can use both almost equally. In addition, some individuals can have a very detailed, clear, and concise image, whereas others have a hard time imaging a clear image (Isaac & Marks, 1994). People may also differ in their mental view. One view is external or third person imagery, and the other view is internal or first person imagery (Glisky & Williams, 1996). For instance, as an external imager, one would view him or herself as if he or she was watching the action take place on a television. On the other hand, as an internal imager,

one would view him or herself as if he or she was actually participating in the visualized task. Mental imagery has been shown to be most effective when it involves all five senses and can be done from both the internal and external viewpoints (Weinberg & Gould, 2003).

Although many sport performance differences have been found between men and women, current research has shown little difference between men and women and their mental imagery use. However, gender differences have been found in other sport-related mental skills, such as anxiety management and concentration training, thus, it is logical to reexamine imagery usage in today's female athletes because of prior conflicting data (Weinberg, Butt, & Knight, 2003). Some studies have found that females practice mental imagery more regularly than males, while other studies have found that males use mental imagery more often than females (Wang, Huddleston & Peng, 2003). Isaac et al. (1994) noted that gender and developmental differences have been found in existing literature; Galton (1883) found differences where females were able image more easily than males. Galton (1883) also found that both sexes used mental imagery more as they aged. Other researchers support these findings (Durndell & Wetherick, 1975; Marks, 1973; Sheehan, 1967; White, Ashton & Brown, 1977); however some studies have found no significant differences in gender and mental imagery experiences (Ashton & White, 1980; Beech & Leslie, 1978; Lane, 1977).

Currently, there exists little evidence to explain the equivocal results regarding female athletes' use of mental imagery. One interesting possibility is that mental imagery may be related to body image. Body image is a complex construct that essentially concerns how one feels about his or her body and how he or she feels others perceive his

or her body. It seems plausible that body image may have an affect on mental imagery use. For example, one might suggest that athletes with a negative body image might prefer an internal imagery perspective in which they are not viewing their body.

One challenge among athletes, especially female athletes, is body image problems, which has the potential to lead to eating and exercise disorders. Some rowers, such as lightweights, must maintain a certain weight to be able to participate in lightweight races. These athletes often need to maintain their current weight or even lose weight to meet sport standards. These standards can result in weight control practices such as dieting and eating disorders (Chapman, 1997). On the other hand, heavyweight rowers often have more muscle and are both taller and wider than the average person, which could possibly lead to body image distortions as well. Athletic uniforms may contribute to social physique anxiety, which can lead to body image disturbances. For instance, athletes such as swimmers, rowers, wrestlers, sprinters, and gymnasts all wear uniforms that are fairly revealing (Krane, Waldron, Michalenok, & Stiles-Shipley, 2001). Rowers often wear a one-piece, form-fitting, suit made of spandex, which eliminates the possibility of the clothing obstructing the rowing motion.

Rowers are clearly not immune to body image disorders, and because of the highly technical and synchronized nature of their sport, are prime candidates to use mental imagery. Thus, it is important to examine how mental imagery and body image may affect each other. To date, previous research has not looked into this area or has come up with mixed results relating to gender and imagery perspective as well as gender and body image. Due to this, the purpose of this paper is to compare high and low skilled women athletes from a collegiate rowing team to see if they have a difference in imagery

abilities and if their imagery is affected by body image perceptions. Comparing these different groups may reveal if rowers image differently or have different perceptions in body image based on their skill. It may also show the different body image perceptions relating to the sport, as well as how their body type fits into the sport. Lastly, the rowers will have their body image and imagery assessed during the midseason. By looking at skill level differences and imagery perspective as well as body image views, it may enable future coaches to look for athletes that have the potential to have a body image disturbance as well as help figure out which imagery perspective the more successful athletes are prone to using.

Statement of Purpose

The purpose of this study was to compare mental imagery and body image perceptions of male and female collegiate varsity rowers. However, due to an insufficient number of male subjects tested, only females were used. Hence, the purpose of this study was to address the relationship between body image and imagery perspective in high and low skilled female rowers.

Hypotheses

It was hypothesized that rowers with a positive body image would use a more external imagery perspective whereas those with a negative body image would employ more of an internal imagery perspective. It was also hypothesized that those having a higher skill level would be more likely to image themselves internally in contrast to athletes at a lower skill level who would be more likely to image themselves externally.

Definition of Terms

The following definitions are operationally defined for the purpose of this investigation. They include:

1. Imagery - using the senses to rehearse or create movements in the mind, without any physical movement actually occurring from the body (Afremow, Overby & Vadocz, 1997).
2. Internal Imagery (first person view) - view of oneself during imagery where he or she is actually performing the task (Mahoney & Avener, 1977).
3. External Imagery (third person view) - view of oneself watching the task at hand being performed (Mahoney & Avener, 1977).
4. Senses - six sensory modalities that the nervous system uses to detect the outside world include visual imagery, kinesthetic imagery, auditory imagery, olfactory imagery, gustatory imagery, and tactile imagery (Vealey, & Walter, 1993).
5. Visual Imagery (see self doing something) - imagery that incorporates the visual/sight sense (Afremow et al., 1997).
6. Kinesthetic Imagery (feel self doing something) - imagery that incorporates feeling/bodily sensations sense (Afremow et al., 1997).
7. Auditory Imagery - imagery that incorporates auditory cues that may particularly benefit dancers, skaters, and gymnasts (Vealey et al., 1993).
8. Olfactory Imagery - imagery that incorporates the sense of smell (Vealey et al., 1993).
9. Gustatory Imagery - imagery that incorporates the sense of taste (Vealey et al., 1993).

10. Tactile Imagery - imagery that incorporates the sense of touch (Vealey et al., 1993).
11. Body Image - a person's personal view of his or her own body (Rodin, 1992).
12. Novice Rower – a rower that is a beginner or in his or her first season.
13. Varsity Rower - a rower that has had previous experience in the sport (i.e., more than one year of experience or raced in at least one varsity race).
14. Lightweight Rower- A weight class for rowing that has specific weight criteria. During the competitive season, male lightweights are required to be less than 165 pounds with a boat average of 160 pounds. Female lightweight rowers are required to have a boat average of 130 pounds (Sykora, Grilo, Wilfley & Brownwell, 1993).
15. Heavyweight Rower- A weight class for rowing that has no specific weight criteria (Sykora et al., 1993).

Delimitations of the Study

The following delimitations include:

1. The study only included male and female varsity rowers from an NCAA Division III college in the northeast United States.
2. Imagery use and vividness were assessed by two questionnaires: Vividness of Movement Imagery Questionnaire (VMIQ; Isaac, Marks & Russell, 1986) and Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1999).
3. Skill level was assessed by each athlete's head coach in order to assess an accurate reflection of rowing talent.

4. Equal numbers of males and females will not be used, therefore, differences between genders might be difficult to identify.

Limitations of Study

The following limitations include:

1. The results can only be applied to male and female, college aged rowers and not other levels or ages as well as only Division III athletes.
2. Skill level is only determined by one, single coach and not multiple coaches.
3. Unequal numbers of males and females were used, which might alter gender differences.
4. Small sample sizes may limit the generalizability of results.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this study was to compare imagery perspectives and body image perceptions of female varsity collegiate rowers of different skill levels. In order to do so, it is important to look at imagery perspectives and body image perceptions while comparing skill level. This section examines the current literature on these topics.

In order to achieve peak performance it is necessary to be physiologically prepared. In addition, it is also necessary to use mental imagery to be prepared psychologically. Imagery refers to using the senses to rehearse or create movements in the mind, without any physical movement actually occurring from the body (Afremow et al., 1997). A variety of names have been used to refer to imagery. Some of these names include "covert practice, image training, imagery practice, imaginary exercise, implicit practice, mental rehearsal, mental review, and symbolic practice" (Grouios, 1992, p. 2). By preparing for sport using mental imagery, an athlete will gain an edge on the competitors who neglect to do so (Surgent, 1985). It is important for athletes to incorporate imagery with physical training because imagery has been found to enhance skills, motivate, and improve performance in various athletic situations (Epstein, 1980; Feltz et al., 1983; Suinn, 1993; Vealey et al., 1993). According to Vealey (1991), imagery is also important because it can be used to practice or learn physical, perceptual, and psychological skills, which are all in sport. In addition, imagery can be used to control physiological responses, overcome performance problems, and recover from injury (Vealey, 1991).

Murphy, Jowdy, and Durtschi (1989) reported that 90% of athletes, 94% of coaches, and 100% of sport psychologists use mental imagery on a regular basis for training in athletic programs. This is most likely due to observations and beliefs that when imagery is used appropriately, it can improve an athlete's performances (Moran, 1993).

This literature review focuses on mental imagery and body image. Mental imagery is explored by looking at imagery use, imagery types, imagery measures, internal and external views of imagery, how imagery and the brain work, and gender-related issues with imagery. Body image is explored by looking at body image measures, gender and body image, exercise, gender and body image, body image and adolescents, and athletes and body image. This section then concludes with a detailed look at rowers, imagery, and body image.

General Uses for Imagery

Imagery is important for both athletes and non-athletes, and has been studied in many different fields. Imagery has been examined in:

> "control of asthma, lessened anxiety, sense of self-efficacy and sense of control, motor skills development, headaches, depression, eating disorders, nausea and vomiting in cancer patients receiving chemotherapy, psychological distress, and wound healing (Menzies & Taylor, 2004, p. 4)."

Beyond its broad spectrum of study, imagery is applied in many areas of life besides competitive sport. It has also been used for developing language, motivation, and motor skills. Giacobbi, Hausenblas, Fallon, and Hall (2003) recently suggested that imagery can be useful for exercise behavior. These authors looked at the content and

function that regular exercisers feel their exercise imagery contains. Using semi-structured interviews on female exercisers, the authors used the following themes: exercise technique, aerobic routines, exercise content, appearance images, competitive outcomes, fitness and health outcomes, emotions and feelings associated with exercise, and exercise self-efficacy. The subjects discussed the content of their imagery being goal oriented to their physical appearance. Exercisers were found to use imagery for energy, appearance, and technique. For instance, imagers picture themselves having increased energy, themselves looking thinner and in better shape, as well as themselves performing the exercise with proper form. The first two types are seen to deal with motivation while the latter type deals with cognitive functions (Giacobbi et al., 2003).

In order to get an advantage over other competitors, some athletes have used imagery to prepare for competition, believing it to positively affect their performance (Murphy, 1990). The use of imagery has been studied extensively over the last century, and dates back as early as 1897-1898 when William Anderson, a physical educator, first started looking at mental practice. Since then, hundreds of studies have looked at the relationship between imagery and performance in sport (Wiggins, 1984). Some 300 or more studies have investigated imagery (Grouios, 1992), yet numerous questions remain regarding its use and effectiveness.

Previous research shows that many athletes have been found to use imagery and feel it is an important skill for athletes to use (Abma, Fry, Li & Relyea, 2002). A few notable athletes that claim to use imagery include Chris Evert, Jack Nicklaus, Jean Claude Killy, Dwight Stones, and Greg Louganis (Gordon et al., 1994; Vealey, 1991). In addition, it has been found in the literature that high level athletes use imagery more than

recreational athletes (Hall et al., 1990). According to Orlick et al. (1988), studies of international-level athletes have found that imagery is used by 70 to 90 percent of athletes. It has also been found that imagery is used by non-elite-level athletes (Orlick et al., 1988; Mahoney, Gabriel, & Perkins, 1987; Ungerleider, Golding, Porter, & Foster, 1989). This is because visualizing a sport situation is helpful in allowing the athlete to experience success when he or she is in the real life sport situation (Campos et al., 2001-2002).

Imagery and its effectiveness on teaching a skill depends on what type of task the individual wishes to learn. For instance, when learning a closed skill, there should be emphasis on kinesthetic imagery, but when learning an open skill, there should be more emphasis on visual imagery to be most effective (Hall et al., 1992). An example of a closed skill would include the motions of rowing since it is a continuous, cyclical movement. On the other hand, an example of an open skill would be soccer since no two games are alike and game situations vary continuously. Imagery has been demonstrated in many studies to memorize movement (Taktek, 2004). Due to this reason, it might be important to use imagery in athletes that are learning a new skill, such as novice rowers.

Types of Imagery

Imagery can be classified based on two distinct categories: imagery perspective and imagery sensory modality. There are two types of imagery perspective; external and internal (Gates, DePalma & Shelley, 2003). It is believed that external imagery is predominantly visual, as it uses a third-person perspective, where the viewer sees him or herself performing the action. According to Epstein (1980), internal imagery is generally linked with the kinesthetic sense because of its use of a first person perspective, where

the viewer feels him or herself doing the motion (Epstein, 1980). It is uncertain if the imager's perspective, either internal or external, plays a role in the impact of mental rehearsal (Epstein, 1980).

Imagery can also be categorized by sensory modality, that is, visual or kinesthetic. Visual imagery uses sight where kinesthetic imagery uses sensations produced during bodily movement. In visual imagery one sees himself doing something whereas in kinesthetic imagery one feels him or herself doing something. Other senses, such as hearing, smell, and touch can also be incorporated into an imagery routine, but are not widely used alone (Afremow et al., 1997). It has been found that including different modalities from the skill the individual is imaging can help to improve motor imagery vividness (Calmels, Holmes, Berthoumieux & Singer, 2004).

Imagery Measures

A variety of tests have been created to measure individual differences in mental imagery. Two popular tests include the Vividness of Movement Imagery Questionnaire (VMIQ, Isaac, Marks & Russell, 1986) and Movement Imagery Questionnaire-Revised (MIQ-R, Hall & Martin, 1999).

Isaac, Marks, and Russell (1986) developed the VMIQ to measure the vividness of movement imagery from an external, visual perspective where an individual watches someone else and an internal visual perspective where an individual watches his or herself from their own perspective. The VMIQ is a 24-item test related to movement imagery. It contains six categories of four items. These categories range from basic body movements (e.g., jumping) to items that demand control (e.g., balancing on one leg). When completing this measure, subjects are asked to image from an external visual

imagery perspective and then to repeat from an internal visual imagery perspective. The subjects rate their ability to image themselves and others performing physical skills. The participants then rate the image on clearness and vividness on a 5-point Likert scale. This scale consists of "perfectly clear and as vivid as normal vision," "clear and reasonably vivid," "moderately clear and vivid," "vague and dim," or "no image at all, you only know that you are thinking of the skill." The lower the score for each of the two perspectives indicates greater vividness. This measure has been found to be both reliable and valid (Callow & Hardy, 2004; Isaac et al., 1986; Ostrow, 2002).

Hall and Martin (1997) developed the MIQ-R to look at individual differences in visual and kinesthetic imagery of movement and assess the ease that subjects visually and kinesthetically imagine movements. It contains eight items: four visual and four kinesthetic. When completing this measure, subjects were instructed to image detailed body movements focusing on using visual or kinesthetic techniques. An example would be to have the subjects try to visualize touching their toes. The odd numbered questions correspond to kinesthetic imagery, while even numbered questions correspond to visual. For each item, an individual is instructed to execute a movement and then rate the clarity of this movement on a 7-point Likert scale. On this scale the subjects respond with "very easy to see/feel," "easy to see/feel," "somewhat easy to see/feel," neutral (not easy to see/feel, not hard to see/feel)," "somewhat hard to see/feel," "hard to see/feel," and "very hard to see/feel." The imagery abilities are calculated separately into two subscales: visual and kinesthetic imagery abilities. A higher score indicates better imaging skill. The MIQ-R has proved to be reliable and valid (Hall & Martin, 1997; Hall, Pongrac & Buckolz, 1985; Ostrow, 2002; Vadocz, Hall & Moritz, 1997).

Effectiveness of External, Internal, Kinesthetic, and Visual Imagery

The ability to image is found to have a significant role in mental aspects of sport (Orlick & Partington, 1988; Vealey et al., 1993). The way that the performer views the skill, either internally or externally, can have an impact on skill development (Eddy & Mellalieu, 2003). Past research has found that most athletes use both perspectives during imagery sessions to an equal extent and are able to switch back and forth between the two perspectives (Hall, Rodgers & Barr, 1990). It has also been proposed that internal imagery is best for acquiring and performing open skills that require perception to be successful (White, & Hardy, 1995). On the other hand, researchers have shown that external imagery is best for performance on tasks where form is an important factor in the skill (Callow & Hardy, 1995). Inconsistencies in the research data could be attributed to studies using a variety of sports, levels, and abilities of athletes (Epstein, 1980).

Many studies have found the internal imagery perspective to be superior. Glisky and Williams (1996) concluded from their examination of the extant research that successful athletes used an internal perspective and kinesthetic sensations during imagery more often than their less successful counterparts (Hall et al., 1990; Mahoney et al., 1977; Orlick et al., 1988). For example, an examination of elite gymnasts from the American Olympic Gymnastics Team found that the more successful athletes – the qualifiers – used primarily internal imagery when compared to the non-qualifiers (Mahoney et al., 1977). Start and Richardson (1964) also used gymnasts in their study. They found that kinesthetic and internal imagery was related to the successful completion of a gymnastics move.

Similar results were found with skiers in a study by Rotella, Gansneder, Ojala, and Billing (1980). These authors used female skiers at the international level and found that the more successful skiers used mental imagery from an internal perspective. The women who were World Cup winners used more of an internal and kinesthetic imagery compared to the members on the team who were not World Cup winners. Eddy et al. (2003) performed a study using elite goalball athletes with visual impairments and used interviews to assess their mental imagery in training and competitions. The authors found that the participants imaged from only an internal perspective. These results were preassumed to be associated with their visual impairment status, as other studies have shown that sighted people have the ability to use both imagery perspectives. Also, Orlick and Partington (1986) found that the successful athletes of Canada's 1984 Olympic team used an internal imagery perspective and felt the actions and the surroundings as if they were actually there in their imagery sessions.

Despite the above noted findings, results remain vague because there are other studies that support the notion that there are no significant differences between the two imagery perspectives, or that an external perspective is more beneficial. For instance, Ungerleider and Golding (1991) found that successful Seoul Olympian track and field competitors also had strong kinesthetic sensations during imagery, but used more of an external imagery view (Callow & Hardy, 2004).

Epstein (1980) examined the relationship of internal and external imagery rehearsal with motor performance, as well as the effect the performance had before a motor task. To do this, she used dart throwing to measure physical performance. The subjects were put into one of the following three groups: control, internal, or external

mental rehearsal group. Epstein used a baseline and then instructed the two imagery groups to mentally rehearse throwing three sets of ten darts with imagery based on the group they were in. There was no difference found between the three groups, but the females were found to differ slightly across the three groups. In addition to Epstein (1980), other studies have found no difference between imagery perspectives. Meyers, Cooke, Cullin, and Liles (1979) looked at collegiate racquetball players and Mumford and Hall (1985) looked at figure skaters, but these studies found no imagery perspective to be any more significant than the other in relation to skill level.

Some studies suggest that experts and novices differ in their ability to use visual imagery and kinesthetic imagery (Barr & Hall, 1992; Mahoney et al., 1977). However, some studies suggest no difference between the two, but that kinesthetic imagery is beneficial with a certain amount of expertise (Guillot et al., 2004; Hardy & Callow, 1999).

In brief, more studies support internal imagery in comparison to external imagery, but there is no consensus on a superior method (Hall, Buckoltz & Fishburne, 1992). It may be that the best method simply depends on which perspective is more comfortable for the user (Beale, 1985). It may also be task dependent. Glisky et al. (1996) looked at internal and external imagery and its effect of kinesthetic and visual tasks. In their study using imagery perspective and task type, they found that external imagers showed greater performance in motor or kinesthetic tasks where internal imagers showed greater performance in cognitive or visual tasks.

Gordon and Weinberg (1994) looked at an internal and external imagery training program and how it helped or hindered the performance of the athletes in cricket bowlers.

Subjects were placed into one of the three following groups: internal imagery training, external imagery training, or control. The internal and external imagery groups used their specific imagery before performing twelve cricket pitches during six practice sessions. The results revealed no significant differences between the three groups with improvement in all three groups during each trial. Results also showed that the individuals used their specific imagery; however, they often found themselves switching back and forth between both types of imagery. This gave the authors reason to believe that imagery perspective may depend on the individual's preference. Due to the fact that the subjects were not able to use one imagery perspective, this could make it difficult to find if one perspective is superior to another.

In sum, identifying the best imagery perspective remains elusive. It appears that the most effective imagery type and perspective is individual-specific and is dependent on a host of task related factors and individual preferences.

How Does Imagery Work?

According to Decety (1995), repeated evidence suggests that mental imagery works. Specifically, imagery uses similar neural mechanisms used in motor control (Decety, 1995). Mental imagery may use the same processes as those involved in programming actual actions (Decety, 1995). Imagery also helps an athlete get mentally ready so that she or he is focused and attending to necessary elements to perform well during competition (Vealey, 1991).

Imagery can be used to improve sport performance when athletes use it to rehearse skills in their mind, run through strategies and routines of play, to motivate by imaging the achievement of goals, and an increase in mental effort since imagery requires

a high amount of concentration to create and control the images (Cumming & Hall, 2002). Imagery is important to motivate athletes because it has been found to optimize arousal and emotional levels, which facilitates goal formation. On the other hand, imagery allows one to adopt effective movement strategies related to sport (Taktek, 2004).

When used as a psychological intervention to enhance performance, imagery is more effective than other techniques that have been used, such as relaxation and positive self-talk (Bacon, 1987; Greer & Engs, 1986). Other studies have found that the use and type of imagery vary, depending on the success of the athlete (Kenitzer et al., 1991). According to Murphy (1990) there are two uses of imagery by sport psychologists, which include mental practice intervention and a coping strategy to help athletes manage their performance. The first use is done by rehearsing a skill in the mind to improve performance mentally, which is thought to be best when used in conjunction with physical practice, as mentioned previously (Murphy, 1990). The second, coping strategy, is thought to be useful as a "psych up" method, prior to competition, to get athletes mentally ready (Murphy, 1990).

Imagery is also important for pre-performance because it can help build self-confidence (Tod, Iredale & Gill, 2003). For instance, if an athlete pictures his or herself winning or performing well, he or she will feel good about themselves before a competition. In order to be effective, imagery should be practiced on a regular basis in combination with physical practice (Feltz & Landers, 1983). It is important for coaches to include time in their training routines for imagery sessions so that they can progress

athletes through imaging by using a script to teach the athletes to feel, smell, taste, hear, and see in great detail (Gates et al., 2003).

According to Shackleton and Fletcher (1984), subject characteristics can have an effect on imagery studies as well. Every individual is different, which can affect the individual's ability to improve performance even with the use of mental imagery. In addition, the subjects age (Feltz et al., 1983), imagery ability (Start et al., 1964), intelligence (Perry, 1939), type of imagery used (Waterland, 1956), previous experience (Corbin, 1972), gender (Johnson, 1967), and skill level (Start, 1962) are all contributing factors on how much of an impact imagery will have. Therefore, all of these factors need to be taken into account. Depending on which task the subjects are participating in and the nature of the experiment, the results will be affected. Because some skills are cognitive versus functional (Ryan & Simons, 1981), familiar versus unfamiliar (Johnson, 1982), fine muscle versus gross muscle (Brumback, 1968), opened-skill versus closed-skill (Feltz et al., 1983), and simple versus complex (Phipps, 1968), the results can vary. Due to this, the nature of the task needs to be taken into account. Motivation can be an issue as well. Some subjects may be more interested in the topic while others are less interested and motivated. Also, motivated individuals may be more likely to participate in a study (Richardson, 1967). And finally, imagery effectiveness research may subject to publication bias, which leads to an overestimation of its effectiveness (Grouios, 1992).

Mental imagery depends on the perception of the imager (Epstein, 1980). Often times, this perception is less intense, more precise, and more detailed than a real life situation. In sport psychology, imagery is seen as a learning experience for athletes. When imagery is combined with physical practice, the optimum motor performance will

result for that individual (Taktek, 2004). Studies have shown that the more vivid a scenario a person images, the more likely this person will correspond to the image in reality, and this will lead to better results in athletic competitions (Corbin, 1972; Smith, 1987). As mentioned previously, it has been agreed upon that imagery training is useful for athletes, in addition to physical practice (Campos, González, Dopico, & Iglesias, 2001-2002; Grouios, 1992).

Most research has indicated that, in addition to training the body, it is important to train the mind and its effect on planning and controlling motor skills (Grouios, 1992). Imagery has positive results and is as effective as physical practice when used in combination with physical practice (Denis, 1991; Feltz et al., 1983; Grouios, 1992). Sometimes imagery is more convenient than physical practice because it can be performed whenever an athlete wishes to do so, or fits it into his or her schedule or routine. There has not been one specific reason found for why athletic improvement occurs through the use of imagery, however, there are a variety of theories that suggest why imagery is beneficial (Grouios, 1992). According to Grouios (1992), a range of studies have been performed using imagery. While doing so, experimenters have used various designs, skills, types of imagery, sports, and so on (Grouios, 1992).

In sum, there has been much research on imagery and its effect on performance skills; however, the processes used in imagery are not as clear (Glisky et al., 1996). The effects of imagery are well documented and are shown to have positive results in performance (Beale, 1985; Epstein, 1980; Feltz et al., 1983; Murphy, 1990; White & Hardy, 1998); however, studies have been inconsistent so it is hard to see what type of

imagery produces the greatest results (Baddeley & Andrade, 2000; Callow et al., 2004; Murphy, 1990).

Gender and Imagery

Gender differences are prominent in the athletic domain. It has been found that males and females vary significantly with the type, level, and intensity of sport involvement (Coakley, 1998). According to Duda (1991), women have not engaged in sport to the same degree as men because women are less likely to engage in physical activity, they are not as competitive, and they do not care as much as the performance outcome in relation to men. These behaviors and attitudes explain some gender differences in sports performance (Weinberg et al., 2003). Because males and females differ in so many different ways physically, mentally, and emotionally, it is possible that there could be differences in imagery use. However, the results of past studies have brought about inconsistent results.

Campos, Pérez-Fabello, and Gómez-Juncal (2004) examined gender and age differences in imaging capacity. In doing so, they looked at college graduates of three different age categories, age 20-40, 41-60, and over 60. The groups participated in a mental image rotation test and a questionnaire on image control. In the performance-based test using mental image rotation, it was found that men obtained higher scores than women and younger subjects received a higher score than older subjects. However, no significant differences were found in the self-reported questionnaire on image control.

Isaac et al. (1994) studied developmental changes and differences in visual and movement imagery in both male and female children and adults. They also investigated if differences in imagery vividness can be measured in specialist groups. In part one of

their, the authors had subjects (ages 7-50+) complete the Movement Imagery Questionnaire (MIQ; Hall et al., 1985) and the VMIQ (Isaac et al., 1986). Females aged 8-9 and males aged 10-11 were found to better imagery vividness. Overall, females reported more vivid imagery when compared to males, but some females were found to have reduced movement imagery vividness. In parts two through five, the same questionnaires were used, but there were specific groups in each part of the study. Part two was made up of children with poor movement control and they were found to be poor imagers, with almost half of them reporting no imagery. Part three was comprised of students from physical education, physics, English, and surveying. The physical education students reported the most vivid imagery out of the groups. Part four found significant differences between elite athlete imagery and a control group. Part five was made up of air traffic controllers and pilots. They were found to have significantly more vivid imagery than control groups.

Weinberg et al. (2003) looked at imagery and gender. To do so, they did three different things. First, they altered the Sport Imagery Questionnaire (SIQ; Hall et al., 1998) by adding an effectiveness component to the current frequency component. Second, they assessed the use of imagery in athletes by finding out when athletes use imagery and under what circumstances. Last, they analyzed the impact that gender and sport type had on imagery use. Using collegiate athletes that participated in individual and team sports, the authors had them complete the SIQ and the Imagery Use Questionnaire (IUQ), as well as an open-ended questionnaire to gauge imagery use. Both the SIQ and IUQ were found to be reliable in this study. The authors found that most athletes used imagery prior to competition and in difficult, high pressure situations. The

authors also found gender differences in the use of imagery. Males used imagery more frequently and felt that imagery was more effective than the female subjects.

The results of Weinberg et al. (2003) are inconsistent with other results regarding gender differences in the use of imagery. For instance, some research suggests that there are no differences between gender and the use of imagery (Martin, Moritz & Hall, 1999; Munroe, Giacobbi, Hall & Weinberg, 2000; White et al., 1998). On the other hand, some studies have found only minor differences in gender and imagery use (Barr et al., 1992; Salmon, Hall & Haslam, 1994). However, Weinberg et al.'s (2003) results are consistent with findings that there are noticeable gender differences in sport participation (Bem, 1993; Burke, 1986; Eccles & Harold, 1991; Gill, 1995). In summary, there is still much to learn regarding gender differences and imagery.

Body Image

Body image is defined as how an individual views his or her own body (Rodin, 1992). This view is a perception of what this individual believes and may or may not be realistic. Body image problems are a growing concern in today's society. There is an emphasis on certain desirable physical characteristics as well as considerable pressure for men and women to obtain these characteristics (Rodin, 1992; Stormer & Thompson, 1996). Due to these pressures, it is common for individuals to be unhappy with the way they view themselves (Zerbe, 1993). Both men and women often feel dissatisfaction with their bodies, however, it has been found that this dissatisfaction is greater in women when compared to men (Depcik & Williams, 2004; Dolan, Birtchnell & Lacey, 1987). According to Dolan et al. (1987), many women often experience body image distortion because they have a misperception of their appearance. This is commonly found in

individuals who are anorexic or obese, but is also found in women who are normal weight. Women who are normal weight often perceive themselves to be larger than they really are, which is part of the reason women always diet or try to lose weight (Dolan et al., 1987).

Body image disturbance can be detrimental to an individual's health. For instance, it can play a leading role in eating disorders as well as disrupt relationships, and cause depression, social introversion, and low self-esteem (Zerbe, 1993). To date, no studies have been found to compare both imagery perspective and body image perceptions.

Body Image Measures

Measuring body image and related concepts is generally done by questionnaire, which can be unidimensional or multidimensional in format. The Physical Self-Description Questionnaire (PSDQ; Marsh, Richards, Johnson, Roche & Tremayne, P., 1994) is a multidimensional physical self-concept instrument that is designed to measure 11 scales in sixty three items. These scales include strength, body fat, activity, endurance/fitness, sports competence, coordination, health, appearance, flexibility, global physical, and global esteem. Questions like, "I am attractive for my age," require subjects to answer "false," "mostly false," "more false than true," "mostly true," or "true." (Marsh et al., 1994). The lower the score is on a six point Likert scale, indicates a better body image. Evidence supports the PSDQ in both convergent and discriminant validity of responses. Due to this, it is recommended that the PSDQ can be used in a variety of settings (Marsh et al., 1994). Previous results also support the construct validity of the PSDQ responses in relation to external criteria and again support the

notion that this measure has potential usefulness in a wide variety of settings (Marsh, 1996a). Lastly, Marsh (1996b) found good internal consistency and discriminant validity across the 11 PSDQ scales.

The Body-Esteem Scale (BES; Franzoi & Shields, 1984) is another multidimensional scale used to assess one's perception of body esteem. The BES lists a number of body parts and functions. Subjects are required to read each item and rate how they feel about this particular body part or function of their own body. The BES has found five common factors among gender: physical attractiveness (PA), sexual attractiveness (SA), upper body strength (UBS), weight concern (WC), and physical condition (PC). Female factors tend to lean towards SA, WC, and PC where male factors tend to lean towards UBS, PA, and PC. The scale consists of thirty-five items require a Likert scale response ranging from "strong negative feelings," "moderate negative feelings," "no feeling one way or the other," "moderate positive feelings," or "strong positive feelings." Examples of a body part or function found on the BES include body scent, appetite, waist, buttocks, and appearance of one's stomach. It has been found to be reliable and valid (Franzoi, 1994; Ostrow, 2002).

The Body Awareness Questionnaire (BAQ; Shields, Mallory, & Simon, 1989) is a unidimensional questionnaire used to assess how aware one is about his or her body, or more specifically, the individual's sensitivity to normal body occurrences. Items pay attention to how sensitive a person is to his or her body cycles, detect changes in his or her body functioning, and how a person anticipates reactions that occur in the body (Shields et al., 1989). The questionnaire consists of eighteen statements that are rated on a Likert scale ranging from 1 through 7 with 1 being "not at all true of me," and 7 being

"very true of me." Examples include, "I notice the differences in the way my body reacts to various foods" and "As soon as I wake up in the morning, I know how much energy I'll have during the day." This measure has been found to be both reliable and valid (Shields et al., 1989).

Gender and Body Image

Each gender has certain behaviors that are learned and come to be expected from society (Andersen, 1997). Masculinity and femininity are based on set characteristics in today's society (Moi, 1989). For instance, masculinity is seen as muscularity and strength, and is associated with being powerful; femininity is seen as graceful, weak, and associated with being powerless (Greendorfer, 1998). Many messages in today's society display the idea that women need to be thin. For example, it is believed that sticking to programs such as Weight Watchers, Tae Bo, or Curves will enable women to easily achieve the desired body (Bordo, 1993). According to Krane et al. (2001), sport and exercise is seen as a way to empower women by providing a challenge, sense of identity, and to learn physical capabilities. However, sport and exercise can have the opposite effect if women use them to attempt to attain the ideal body. Specifically, women often exercise for weight loss and toning to reach their ideal body, rather than to improve their health. For women athletes, there is a conflict because there is the socially acceptable female body, thin and lean, and there is the athletic body, larger and more muscular. This can result in a negative impact in female athletes' self-esteem, health, and self-perceptions (Krane et al., 2001).

Klomsten, Skaalvik, and Espnes (2004) investigated gender differences in physical self-concept of elementary and secondary school-aged students. The subjects

completed the Physical Self-Description Questionnaire and the authors found that the males had significantly higher self-concept in eight of the nine sub domains including global physical self-concept and self-esteem. The largest male and female differences were found in global physical, endurance, strength, appearance, and body fat-scales. The smallest male and female differences were found in health, flexibility, and coordination dimensions. This was especially found with increasing age, most likely due to the adolescent years.

Another study looked at both males and females and their body image. Fallon and Rozin (1985) had male and female undergraduate students look at a set of nine figures. The students indicated their current figure, ideal figure, figure they thought would be most attractive to the opposite sex, and figure of the opposite sex they found most attractive. They found that the men usually selected a figure close to their actual figure, while most women picked a figure that was heavier than their current figure. It was found that both genders mistake what the opposite sex finds attractive. For instance, men think women want a heavier male than they really do, whereas women think men want a thinner female than they actually do. This perception allows men to be satisfied with their figure, since they believe it is what women like. On the other hand, the perception that women have, that they need to be thinner, causes them to be unhappy and is probably directly related to the fact that women have a higher percentage of eating disorders than men (Fallon et al., 1985).

Bowker, Gadbois, and Cornock (2003) examined the role that gender and sports participation plays in predicting self-esteem. They found that the male subjects had greater satisfaction with their weight and appearance when compared to the female

subjects. There was no difference between the two groups when considering the subject's self-worth. The females that participated in athletics were found to have lower levels of perceived athletic competence and global self-worth, but they displayed a higher self-esteem when they participated in more non-competitive sports. This shows that sports participation predicts self-esteem; however, gender orientation and type of sport are only moderating factors.

Previous research has found that women are more dissatisfied with their body weight and body and facial features when compared to men (Rosen, 1992; Salmon, 1987). According to Silberstein, Strifel-Moore, Timko, and Rodin (1998), it seems that both men and women are concerned about their weight. However, most women want to lose weight, while men are often split down the middle, with half wanting to gain muscle weight and half wanting to just lose weight (Silberstein et al., 1988). Women have been found to desire thinness for many decades; however, more recently the ideal body shape has become even thinner than in the past (Furnham, Titman & Sleeman. 1994). This increasing need for thinness is often displayed in magazines through pictures of thin models and articles on how to become even thinner (Garner, Garfinkel, Schwartz & Thompson, 1980). Often, it seems that feelings about the body are associated with feelings about the self (Worsley, 1981).

Exercise, Gender, and Body Image

Exercise often is found to increase positive thoughts about oneself, therefore it would seem that female athletes would not have eating disorders or other psychophysical ailments tied into negative self-perceptions. However, it could be argued that people who are susceptible to eating disorders may be drawn to athletic competition, in part because

the primary goal of sports training is to manage weight through intense workouts, rather than to enjoy the sport and competition (Furnham et al., 1994). In today's society, the ideal female body is a thin and fit body where the ideal male body is a lean and muscular body (Brownwell, 1991; Hausenblas & Fallon, 2002). According to Davis (1990) and Loland (2000), due to ideal body belief, there is a heavy emphasis on engaging in physical activity, which promotes a negative relationship of exercise behavior and body image. There is often a relationship between excessive exercise, which is also referred to as exercise dependence and body image (Davis, 1990; Loland, 2000).

Numerous studies, including Attie and Brooks-Gunn (1989), Bartlewski, Van-Raalte, Brewer (1996), Depcik and Williams (2004), Dolan, Birtchnell, and Lacey (1987), Furnham, Titman, and Sleeman (1994), Haase and Prapavessis (2001), Krane, Waldron, Michalenok, and Stiles-Shipley (2001), Robinson and Ferraro (2004), Rosen, McKeag, Hough, and Curley (1986), and Sundgot-Borgen (1994) have looked into female athletes and exercisers and their body image. However, not many studies have looked at male athletes and exercisers or to compare male athletes and exercisers to female athletes and exercisers. Few studies such as Bowker, Gadbois, and Cornock (2003), Fallon and Rozin (1985), Hausenblas and Fallon (2001), Hayes, Crocker, and Kowalski (1999), Klomsten, Skaalvik, and Espnes (2004), Marsh (1998), and Silberstein, Striefel-Moore, Timko, and Rodin (1988) that have looked at gender and body image have found mixed results. The following studies have looked at exercise and body image.

Furnham et al. (1994) performed a study to see the effects of exercise on women's perceptions of their body shape and body image satisfaction. Results found that women

who exercise have a more positive perception of their bodies and an increased acceptance for those with muscular shapes. This study looked at both females that exercised as well as females who participated in varsity athletics. Krane et al. (2001) used a feminist cultural studies framework to look at the relationship between body image, eating, and exercise behaviors in females who exercised or participated in athletics. The subjects were asked questions regarding their ideal body image, eating and exercise behaviors, and feelings relating to eating and exercise. It was found that both groups in the study had an unrealistic ideal body image with an emphasis on a toned body and no fat. The women compared themselves to an unrealistic ideal body due to cultural reasons. The women in this study constantly thought about exercising and eating. If they exercised, they were allowed to eat and if they ate too much, they were punished with more exercise. Here they used eating and exercise as a balancing act. In particular, the athletes seemed to experience a positive effect of body image when compared to their athletic environment, but a more negative effect when in a social environment where it is expected that females should be less muscular and more petite.

Female athletes seem to have many risk factors for acquiring an eating disorder. According to Garner, Rosen, and Barry (1998), when participating in sport, there seem to be pressures placed on female athletes to be thin and physically fit at the same time. In addition, it is also thought that coaches, judges, and teammates encourage unhealthy eating and exercising behaviors in athletes (Garner et al., 1998). Most of the research has looked at sports considered "lean sports" (Robinson & Ferraro, 2004). These are sports in which successful performance is dependent upon the athlete weighing as little as

possible because weight and appearance come into play. Lean sports include skating, gymnastics, diving, and dancing (Robinson et al., 2004).

In a 2004 study, Robinson et al. (2004) looked at both female athletes and non-athletes and their body image belief. These authors looked at female athletes from four sports as well as non athletes. The athletes were further divided into speed and technically focused groups. The speed athletes consisted of swimmers and track and field athletes; the technique athletes consisted of golfers and volleyball players. The control group, or the non athletes, consisted of females that were not participating in collegiate athletics. The participants completed scales to measure body dissatisfaction, weight issues, and what they thought about their body type and weight. The results indicated that the speed group of athletes and the technically focused athletes did not differ in their weight and body image concerns. On the other hand, it was found that non athletes had more dissatisfaction about their body when compared to the athletic group.

Body Image and Adolescence

Body image becomes apparent during adolescence (Pipher, 1994). Ferron (1997) suggested that this is where it becomes apparent because of the bodily changes that males and females begin to experience due to puberty, and an increased interest towards the opposite sex. Many girls at this time begin to experience body dissatisfaction due to weight gain and increased gender role expectations that come along with puberty (Attie & Brooks-Gunn, 1989). It has been found that physical self-esteem or satisfaction with body image may be increased during adolescence for both genders through participation in sports (Bowker et al., 2003). Along with sports come a variety of health benefits such as increased aerobic power, muscle strength, and weight loss, which could all be believed

to increase body image (Centre for Research in Girls and Women in Sport, 1997). For this reason, it seems important to play sports as an adolescent. It is important to look into the fact that this is carried over into collegiate athletics because college is a time for change, which can increase weight gain. It has been found that the absence of increased physical self-esteem and positive body image has a negative influence on global self-esteem in college women (Bowker et al., 2003).

Bowker et al. (2003) concluded from their examination of the research literature that adolescents, particularly females, have a decreased self-esteem when compared to males. Males have been found to have low levels of self-esteem during adolescence; however, it is still higher than that of females (Marsh, 1998). This caused the adolescent males to focus on sports participation because they felt it could be used as a protective factor. If the athletes have a high self-esteem and sense of self-worth, they will probably be more likely to have a better image of themselves. Since there are gender differences found in esteem and body image (Attie et al., 1989; Bowker et al., 2003), it was interesting to look at both crew teams to see if there was a significant difference in how they view themselves during imagery and visualization.

Male athletes outnumber female athletes, which could suggest a reason for differences in body image if sport participation is seen to increase self-esteem (Bowker et al., 2003). It has also been suggested that mental imagery can be the main way individuals acquire information about their bodies since we are not able to look at our bodies directly, in a visual manner (Auchus, Kose & Allen, 1993). For this reason alone, it seems it is important to look at mental imagery and body image because this might be a

way of predicting which individuals will be susceptible to body image disturbance in the future.

Athletes and Body Image

Eating and body issues are important to be aware of since they can pose a significant threat to an athlete's physical and psychological well being (Sundgot-Bargon, 1994; Swoap & Murphy, 1995; Thompson & Sherman, 1993). It is hard to tell exactly how many athletes are affected by issues such as eating disorders, due to many people keeping them secretive, different diagnostic procedures, and the fact that certain sports emphasize more of a thin and visually pleasing appearance compared to others (Sundgot-Bargon, 1994; Swoap et al., 1995; Thornton, 1990). For instance, some sports are judged on body appearance and performance such as gymnasts, dancers, diving, and figure skaters. On the other hand, there are some sports where it is thought that a reduced body weight helps maximize performance such as swimming and running. Lastly, there are sports that incorporate weight classes into their competitions such as rowing, wrestling, judo, and boxing (Sundgot-Borgon, 1994; Swoap et al., 1995; Thompson & Sherman, 1993).

It has been found that about 90% of people with eating disorders such as anorexia nervosa and bulimia are female (Bemis, 1978; Halmi, Falk & Schwartz, 1981). This difference is most likely due to the fact that females like to weigh themselves more often compared to males, call themselves fat more often, diet more often, and attempt to get medical help for weight related problems more often (Dwyer, Feldman, Seltzer, & Mayer, 1969; Gray, 1977; Huenemann, Shapiro, Hampton, & Mitchell, 1966; Waldron,

1983). It is important to be aware of eating disorders in general, but especially athletes who train hard physically and mentally on a daily basis (Fallon & Rozin, 1985).

In sport, there is a lot of pressure to be thin (Garner et al., 1998). For instance, in endurance events, it is believed that excess weight will impair performance (Caldwell, 1993). In addition, athletes who are rated on their performance such as divers, gymnasts, figure skaters, and dancers often feel they need to be thin because they do not want their weight to affect the opinion of the judges' ratings (Caldwell, 1993). Rosen, McKeag, Hough, and Curley (1986) using female athletes found, through self-administered questionnaires, that 32 percent of the participants practiced in at least one weight control behavior. These weight control behaviors included self-induced vomiting, laxatives, diet pills or diuretics on a daily basis for one month (Chapman, 1997).

Rowers, Imagery, and Body Image

Rowing and Imagery

Performing a motor task mentally has a positive effect on learning (Feltz et al., 1983; Grouios, 1992). This is important for sports or motor activities that have few opportunities for physical practice or sports that someone is training for that are risky or dangerous (Féry, 2003). This is why imagery seems so important for rowing because physical practice is inconvenient and time consuming: getting the boat on the water (often located miles away), organizing teammates, and so forth.

To date, not much research has focused on rowing and the athlete's imagery. The only research found on only rowing and imagery was done by Barr et al. (1992). Barr et al. (1992) evaluated imagery in rowers by having rowers of all levels (i.e., high school, college, and national team levels) complete the Imagery Use Questionnaire (IUQ; Hall,

Rodgers & Barr, 1990), which was designed specifically for their study. They found that most rowers in the study reported using imagery as a mental training technique. The rowers reported using imagery before competing, however, they did not use structured imagery sessions because they were not done on a regular basis, nor were they done in the same time frame for each session. The rowers reported using more of an internal imagery when compared to external imagery. This was because the rowers stressed the importance of being able to feel themselves going through the motion. When the authors compared the elite rowers to the novice rowers, they found that elite rowers performed imagery on a more regular basis. Novices also reported seeing themselves rowing incorrectly during their imagery sessions when compared to their more experienced counterparts, the elite rowers. The elite rowers were able to execute a pre-performance routine and also were able to feel themselves rowing through blade work, muscles, parts of the stroke, and moving together with the other rowers in the boat. In terms of imagery perspective, those with more experience used more of an internal perspective compared to the novices, who were less experienced, and used more of an external perspective. This is most likely because the newer rowers have not yet refined their internal focus in order to model themselves (Barr et al., 1992).

Though not an imagery study, Connolly and Janelle (2003) looked at the psychophysical aspects of rowing performance. In particular, these authors explored the effectiveness of attentional strategies on rower's performance, heart rate, and perceived exertion. In order to be a successful rower and/or team, it is important to have a high level of concentration or, in this case, mental toughness, which is important

psychologically. The study revealed how concentration during rowing is vital to reaching optimal performance.

Rowing is considered to be an internally focused sport, as each rower needs to balance his or her own timing and movements with other team members in the boat to enable to boat to move at maximum speed (Barr et al., 1992). Each rower must be aware of his or her body position as well as the timing of the blade placement with the other rowers in the boat. In addition to having perfect positioning with the other rowers in the boat, rowing pushes physiological aspects of the body to the limits. For instance, the standard distance for a spring season race is 2000 meters. This race tests the athletes' physically, as it puts a demand on the aerobic system, as well as increases the build up of lactic acid in the body (Connolly & Janelle, 2003). Since this sport has such a high demand on both the mind and body, it seems important to explore it further to look at imagery in this sport.

Rowing and Body Image

Sports, such as rowing, that include weight classes can be detrimental to an athlete's health if an athlete is close to borderline of being above the required weight. For instance, if an athlete fails to make weight for an upcoming competition, he or she will be unable to participate. Due to these reasons, many athletes may feel tempted to keep their body weight at a lower weight than normal. This can lead to a snowball effect where athletes can have negative attitudes towards eating as well as negative perceptions towards body shape and size. These negative attitudes and perceptions may lead to eating disorders (Sundgot-Borgon, 1994; Swoap et al., 1995; Thompson et al., 1993). Rowing is a sport not necessarily associated with eating disorders, but there is a growing

database suggesting that rowers are also at risk. For rowers who are on the borderline between heavyweight and lightweight, they may prefer to be in the lightweight category if they cannot match up with the heavyweight rowers in size and strength. Due to this, it would be thought to promote unhealthy eating and exercising behaviors (Terry, Lane & Warren, 1999).

In the past, some studies have looked into eating issues in rowing and have found that many athletes involved in rowing have disturbed body images and disordered eating habits no matter what weight class the individual was in (Sykora et al., 1993; Terry & Waite, 1996; Thiel, Gottfried & Hesse, 1993). These studies found that there are issues relating to both genders and weight classes. Thiel et al. (1993) looked at male lightweight rowers as well as male wrestlers. They found that both sports have a high risk for eating disorders as well as body image disturbance. Sykora et al. (1993) looked at attitudes, dieting, weight changes, and weight loss methods in collegiate rowers. They found that females, when compared to males, showed more of a disturbed eating attitude and weight loss strategies, which included vomiting. They also found that both weight categories: heavyweight and lightweight, showed disturbed eating attitudes and weight loss methods.

Terry, Lane, and Warren (1999) studied rowers by looking at the influence that age, gender, and weight had on their eating attitudes, body shape perceptions, and mood. The elite rowers were instructed to complete the Eating Attitude Test (EAT), the Body Shape Questionnaire (BSQ), and a shortened version of the Profile of Mood State (POMS-C; Terry, Keohane & Lane, 1996). The rowers were grouped into two separate categories, lightweight and heavyweight. The lightweight group displayed a higher EAT

score when compared to the heavyweight group. On the other hand, body shape concerns were found to be higher in the heavyweights when compared to the lightweights and higher in the females when compared to the males. The BSQ also found that there was a negative correlation with age. It was found in this study that females had eating attitudes associated with eating disorders as well as body shape perceptions. In addition, some of the athletes admitted using vomiting as a weight control strategy. The males in the study were found to have abnormal eating attitudes as well, which shows that eating disorders have been found to extend to both genders. The authors suggest that these results show that the risk of eating disorders among elite rowers is moderated by age, gender, and weight category. In addition these authors suggested that measures of mood may aid in identifying athletes at risks from eating disorders.

A multiple case study by Chapman (1997) examined the relationship between sport and female athletes' weight management practices. The study examined eight women who competed in lightweight rowing at the national level. All of the rowers involved in the study used various methods, such as food restriction, monitoring and additional workouts, to reach the required weight. The majority felt that they looked better when they reached the mandatory weight, and that they were disappointed when they gained the weight back after the season. Although most of the women had not dieted before rowing lightweight, the experience caused most of them to continue using some of the dieting techniques, even though they had decided not to continue rowing and were not required to maintain a specific weight (Chapman, 1997).

CHAPTER 3

METHODS

Introduction

The purpose of this study was to examine the relationship between body image perception and imagery perspective for female varsity collegiate rowers. Skill level was examined as a potential influence on the relationship between body image and imagery perspective. Written inventories were used to measure mental imagery perspective and body image perceptions of collegiate rowers to identify possible links between the two. The athletes' coach was asked to complete a form indicating the skill level of each participant by subjectively rating the athletes on technique and objectively by comparing the athletes' ergometer scores. This chapter describes the methodology that was used for this study and is divided into the following sections: participants, procedures, instruments, and data analyses.

Participants

After receiving Human Subject Review Board approval for the study, the varsity coach of a college rowing team was contacted and asked for permission to meet with her athletes to discuss possible participation in the study. The participants for this study were female undergraduate student-athletes from an NCAA Division III rowing team. Only those athletes on the varsity squad were invited to participate. The rationale for selecting only varsity athletes was that the novice rowers varied too widely in rowing experience. This experience, ranging from one or more years to none at all, makes comparisons in rowing imagery untenable and difficult to interpret. All participants were eighteen years of age or older and signed an informed consent form (Appendix A) prior to participation.

After the participants completed the informed consent document the subjects were reminded that they could remove themselves from participating in this voluntary experience with no penalty.

With permission from the rowing coaches, recruitment flyers (Appendix B) were posted throughout the boathouse and rowing team office. In addition, prior to leaving for the spring break training trip in Georgia, the coach set up a time with the primary researcher, a volunteer assistant coach on the rowing team, to meet with the athletes. This meeting introduced the study to possible participants and the researcher passed out an informational flyer, or recruitment statement, (Appendix C) about the study. Those interested in participating were asked to sign up with their name, email, and phone number so that the researcher could contact them to explain the study in more detail and make sure they were still interested in participating. The researcher followed up individually with each interested participant over the phone or in person and sent an email explaining the study further if they requested more information on the sign up sheet. Since practice times in Georgia varied and down time was different each day, the researcher contacted the athletes in person to finalize meeting times for their participation in the study.

During the training trip in Georgia, which took place March 4th to 12th of 2006, the experimenter discussed dates and times to meet with each athlete that previously expressed interest in the study. While in Georgia athletes could sign up to participate even if they seemed uninterested previously, with the condition there must be two days remaining in order to complete all the necessary measures. In addition, those athletes

who previously expressed interest were allowed to remove themselves from the study at anytime during any part of the study with no penalty.

Procedures

After an athlete agreed to participate, they were asked to complete selected questionnaires and undergo selected anthropometric assessment during their spring break training trip in Georgia. Subjects gathered in groups, but completed the measures separately and without coaches being present. The subjects completed the measures at the team's hotel in either the researcher's room, a conference room, or their own room, depending on what was available and where the participants felt most comfortable.

Participants were then asked to complete two measures relating to imagery: the Vividness of Movement Imagery Questionnaire (VMIQ; Isaac, Marks & Russell, 1986; Appendix D) and the Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1999; Appendix E) and three body consciousness measures: Physical Self-Description Questionnaire (PSDQ; Marsh, Richards, Johnson, Roche & Tremayne, 1994; Appendix F), the Body-Esteem Scale (BES; Franzoi & Shields, 1984; Appendix G), and the Body Awareness Questionnaire (BAQ; Shields, Mallory & Simon, 1989; Appendix H). The subjects also completed a Sports Participation Form (SPF) that included basic demographic information (Appendix I). Finally, each subject had anthropometric data (waist, abdomen, and hip girth; and height and weight) gathered by the researcher. Anthropometric data were used to compare a subject's perception of her body size with actual measurements. Anthropometric measurements were taken during or after the spring break trip to Georgia. Height and weight were recorded upon return to campus.

A Coach Rating Questionnaire (CRQ; Appendix J), which asked the coach to rate the quality of each rower's technique, was distributed to women's head rowing coach for each athlete. The athlete did not see this report from their coach. In addition, the coach ranked the athletes on her team from the best skilled to the least skilled, with 1 being the best and the highest number (based on number of participants) being the least skilled.

The measures were completed over a period of three days. During Day 1, subjects completed the following in this order: Informed Consent Form, VMIQ, BES, and BAQ. During Day 2, subjects completed the following in this order: MIQ-R, PSDQ, and the SPF. As part of the SPF, anthropometric data was collected. The researcher collected some of this data in Georgia after participants completed the measures and some was collected upon return from the trip when the participants were back on campus. To gather anthropometric data, the researcher took circumference/girth measurements of the participant's hip, waist, and abdomen. Each measurement was taken three times at each site in accordance with guidelines specified by the ACSM (American College of Sports Medicine, 2004). After the trip, participants set up a time to meet with the researcher to measure height and weight, which took place on campus during Day 3. This was done on campus in order to get the most accurate readings, since this equipment was not available in Georgia. The height and weight of the subjects was also recorded according to guidelines based on ACSM (American College of Sports Medicine, 2004).

On her own time the head coach completed the CRQ for her athletes. Each subject's name was converted to a random number to prevent them from knowing their own or others results when the study was finished.

Instruments

Imagery Measures

Mental imagery was assessed using VMIQ and the MIQ-R. Isaac, Marks, and Russell (1986) developed the VMIQ to measure the vividness of movement imagery from an external visual perspective, and an internal visual perspective. The VMIQ is a 24-item test related to movement imagery. It contains six movement categories of four items each. These categories range from basic body movements (e.g., jumping), to movements that require precise control (e.g., balancing on one leg). For each item, subjects were asked to image from an external visual imagery perspective (watching others perform the task) and then to repeat from an internal visual imagery perspective (watching themselves perform the task). The subjects were asked to rate their ability to image others performing physical skills as well as themselves performing the same skills. The participants rated this image on clearness and vividness using a 5-point Likert scale (Callow & Hardy, 2004; Isaac et al., 1986; Ostrow, 2002). This scale consists of "perfectly clear and as vivid as normal vision," "clear and reasonably vivid," "moderately clear and vivid," "vague and dim," or "no image at all, you only know that you are thinking of the skill." The lower the score for each of the two perspectives indicates greater vividness. The measure has been found to be both reliable and valid (Callow & Hardy, 2004; Isaac et al., 1986; Ostrow, 2002).

Hall and Martin (1997) developed the MIQ-R to look at individual differences in visual and kinesthetic imagery of movement and to assess the ease with which subjects visually and kinesthetically image movements. It contains eight items: four visual and four kinesthetic. Subjects were instructed to image detailed body movements while

focusing on using visual or kinesthetic techniques. An example would be to have the subjects try to visualize touching their toes. The odd numbered questions correspond to kinesthetic imagery, whereas even numbered questions are visual. For each item, individuals were instructed to execute a movement and then rate this movement on a 7-point Likert scale (Hall & Martin, 1997; Hall, Pongrac & Buckolz, 1985; Ostrow, 2002; Vadocz, Hall & Moritz, 1997). On this Likert scale, the subjects responded with "very easy to see/feel," "easy to see/feel," "somewhat easy to see/feel," "neutral (not easy to see/feel, not hard to see/feel)," "somewhat hard to see/feel," "hard to see/feel," and "very hard to see/feel." The imagery abilities were calculated separately into two subscales: visual and kinesthetic imagery abilities. A higher score indicated better imaging skill. The MIQ-R has shown to be reliable and valid (Hall & Martin, 1997; Hall, Pongrac & Buckolz, 1985; Ostrow, 2002; Vadocz, Hall & Moritz, 1997).

Body Image Measures

The tests chosen to assess body consciousness were the Physical Self-Description Questionnaire (PSDQ; Marsh, Richards, Johnson, Roche & Tremayne, P., 1994), the Body-Esteem Scale (BES; Franzoi & Shields, 1984), and the Body Awareness Questionnaire (BAS; Shields, Mallory & Simon, 1989). The PSDQ is a multidimensional physical self-concept instrument designed to measure 11 scales in sixty-three items. These scales are strength, body fat, activity, endurance/fitness, sports competence, coordination, health, appearance, flexibility, global physical, and global esteem. The following is an example of a question found on the PSDQ: "I am attractive for my age.". The responses require subjects to answer "false," "mostly false," "more false than true," "more true than false," "mostly true," or "true." The test was scored by

averaging answers for each scale, which also included negatively scored items. A lower the score on the six point Likert scale indicates a better body image. Evidence supports the PSDQ in both convergent and discriminant validity of responses. Due to this, it is recommended that the PSDQ can be used in a variety of settings (Marsh et al., 1994). Previous results also support the construct validity of the PSDQ responses in relation to external criteria and again support the notion that this measure has potential usefulness in a wide variety of settings (Marsh, 1996a). Previous results also support the construct validity of the PSDQ responses in relation to external criteria and again support the notion that this measure has potential usefulness in a wide variety of settings (Marsh, 1996a). Lastly, Marsh (1996b) found good internal consistency across the 11 PSDQ scales. The discriminant validity was also supported in this study as well as for the 11 scales. In addition, Marsh et al. (1994) found that the PSDQ has been found to show good reliability and good test-retest reliability over a short term (3 months) and long term (14 months).

The BES was used to examine how one feels about their physical body. Subjects were required to read items referring to body parts and body functions and rate how they felt about the particular body part or function. It contains five common factors: physical attractiveness (PA), sexual attractiveness (SA), upper body strength (UBS), weight concern (WC), and physical condition (PC). Some of these factors have been found to differ in men and women where some have been found to be similar across genders (Franzoi et al., 1984). Females tend to lean towards SA, WC, and PC whereas males tend to lean towards UBS, PA, and PC. The scale consists of thirty-five items requiring a Likert scale response including "strong negative feelings," "moderate negative feelings,"

"no feeling one way or the other," "moderate positive feelings," or "strong positive feelings." Some examples of a body part or function found on the BES include body scent, appetite, waist, buttocks, and appearance of one's stomach. For the males, the following factors have been found reliable: physical attractiveness, upper body strength, and general physical condition. On the other hand, for females, the following factors have been found reliable: sexual attractiveness, weight concern, and general physical condition (Franzoi et al., 1984; Franzoi, 1994; Ostrow, 2002). This measure has been found to be valid among male and female undergraduate students (Franzoi et al., 1984; Franzoi, 1994; Ostrow, 2002).

The BAQ was used to look at one's awareness of his or her body. More specifically, it looked at an individual's sensitivity to normal body occurrences. Test items inquire as to how sensitive a person is to his or her body cycles, if one can detect changes in his or her body functioning, and how a person anticipates reactions that occur in his or her body (Shields et al., 1989). The questionnaire consists of eighteen statements that are rated on a Likert scale ranging from 1 through 7 with 1 being "not at all true of me," and 7 being "very true of me." Examples include, "I notice the differences in the way my body reacts to various foods" and "As soon as I wake up in the morning, I know how much energy I'll have during the day." Norms are based on a heterogonous adult sample so it is useful in student populations (Shields, & Simon, 1991). This measure has been found to be internally reliable in order to measure self-reports of normal body processes. It also has been found to have acceptable test-retest reliability, separated by two weeks (Shields et al., 1989; Shields et al., 1991).

Convergent and discriminant validity have been established by looking at other self-report instruments that look at self-evaluation and self-awareness (Shields et al., 1989).

Coach Rating Questionnaire

Before HSRB approval, the women's coach was asked to provide input on constructing a coach rating form in order to obtain subjective information on the athletes. This questionnaire had four components: a technique rating section, an ergometer score ranking section, a comparison ranking of current athletes to former athletes, and a comparison ranking among the athletes participating in the current study. The technique rating section was designed to rate a rower's technique and ability when compared to the other rowers on the team, using five different criterion that are critical for proper technique. These areas are the recovery (when the oar is moving through the air), body preparation (moving the body to get it prepared to take a stroke, which also occurs during the same time as the recovery), drive (when the oar blade is moving through the water), catch (when the blade is placed in the water at the start of the stroke), and release (when the blade is taken out of the water at the finish of the stroke) with subtopics under each area. These items were rated on a Likert scale and ranged from 1 to 5 with 1 being "poor" and 5 being "excellent." The maximum possible score an athlete could obtain was twenty-five. This score is important because it enabled the experimenter to rank order the athletes from most skilled to least skilled. The second part of the questionnaire recorded three of the athlete's ergometer scores: most recent, best this year, and personal record as a collegiate rower. These ergometer scores were based on 2,000 meter trials and were scored in minutes and seconds and provided objective measures by which to rank the athletes. The third part of the questionnaire had a percent comparison question

to compare the particular rower to previous athletes the coach has worked with. The fourth part of the questionnaire had the coach rank each of the participating athletes from best to least skilled, with the best athlete being labeled 1 and the least skilled athlete being labeled with the highest number possible.

Demographics

The SPF gathered basic background and demographic information such as rowing experience, other sport history, imagery history, and anthropometric data in order to assess the individual's height, weight, and girth measurements. This was used in order to compare waist to hip ratio, as well as height and weight information in order to assess Body Mass Index (BMI). This data was important in order to obtain specific information about the athlete's true physical shape to see if her body image perceptions mirror her actual body shape. The circumference/girths of the subject's hip, waist, and abdomen were measured based on ACSM guidelines (American College of Sports Medicine, 2004).

Group Determination Based on Performance Measures

The nineteen female athletes used in this study were divided into two groups, high skilled and low skilled athletes. In order to select the appropriate skill group in which to place the athletes, they were assessed on three areas of performance from the Coach Rating Questionnaire. The three areas of performance included total technique rating, coach ranking, and the three ergometer scores. Ergometer scores were measured in seconds.

The total technique rating from the Coach Rating Questionnaire was weighed most heavily, providing seventy-five percent of the athlete's skill rating. This had the

most emphasis placed on it because the experimenter, a previous rower and coach, felt that in order to be a successful rower, technique is crucial. The coach ranking of each of the participant athletes made up fifteen percent of the performance score. The reasoning for this was, although ranking is important, it could be biased based on the coach-athlete relationship. The ergometer scores made up the remaining ten percent of performance. Since three ergometer scores were used in this study: best ever, best this year, and most recent, the best ever score accounted for five percent where the best this year and most recent accounted for two and one half percent each. The best ever ergometer score was given more weight than the best this year and most recent in case an individual had an off season, injury, or some other reason to prevent her from performing at her top level.

From these scores, each athlete was given a performance skill rating by running syntax in SPSS. First, the groups were separated by gender and a Z score was computed. Then the percentages of technique, coach ranking, and ergometer scores were computed to divide the athletes into two ability classifications. The athletes were then rank-ordered and the top half was assigned to the high skilled group and the lower half assigned to the low skilled group.

Data Analysis

The dependent measures of this study included the mental imagery measures: VMIQ and MIQ-R, and the body image measures: PSDQ, BES, and BAQ. Anthropometric data and data from the Coach Rating Questionnaire (technique rating, coach ranking, and ergometer scores) were also included in the dependent measures for correlational purposes. The independent measures of this study were skill level, either high or lower skilled, that the athletes were assigned to.

The PSDQ included eleven subscales that were analyzed separately and the BES had five subscales (sexual attractiveness, weight concern, physical condition, upper body strength, and physical attractiveness) that were also analyzed separately.

A one-way analysis of variance (ANOVA) was run to compare differences between skill level groups (high, low) in imagery measurements and body image measurements. Pearson correlations were run to assess associations among body image, mental imagery, anthropometrics, and individual measures of athletic skill. The alpha level for all analyses was set at .05.

CHAPTER 4

RESULTS

This study examined differences in mental imagery and body image perceptions between female and male collegiate varsity rowers. The rowers at an NCAA Division III school in the northeast United States completed three body image measures, two mental imagery measures, and a demographics questionnaire as part of the data collection process. Male and female athletes were originally tested, but there were an insufficient number of male participants to justify their inclusion into any data analyses, thus only female athletes were used for further analyses. This chapter is divided into multiple sections consisting of group demographics and performance characteristics, group differences in imagery, group differences in body image, and variable correlations.

Group Demographics, Performance Measures, and Imagery Use

Table 1 shows the physical characteristics of the athletes in the high (n = 10) and low (n = 9) skilled groups. The high skilled group was significantly older than the low skilled group, but there were no significant differences in any anthropometric measure.

Table 1
Means (M) and Standard Deviations (SD) for Physical Characteristics of the High (n = 10) and Low Skilled (n = 9) Ability Groups

	Low Ability (n=9)		High Ability (n=10)		Overall (N=19)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Age (year)	20.20	0.92	21.11*	0.78	20.63	0.96
Height (cm)	168.20	6.22	168.44	9.61	168.32	7.77
Mass (kg)	67.33	7.35	69.85	6.56	68.52	6.91
Hip Circumference (cm)	101.75	6.38	102.89	4.32	102.29	5.38
Abdomen Circumference (cm)	81.83	4.29	84.27	4.19	82.99	4.31
Waist Circumference (cm)	75.88	3.70	76.04	3.74	75.96	3.61
Waist to Hip Ratio	0.75	0.03	0.74	0.03	0.74	0.03

* Groups significantly differ, $p \leq .05$
** Groups significantly differ, $p \leq .01$

The performance measures (Table 2) include information obtained from the CRQ and the SPF. This information includes number of years rowed, the three ergometer scores (best ever, most recent, and best this year), rower comparison score, technique scores, and coach ranking. The higher skilled athletes scored significantly higher in the number of years rowed, the three ergometer scores, rower comparison score, recovery technique, body preparation technique, drive technique, catch technique, and total technique, as well as coach ranking.

Table 2
Means (M) and Standard Deviations (SD) of Performance Measures Based on the High (n = 10) and Low Skilled (n = 9) Ability Groups

	Low Ability (n=9)		High Ability (n=10)		Overall (N=19)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Years Rowed	2.50	0.71	3.89**	1.17	3.16	1.17
Best Ergometer (sec)	475.88	10.52	459.07**	3.59	467.92	14.55
Best This Year Ergometer (sec)	477.92	9.78	460.67**	14.44	469.75	14.79
Most Recent Ergometer (sec)	478.61	8.89	462.87*	15.71	471.15	14.64
Comparison to Past Rowers	1.30	0.82	2.89**	1.17	2.05	1.27
Recovery Technique	3.42	0.41	3.84**	0.19	3.62	0.38
Body Preparation Technique	3.71	0.34	4.00*	0.00	3.85	0.28
Drive Technique	3.48	0.40	3.90**	0.15	3.68	0.37
Catch Technique	3.43	0.49	3.89*	0.22	3.65	0.44
Release Technique	3.45	0.50	3.86	0.25	3.65	0.44
Total Technique	17.49	1.55	19.49**	0.42	18.44	1.53
Coach Ranking	13.90	3.78	5.67**	3.87	10.00	5.63

* Groups significantly differ, $p \leq .05$
** Groups significantly differ, $p \leq .01$

Table 3 includes imagery information obtained from the SPF. There was one significant finding here. The high skilled rowers indicated they used imagery significantly more on a regular basis than their low skilled counterparts ($p = .033$) in a yes or no question, "Do you use imagery?" This means that the high skilled athletes said they used imagery significantly more than the low skilled athletes. All of the other

imagery information, including amount of time spent using imagery in minutes per week ($p = .232$), preferred imagery perspective (internal versus external, $p = .532$), number of years using imagery ($p = .085$), and does it improve performance ($p = .174$), were not found to be significant.

Table 3

Means (M) and Standard Deviations (SD) of Imagery Information Based on the High (n = 10) and Low Skilled (n = 9) Ability Groups

	Low Ability (n=9)		High Ability (n=10)		Overall (N=19)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Use Imagery Regularly (1 = no, 2 = yes)	1.60	0.52	2.00*	0.00	1.79	0.42
Time Spent Using Imagery (minutes/week)	14.30	17.53	23.61	14.95	18.71	16.61
Years Spent Using Imagery	2.20	1.32	3.22	1.09	2.68	1.29
Imagery Improves Performance (1 = no, 2 = yes)	1.60	0.84	2.00	0.00	1.79	0.63
Imagery Perspective Preference (1 = always external, 2 = usually external, 3 = both equally, 4 = usually internal, 5 = always internal)	3.00	1.16	3.33	1.12	3.16	1.12

* Groups significantly differ, $p \leq .05$

** Groups significantly differ, $p \leq .01$

Group Differences in Imagery Ability

Means and standard deviations for imagery variables are shown in Table 4 with analysis of variance (ANOVA) results shown in Table 5. As shown in Table 4 and 5, the groups did not significantly differ in imagery perspective except for the kinesthetic portion of the MIQ-R. The low ability group had a significantly ($F(1,17) = 7.70, p = 0.01$) lower MIQ-R kinesthetic score ($M = 18.30, SD = 7.09$) than the high ability group ($M = 25.11, SD = 2.03$).

Table 4

Means (M) and Standard Deviations (SD) of Imagery Measures Based on the High (n = 10) and Low Skilled (n = 9) Ability Groups

	Low Ability (n=9)		High Ability (n=10)		Overall (N=19)	
	M	*SD*	*M*	*SD*	*M*	*SD*
VMIQ Watching Self	59.00	20.55	68.67	26.24	63.58	23.27
VMIQ Watching Others	48.30	20.12	64.44	27.79	55.95	24.79
VMIQ Total (Self & Others)	109.10	42.03	133.11	47.56	120.47	45.17
MIQ-R Visual	19.80	6.60	22.00	7.57	20.84	6.96
MIQ-R Kinesthetic	18.30**	7.09	25.11	2.03	21.53	6.26
MIQ-R Total (Visual & Kinesthetic)	38.10	12.57	47.11	8.85	42.37	11.63

* Groups significantly differ, $p \leq .05$

** Groups significantly differ, $p \leq .01$

Table 5

Imagery Measures and Significance Based on High and Low Skilled Ability

Source	*Dependent Variable*	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
Ability						
	VMIQ (Self)	442.63	1	442.63	0.81	0.38
	VMIQ (Others)	1234.63	1	1234.63	2.14	0.16
	VMIQ (Total)	2730.95	1	2730.95	1.37	0.26
	MIQ-R (Visual)	22.93	1	22.93	0.46	0.51
	MIQ-R (Kinesthetic)	219.75	1	219.75	7.70	0.01*
	MIQ-R (Total)	384.63	1	384.63	3.19	0.09
Error						
	VMIQ (Self)	9308.00	17	547.53		
	VMIQ (Others)	9822.32	17	577.78		
	VMIQ (Total)	33997.79	17	1999.87		
	MIQ-R (Visual)	849.60	17	49.98		
	MIQ-R (Kinesthetic)	484.99	17	28.53		
	MIQ-R (Total)	2047.79	17	120.46		
Total						
	VMIQ (Self)	86554.00	19			
	VMIQ (Others)	70529.00	19			
	VMIQ (Total)	312493.00	19			
	MIQ-R (Visual)	9126.00	19			
	MIQ-R (Kinesthetic)	9509.00	19			
	MIQ-R (Total)	36539.00	19			

* Groups significantly differ, $p<.05$

** Groups significantly differ, $p \leq .01$

Group Differences in Body Image and Body Perception

Means and standard deviations for the following body image measures, BES and BAQ are shown in Table 6 with ANOVA results being found in Table 7. As shown in Tables 6 and 7, the groups did not significantly differ in any areas of body image.

Table 6

Means (M) and Standard Deviations (SD) of Body Image Measures Based on the High (n = 10) and Low Skilled (n = 9) Ability Groups

	Low Ability (n=9)		High Ability (n=10)		Overall (N=19)	
	M	*SD*	*M*	*SD*	*M*	*SD*
BES Sexual Attractiveness	44.30	8.08	47.67	5.81	45.89	7.12
BES Weight Concern	27.90	8.61	30.33	8.60	29.05	8.46
BES Physical Condition	34.80	4.92	35.72	3.73	35.24	4.30
BES Total	107.00	17.53	113.72	11.41	110.18	14.95
BAQ Total	78.40	12.43	85.33	14.44	81.68	13.51

* Groups significantly differ, $p \leq .05$

** Groups significantly differ, $p \leq .01$

Table 7

Body Image Measures and Significance Based on High (n = 10) and Low (n = 9) Skilled Ability

Source	*Dependent Variable*	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
Ability						
	BES (SA)	53.69	1	53.69	1.06	0.32
	BES (WC)	28.05	1	28.05	0.38	0.55
	BES (PC)	4.03	1	4.03	0.21	0.65
	BES (Total)	214.05	1	214.05	0.96	0.34
	BAQ (Total)	227.71	1	227.71	1.27	0.28
Error						
	BES (SA)	858.10	17	50.48		
	BES (WC)	1258.90	17	74.05		
	BES (PC)	329.16	17	19.36		
	BES (Total)	3806.56	17	223.92		
	BAQ (Total)	3058.40	17	179.91		
Total						
	BES (SA)	40932.00	19			
	BES (WC)	17324.00	19			
	BES (PC)	23924.25	19			
	BES (Total)	234691.25	19			
	BAQ (Total)	130060.00	19			

* Groups significantly differ, $p<.05$ ** Groups significantly differ, $p \leq .01$

The means and standard deviations for the PSDQ are found in Table 8 and the ANOVA results are found in Table 9. Table 9 shows a significant difference between PSDQ flexibility, but the other subcategories and the total score were not significantly different between groups. The low ability group had a significantly ($F(1,17) = 5.90$, $p = 0.03$) lower PSDQ flexibility score ($M = 4.49$, $SD = 0.93$) than the high ability group ($M = 5.41$, $SD = 0.69$).

In summary, the high and low skilled athletes had only a few differences in imagery and body image measures. The high skilled rowers rated significantly higher on the MIQ-R kinesthetic scale and on the PSDQ flexibility scale.

Table 8
Means (M) and Standard Deviations (SD) of PSDQ Based on the High (n = 10) and Low Skilled (n = 9) Ability Groups

	Low Ability (n=9)		High Ability (n=10)		Overall (N=19)	
	M	*SD*	*M*	*SD*	*M*	*SD*
PSDQ Health (modified)	4.59	0.71	5.16	0.69	4.86	0.74
PSDQ Coordination	4.32	0.96	4.32	0.74	4.32	0.84
PSDQ Physical Activity	5.86	0.17	5.70	0.44	5.78	0.33
PSDQ Body Fat	4.64	0.86	3.59	1.55	4.14	1.31
PSDQ Global Physical	4.56	0.69	4.70	0.75	4.63	0.71
PSDQ Appearance	4.20	0.60	4.53	0.90	4.36	0.75
PSDQ Strength	4.94	0.49	5.23	0.64	5.08	0.57
PSDQ Flexibility	4.49	0.93	5.41*	0.69	4.93	0.93
PSDQ Endurance	5.29	0.68	4.73	1.12	5.03	0.93
PSDQ Global Esteem	5.36	0.62	5.41	0.42	5.38	0.52
PSDQ Total (modified)	329.00	26.18	334.22	35.47	331.47	30.15

* Groups significantly differ, $p \leq .05$
** Groups significantly differ, $p \leq .01$

Table 9

PSDQ and Significance Based on High (n = 10) and Low (n = 9) Skilled Ability

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Ability						
	PSDQ					
	Health (modified)	1.52	1	1.52	3.07	0.10
	Coordination	2.34×10^{-5}	1	2.34×10^{-5}	0.00	1.00
	Physical Activity	0.12	1	0.12	1.13	0.30
	Body Fat	5.23	1	5.23	3.46	0.08
	Sport	0.37	1	0.37	0.38	0.55
	Global Physical	0.09	1	0.09	0.18	0.68
	Appearance	0.53	1	0.53	0.93	0.35
	Strength	0.41	1	0.41	1.29	0.27
	Flexibility	4.02	1	4.02	5.90	0.03*
	Endurance	1.47	1	1.47	1.76	0.20
	Global Esteem	0.01	1	0.01	0.04	0.84
	Total (modified)	129.18	1	129.18	0.14	0.72
Error						
	PSDQ					
	Health (modified)	8.39	17	0.49		
	Coordination	12.67	17	0.75		
	Physical Activity	1.82	17	0.11		
	Body Fat	25.73	17	1.51		
	Sport	16.62	17	0.98		
	Global Physical	8.86	17	0.52		
	Appearance	9.66	17	0.57		
	Strength	5.38	17	0.32		
	Flexibility	11.58	17	0.68		
	Endurance	14.17	17	0.83		
	Global Esteem	4.81	17	0.28		
	Total (modified)	16233.56	17	954.92		
Total						
	PSDQ					
	Health (modified)	458.29	19			
	Coordination	367.43	19			
	Physical Activity	637.63	19			
	Body Fat	356.95	19			
	Sport	344.63	19			
	Global Physical	415.61	19			
	Appearance	371.02	19			
	Strength	495.91	19			
	Flexibility	476.70	19			
	Endurance	495.65	19			
	Global Esteem	555.63	19			
	Total (modified)	2103984.00	19			

* Groups significantly differ, $p<.05$

** Groups significantly differ, $p\leq.01$

Variable Correlations

Variable associations were assessed by Pearson correlations. Tables 10 to 14 show correlation r-values broken down by category of variables. Tables 10 reports correlations of body image measures with imagery measures and Table 11 shows body image measures with performance measures. The PSDQ body fat correlates with VMIQ others, VMIQ total, hip measurement (centimeters), best ever ergometer (seconds), best this year ergometer (seconds), most recent ergometer (seconds), recovery, drive, release, and total technique scores, and also coach ranking.

Table 10
Variable Correlations with Imagery Measures and Body Image Measures

VMIQ High Score = More Vivid Imagery and MIQ-R High Score = More Vivid Imagery						
Imagery Measures	**VMIQ Self**	**VMIQ Others**	**VMIQ Total**	**MIQ-R Visual**	**MIQ-R Kinesthetic**	**MIQ-R Total**
PSDQ Scales						
Health (modified)	0.38	0.18	0.30	-0.03	0.19	0.09
Coordination	-0.18	0.03	-0.08	0.17	0.33	0.28
Physical Activity	-0.26	-0.33	-0.30	0.09	-0.28	-0.10
Body Fat	-0.30	-0.60**	-0.46*	0.30	-0.18	0.08
Sport	-0.21	-0.39	-0.32	0.36	0.13	0.29
Global Physical	-0.25	-0.46*	-0.38	0.15	-0.07	0.05
Appearance	-0.38	-0.49*	-0.48*	0.39	0.13	0.30
Strength	0.06	-0.12	-0.03	0.16	-0.02	0.08
Flexibility	0.23	0.23	0.20	-0.18	0.50*	0.16
Endurance	-0.23	-0.32	-0.28	0.09	-0.21	-0.06
Global Esteem	0.01	-0.24	-0.11	0.08	-0.11	-0.01
PSDQ Total (modified)	-0.19	-0.42	-0.33	0.27	0.09	0.21
BES Scales						
Sexual Attractiveness	-0.22	-0.25	-0.26	0.20	0.06	0.15
Weight Concern	-0.20	-0.44	-0.36	0.13	0.13	0.15
Physical Condition	0.07	-0.02	0.05	-0.13	-0.22	-0.20
BES Total	-0.20	-0.37	-0.32	0.13	0.04	0.10
BAQ						
BAQ	-0.20	-0.29	-0.25	0.35	0.29	0.37

* Groups significantly differ, $p<.05$
** Groups significantly differ, $p\leq.01$

Table 11
Variable Correlations with the PSDQ and Performance Measures

PSDQ High Score = better physical self descriptions						
PSDQ Scales	**Health (modified)**	**Coordination**	**Physical Activity**	**Body Fat**	**Sport**	**Global Physical**
Performance Measures						
Best Ever Ergometer (sec)	0.11	-0.22	0.40	0.52*	0.17	0.16
Best This Year Ergometer (sec)	0.13	-0.14	0.36	0.49*	0.20	0.14
Most Recent Ergometer (sec)	0.19	-0.12	0.28	0.46*	0.25	0.14
Percent Comparison	-0.21	0.41	-0.26	-0.39	0.08	0.04
Recovery Technique	-0.03	0.05	-0.27	-0.49*	0.02	-0.24
Body Preparation Technique	-0.02	0.45	-0.23	-0.22	0.19	0.12
Drive Technique	0.13	0.20	-0.36	-0.52*	-0.12	-0.18
Catch Technique	-0.14	0.24	-0.23	-0.19	0.09	-0.09
Release Technique	0.05	0.18	-0.41	-0.54*	0.04	-0.36
Total Technique	-0.01	0.17	-0.38	-0.50*	0.05	-0.21
Coach Ranking	-0.04	-0.26	0.41	0.52*	0.04	0.09
Physical Characteristics						
Hip Measurement (in)				-0.49*		

* Groups significantly differ, $p<.05$
** Groups significantly differ, $p\leq.01$

Table 11, cont.
Variable Correlations with the PSDQ and Performance Measures (continued)

PSDQ High Score = better physical self descriptions						
PSDQ Scales	**Appearance**	**Strength**	**Flexibility**	**Endurance**	**Global Esteem**	**Total (modified)**
Performance Measures						
Best Ever Ergometer (sec)	0.17	-0.04	-0.16	0.51*	0.04	0.29
Best This Year Ergometer (sec)	0.14	-0.07	-0.13	0.48*	0.05	0.29
Most Recent Ergometer (sec)	0.17	-0.04	-0.16	0.46*	0.05	0.30
Percent Comparison	0.05	0.09	0.36	-0.43	0.04	-0.04
Recovery Technique	0.13	0.07	0.44	-0.38	-0.31	-0.18
Body Preparation Technique	0.20	-0.06	0.39	-0.39	0.01	0.08
Drive Technique	0.32	0.07	0.57*	-0.50*	-0.09	-0.17
Catch Technique	0.31	-0.14	0.43	-0.23	-0.20	-0.01
Release Technique	0.32	-0.07	0.48*	-0.43	-0.19	-0.16
Total Technique	0.33	-0.03	0.58**	-0.48*	-0.21	-0.12
Coach Ranking	-0.01	-0.06	-0.43	0.52*	0.06	0.15
Physical Characteristics						
Age (yr)			0.530*			
Mass (kg)				-0.491*		

* Groups significantly differ, $p<.05$
** Groups significantly differ, $p\leq.01$

Table 12 shows correlations between imagery measures and performance measures. The VMIQ had no relation to performance measures, but the MIQ-R did show significant correlations with some performance measures. MIQ-R visual, kinesthetic, and total correlate with performance measures that include amount of time spent using imagery, catch, body preparation, recovery, release, and total technique scores, as well as rower comparison, coach ranking, and the best ever ergometer score.

Table 12
Variable Correlations with Imagery Measures and Performance Measures

VMIQ High Score = More Vivid Imagery and MIQ-R High Score = More Vivid Imagery						
Imagery Measures	VMIQ Self	VMIQ Others	VMIQ Total	MIQ-R Visual	MIQ-R Kinesthetic	MIQ-R Total
Performance Measures						
Best Ever Ergometer (sec)	-0.14	-0.40	-0.28	-0.11	-0.50*	-0.33
Best This Year Ergometer (sec)	-0.11	-0.40	-0.26	-0.11	-0.43	-0.30
Most Recent Ergometer (sec)	-0.17	-0.44	-0.32	-0.03	-0.34	-0.20
Percent Comparison	-0.06	0.27	0.10	0.21	0.63**	0.47*
Recovery Technique	-0.11	0.10	-0.05	0.31	0.64**	0.53*
Body Preparation Technique	-0.11	-0.13	-0.20	0.25	0.72**	0.54*
Drive Technique	-0.04	0.05	-0.05	-0.03	0.45	0.23
Catch Technique	-0.29	-0.08	-0.21	0.53*	0.78**	0.74**
Release Technique	0.00	0.26	0.10	0.11	0.48*	0.32
Total Technique	-0.14	0.06	-0.09	0.30	0.77**	0.59**
Coach Ranking	-0.11	-0.35	-0.22	-0.14	-0.69**	-0.45
Imagery Information						
Time Imaging (min)				0.46*		

* Groups significantly differ, $p<.05$
** Groups significantly differ, $p\leq.01$

Specifically, MIQ-R visual correlates with time spent imaging and catch technique. MIQ-R kinesthetic correlates with best ever ergometer performance, rower comparison, recovery, body preparation, catch, release, and total technique scores, as well as coach ranking. MIQ-R kinesthetic and best ever ergometer score correlate negatively. This means that a better kinesthetic imaging score is associated with lower (better) times for the best ever ergometer score. The rower comparison is positively

correlated with MIQ-R kinesthetic; as the MIQ-R kinesthetic score got higher (better), the rower comparison got higher (worse). The five technique scores are positively correlated; a higher (better) kinesthetic score is associated with a higher (better) technique score in all technique categories. The negative coach ranking correlation implies that rowers with higher coach rankings find it easier to use kinesthetic imagery.

MIQ-R total, which includes the total scores of visual and kinesthetic, is correlated with rower comparison, recovery, body preparation, catch, and total technique scores. These correlations are all positive, which means that the higher (better) the technique scores, the better the imagery through sight and feeling since both VMIQ total and technique scores are better when higher. On the other hand, with the rower comparison, the higher (better) the MIQ-R total score, the lower (worse) the percent comparison from the coach. The higher (better) the technique scores, the higher (better) the MIQ-R total score.

Table 13 shows correlations between body image measures and performance measures. The performance measures were not significantly correlated with any of the body image data. Table 14 shows three significant correlations between anthropometrics and body image. PSDQ endurance has a negative correlation with body weight, which means that as body weight increases, endurance decreases and vice versa. PSDQ body fat correlates negatively with hip girth. This means that as hip measurement increases, the PSDQ body fat score decreases. The other correlation is between hip girth and BES weight concern. This correlation is a negative correlation meaning that as one increases, the other decreases. A higher (better) score on BES weight concern means a strong positive feeling. Therefore, as hip girth decreases, the better one feels about their weight.

Table 13

Variable Correlations with the BES and BAQ and Performance Measures

BES High Score = strong positive feelings and BAQ High Score = very true of my body					
Body Image Measures	**BES Sexual Attractiveness**	**BES Weight Concern**	**BES Physical Condition**	**BES Total**	**BAQ**
Performance Measures					
Best Ever Ergometer (sec)	-0.30	-0.08	-0.04	-0.20	-0.24
Best This Year Ergometer (sec)	-0.30	-0.09	-0.02	-0.20	-0.21
Most Recent Ergometer (sec)	-0.23	-0.08	-0.02	-0.16	-0.13
Percent Comparison	0.22	0.20	0.09	0.25	0.33
Recovery Technique	-0.01	-0.11	-0.18	-0.12	0.09
Body Preparation Technique	0.34	0.35	0.14	0.40	0.14
Drive Technique	0.26	0.07	-0.28	0.08	0.18
Catch Technique	0.32	0.23	-0.17	0.23	0.44
Release Technique	0.24	-0.10	-0.25	-0.01	0.20
Total Technique	0.28	0.09	-0.21	0.13	0.28
Coach Ranking	-0.27	-0.22	0.02	-0.25	-0.19

* Groups significantly differ, $p<.05$

** Groups significantly differ, $p\leq.01$

Table 14

Variable Correlations with the Body Image Measures and Anthropometric Data

Anthropometric Data	**Height (cm)**	**Weight (kg)**	**Hip (cm)**	**Abdomen (cm)**	**Waist (cm)**	**Waist to Hip**
PSDQ Scales						
Health (modified)	-0.18	-0.15	-0.13	-0.03	-0.17	-0.04
Coordination	0.24	-0.11	-0.15	0.08	0.10	0.33
Physical Activity	-0.02	-0.01	-0.01	-0.23	0.01	0.04
Body Fat	0.10	-0.45	-0.49*	-0.32	-0.32	0.28
Sport	-0.39	-0.31	-0.30	-0.31	-0.12	0.25
Global Physical	-0.22	-0.34	-0.41	-0.35	-0.21	0.31
Appearance	-0.03	-0.05	-0.20	0.05	0.07	0.33
Strength	-0.42	-0.03	0.07	-0.20	0.11	0.03
Flexibility	0.01	-0.02	-0.04	-0.01	0.00	0.04
Endurance	-0.31	-0.50*	-0.38	-0.38	-0.37	0.08
Global Esteem	0.00	0.01	-0.10	0.07	0.09	0.26
PSDQ Total (modified)	-0.17	-0.36	-0.40	-0.28	-0.19	0.32
BES Scales						
Sexual Attractiveness	0.18	0.11	-0.08	0.38	0.11	0.24
Weight Concern	-0.06	-0.42	-0.57*	-0.32	-0.28	0.45
Physical Condition	-0.25	-0.10	-0.11	-0.08	-0.05	0.11
BES Total	-0.02	-0.21	-0.40	-0.02	-0.12	0.40
BAQ						
BAQ	0.17	0.06	0.04	0.31	0.08	0.02

* Groups significantly differ, $p<.05$ ** Groups significantly differ, $p\leq.01$

Summary

Overall, the high and low ability groups did not significantly differ in imagery perspective except for the kinesthetic portion of the MIQ-R. The low ability group had a significantly ($p = 0.01$) lower MIQ-R kinesthetic score than the high ability group. Two of the three body image measures, the BES and BAQ, did not significantly differ between groups. The third body image measure, the PSDQ, did show significant group differences in one of the subcategories, PSDQ flexibility. The low ability group had a significantly ($p = 0.03$) lower PSDQ flexibility score than the high ability group. From these results, it is clear that the high skilled rowers rated significantly higher on the MIQ-R kinesthetic scale and on the PSDQ flexibility scale when compared to the low skilled rowers.

CHAPTER 5

DISCUSSION

The purpose of this study was to examine the relationship between body image perception and imagery perspective for female and male varsity collegiate rowers. In addition, skill level was examined as a potential influence on the relationship between body image and imagery perspective. The varsity rowers at a Division III school in the northeast United States completed three questionnaires relating to body image, two relating to mental imagery, and a demographics questionnaire. Performance level and skill-related factors of each athlete were assessed by information obtained on the demographics questionnaire and assessments obtained from the rowers' coaches. A lack of male participation prevented any investigation into gender differences as originally planned.

It was hypothesized that rowers with a positive body image would use more of an external imagery perspective while those with a negative body image would employ more of an internal imagery perspective. This hypothesis was not fully supported, as there was no significant difference between body image and imagery perspective. However, a number of significant correlations between body image and imagery perspective suggest that there may be a complex relationship. It was also hypothesized that those having a higher skill level would be more likely to image themselves internally whereas those at a lower skill level would be more likely to image themselves externally. This hypothesis was marginally supported. There was a difference in kinesthetic score between the low skilled and high skilled ability groups. The low ability group had a significantly (p = 0.01) lower MIQ-R kinesthetic score than the high ability group, however, the high

ability group was not found to significantly differ from the low ability group in the case of internal imagery as previously predicted. The only other significant difference found between the high and low skilled athletes was the PSDQ flexibility scale. The low ability group had a significantly ($p = 0.03$) lower PSDQ flexibility score than the high ability group, suggesting that the lower skilled athletes perceived themselves to be less flexible than did the higher skilled athletes. Each of these hypotheses are discussed in more detail below.

Body Image and Mental Imagery

As previously mentioned, it was hypothesized that rowers with a positive body image would use a more external imagery perspective whereas those with a negative body image would employ more of an internal imagery perspective. This hypothesis was not fully supported, as there was no significant difference between body image and imagery perspective. However, a number of significant correlations suggest that there may be a complex relationship between body image and imagery perspective.

From the correlational analyses, the PSDQ did show significant correlations with some imagery subscales. Specifically, the body fat, global physical, appearance, flexibility, and endurance subscales correlated with imagery (MIQ-R kinesthetic, VMIQ Others, VMIQ Total) and selected performance measures.

PSDQ flexibility, which refers to one's perception of his or her ability to bend and move easily, correlated with MIQ-R kinesthetic, age, and the performance scores of drive, release, and total technique scores. The higher the PSDQ flexibility scores the better the technique scores. With MIQ-R kinesthetic, the higher the score means a better

ability to feel meaning that if you perceive yourself to be flexible; you are able to feel movement better when using imagery.

PSDQ body fat, which refers to a person's feelings of being over fat or not, inversely correlated to the VMIQ others score. This means that if a person has a good perception of their body weight they are able to image others easier and more vividly. There is a similar relationship between PSDQ body fat VMIQ total. Those with better perceptions of their body weight find it easier to image both others and themselves more vividly. Put differently, those who perceive themselves to have an appropriate body fat also have an easier time imaging others as well as themselves. From these correlations, it shows that those with poor body image views will image differently than those with positive views.

A high PSDQ body fat score (not feeling overfat) correlated with better scores on a number of different measurements, such as VMIQ others, VMIQ total, best ergometer time, best this year ergometer time, most recent ergometer time, recovery, drive, release and total rowing technique scores, and coach ranking. The Body Esteem Scale subcategory of weight concern had a near significant correlation ($r = -.44$) with VMIQ others, reinforcing the PSDQ body fat score. However, other body esteem and body awareness did not correlate with any imagery measure. It appears from these data that a complex relationship exists among imagery ability, technical skill, and body image. Larger rowers generally have more muscle mass enabling them to be a stronger athlete on the ergometer, as well as a stronger athlete as rated by the coach. It is interesting to find that body fat shows a relationship with VMIQ others because it was hypothesized that

those with a positive body image would use more external imagery perspective while those with a negative body image would employ more of an internal imagery perspective.

There could be many reasons why mental imagery was not significantly influenced by overall body esteem and body awareness. One reason could be due to the fact that people do not care what they look like and are only doing the sport for feelings of accomplishment in performance rather than for body image reasons. For instance, when mental imagery is taught, the goal of it is to improve sport performance so if athletes are not taught to connect it with body image, it may not affect their imagery perspectives in the way they view themselves like originally thought. The other factors that could affect the hypothesis, mental imagery and body image, are discussed further in this chapter.

Mental Imagery, Rowing, and Skill Level

It was also hypothesized that those who have a higher skill level would be more likely to image themselves internally whereas those with a lesser skill level would be more likely to image themselves externally, since they are not used to seeing their body doing the rowing motion from their own view. This hypothesis was only marginally supported. There was a difference found between the low and high skilled ability groups and their kinesthetic scores. The low ability group had a significantly ($p = 0.01$) lower MIQ-R kinesthetic score than the high ability group however, the high ability group was not found to have a significant difference from the low ability group in the case of internal imagery as previously predicted.

Imagery use seems to be an important aspect in aiding in the technical aspect of rowing (see Table 3). The results of this study found that the high skilled athletes used

imagery significantly more on a regular basis whereas the low skilled athletes were less likely to use imagery on a regular basis. This is not surprising because imagery has been shown to have a positive effect on learning and performing various sport skills (Feltz & Landers, 1983; Martin, Moritz, & Hall, 1999) and within rowing, athletes have used mental preparation to enhance learning and help with performance (Beale, 1985), which one would think would be especially useful for these particular athletes practicing in an area where cold, wind, and rain could limit practice time on the water.

In order to get an advantage over other competitors, some athletes have used imagery to prepare for competitions, and indeed, imagery has been found to positively affect performance (Murphy, 1990). The female rowers in this study employed imagery on a regular basis, especially those athletes who were classified as high skilled rowers. This is interesting because the rowers in the current study are members of a highly successful team. The rowers that are classified as high skilled rowers, have been on the team longer than the low skilled rowers so they most likely have competed in big competitions, such as NCAA's, and would be considered to be better than most Division III rowers. This supports previous research that those who are elite or highly skilled use imagery on a regular basis.

Imagery Perspective Differences

It has been found that people may differ in their mental view of imagery. One view is external or third person imagery, and the other view is internal or first person imagery (Glisky & Williams, 1996). Imagery has been shown to be most effective when it involves all five senses and can be done from two different perspectives: internal and external (Weinberg & Gould, 2003). Again referring to Table 3, it is interesting to note

that the athletes in the current study, both high and low skilled, do not favor one imagery perspective over another. The high skilled athletes and the low skilled athletes both used internal and external imagery equally. This is interesting because it has been found that people may differ in their mental view of using imagery, but the individuals that participated in this study, did not have a preference. Since they did not have a preference, it could be because they have the same coach or because they were all trained to use imagery by the same individual. Also in other studies, rowers reported using more of an internal imagery when compared to external imagery. This was because the rowers stressed the importance of being able to feel themselves going through the motion (Barr et al., 1992), however, the athletes in this study did not have a preference.

Some studies suggest that experts and novices differ in their ability to use visual imagery and kinesthetic imagery (Barr et al., 1992; Mahoney et al., 1977). However, some studies suggest no difference between the two, but that kinesthetic imagery is beneficial with a certain amount of expertise (Guillot et al., 2004; Hardy et al., 1999). Even though the low skilled athletes in this study are not considered novices, they did have considerably less experience rowing when compared to the high skilled athletes. It is interesting that the low skilled athletes in the study were found to have a significantly poorer MIQ-R kinesthetic score than the high ability group. In other words, the low skilled athletes had a harder time feeling the motions during imagery than their higher skilled counterparts.

Factors Influencing the Results

Despite the hypotheses not being met, there could be many factors that came into play that influence the study outcomes. These reasons include: a small group of athletes

that participated in data collection, a female-only subject population, and a limited skill range of athletes. All athletes used in the study were from a Division III school, which could make a difference in the caliber of athletes, even though these athletes could be considered higher caliber than most Division III athletes due to their past success in NCAA championships. Further influencing the results was the technique and skill rating from just a single source: the head coach. Individuals with body image issues may have chosen not to participate because of worry that they would be found to have a problem, and lastly, it may be that individuals with body image issues choose one sport over another depending on uniforms. Due to this, it may be useful to look at athletes involved in other sports that have similar tight fitting uniforms which might cause body image pressures. These sports might include, but are not limited to gymnastics, wrestling, and swimming (Krane et al., 2001). If it is found that athletes in other sports that wear tight fitting clothing do not have any body image issues, it could be that those who have body image issues choose sports with different clothing types to hide their body image issues.

For the purposes of this study, it was easiest to collect data from the women's rowing team because the experimenter was involved in coaching the freshman women rowers. The experimenter's relationship with the team may have affected the results. Courtesy bias could also have skewed the results if the participants were not truthful when responding to the surveys either due to being lazy or because they knew the experimenter and were worried that they would be judged even though they were assured of anonymity. The athletes that volunteered to participate could all have a high body image to start with and maybe those with a poorer body image decided not to participate once they heard what the study was about.

Summary

Despite the findings in this study not confirming the hypotheses originally expected, there are many factors worth noting. The hypothesis that rowers with a positive body image would prefer external imagery over those who had a negative body image who prefer internal imagery was not met. The second hypothesis, that those who have a higher skill level would be more likely to image themselves internally versus those who are lesser skilled was marginally supported. There was a difference found between the low skilled ability group and their kinesthetic score. The low ability group had a significantly ($F(1,17) = 7.70, p = 0.01$) lower MIQ-R kinesthetic score ($M = 18.30$, $SD = 7.09$) than the high ability group ($M = 25.11$, $SD = 2.03$). The high ability group was not found to have a significant difference in internal imagery like previously thought. There was a significant difference found between the high and low skilled athletes in the MIQ-R kinesthetic scale and the PSDQ flexibility scale. The low ability group had a significantly ($F(1,17) = 5.90, p = 0.03$) lower PSDQ flexibility score ($M = 4.49$, $SD = 0.93$) than the high ability group ($M = 5.41$, $SD = 0.69$). This means that the low ability group perceives themselves to be less flexible than the high ability group. Being flexible and agile aids in the rowing stroke because it enables the athlete to bend and move more easily.

CHAPTER 6

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study examined mental imagery and body image perception differences in female (n=19) collegiate varsity rowers. The varsity rowers at a Division III school in the northeast United States completed three body image measures, two mental imagery measures, and a demographics questionnaire. In addition, their coach completed a questionnaire, which helped categorize the athletes as high ability and low ability. Limited male participation prevented any investigation into gender differences, so the results included information on the female participants only.

Summary

It was hypothesized that rowers with a positive body image would use more external imagery while those with a negative body image would employ more internal imagery. This hypothesis was not supported, as there was no significant difference between body image and imagery perspective. It was also hypothesized that those who have a higher skill level would be more likely to image themselves internally where as those with a lesser skill level would be more likely to image themselves externally, since they are not used to seeing their body doing the rowing motion from their own view. This hypothesis was only marginally supported because the higher skilled athletes were found to use kinesthetic imagery significantly more than the lower skilled athletes and kinesthetic imagery is linked to internal or first person imagery.

Pearson correlations were run to see if there were any significant correlations between variables. There were a few significant correlations found between two of the three body image measures, the BES and BAQ, and imagery and performance measures.

The third body image measure, the PSDQ, did however show some correlations to imagery and performance measures in the following subscales: body fat, global physical, appearance, flexibility, and endurance. For the imagery measures, the VMIQ showed no relation to performance measures, but MIQ-R did have correlations with both performance measures and body image measures. The performance measures such as best ever ergometer (seconds) best this year ergometer (seconds), most recent ergometer (seconds), coach ranking, recovery, drive, release, and total techniques correlated with some of the PSDQ subscales.

An analysis of variance (ANOVA) was run in order to figure out if there were any significant findings based on this study. The high and low ability groups showed no significant difference in imagery perspective except for the kinesthetic portion of the MIQ-R. The low ability group had a significantly ($F(1,17) = 7.70, p = 0.01$) lower MIQ-R kinesthetic score ($M = 18.30, SD = 7.09$) than the high ability group ($M = 25.11, SD = 2.03$). The groups did not significantly differ in any areas of body image relating to the BES and BAQ. However, there was a significant difference found between PSDQ flexibility and ability groups, but no significant difference was found in the other PSDQ subcategories as well as the PSDQ total score. The low ability group had a significantly ($F(1,17) = 5.90, p = 0.03$) lower PSDQ flexibility score ($M = 4.49, SD = 0.93$) than the high ability group ($M = 5.41, SD = 0.69$).

Due to these results on the MIQ-R kinesthetic portion of the test, it could mean that the low ability group has a harder time feeling their body movements compared to the high ability group. It would make sense that the lower ability group had a harder time feeling movements if the MIQ-R was based on rowing, but since it is not, it might be due

to the fact that they are not as high skilled at sports in general and have a difficult time feeling movement when using mental imagery.

The PSDQ subscale of flexibility refers to being able to bend and move easily in different directions. This is interesting to note that the low skilled athletes scored lower on perceived flexibility because rowing involves a great deal of flexibility, especially in the hamstrings. If an athlete feels as if they are not flexible enough and it is true, it could be what is hindering them from becoming a highly skilled athlete. If an athlete is not flexible enough to bend forward from the waist, it could be what is causing them to be classified as a low skilled athlete by their coach.

It is interesting to find that body fat shows a relationship with VMIQ others because it was hypothesized that those with a positive body image would use more external imagery perspective while those with a negative body image would employ more of an internal imagery perspective. It seems as if the athletes in the current study that scored higher in not feeling overweight, or the body fat subscale, prefer to image watching others rather than themselves like originally thought in the hypothesis. This is similar to what was predicted previously because it was believed that athletes who like the way their bodies look would employ imagery strategies to see their entire body, through external imagery, rather than internal imagery of only watching from their own view. It could be that when these athletes were completing the questionnaire, they felt they preferred to watch others doing the entire motion rather than themselves doing the motion if they thought that the motion was supposed to be done internally.

Global physical is only correlated with VMIQ others; appearance is correlated with VMIQ others and VMIQ total; flexibility is correlated with MIQ-R kinesthetic,

drive, release, and total techniques, and coach ranking; and endurance is correlated with best ever ergometer (seconds), best this year ergometer (seconds), most recent ergometer (seconds), drive and total techniques, and coach ranking. It is surprising to note that both global physical and appearance are correlated with VMIQ others since appearance refers to being good looking and global physical refers to feeling positive about the physical self. One would think it would correlate with VMIQ self if one feels positive about their appearance and physical self. It makes sense that flexibility is associated with all the subcategories it is linked with since it deals with being able to bend and move the body easily. It appears that if an athlete is flexible, she scored highly with the coach technique rating as well as ranking. Lastly, with endurance, it also makes sense to be correlated with the ergometer pieces as well as the coach ranking because the endurance subscale is referring to being able to exercise for a long time and not tiring easily when exercising hard. One would think the coach would want an athlete that has a great endurance capacity since rowing is an endurance sport.

VMIQ had no relation to performance measures, but MIQ-R did show correlations with both performance and body image measures. MIQ-R visual only correlates with catch technique and MIQ-R total correlates with percent comparison, recovery, body preparation, catch and total techniques. MIQ-R kinesthetic correlates with PSDQ flexibility, best ever ergometer (seconds), percent comparison, recovery, body preparation, catch, release, and total techniques, as well as coach ranking. Since there was a relationship between MIQ-R visual and catch technique, it might mean that rowers image the correct timing and placement of the oar into the water, which is referred to as the catch. MIQ-R total correlates with multiple scales, but only the performance

measures that were scored by the head coach. From this, it must mean that in order to be viewed as a top rower, or a strong rower on the team by the coach, the athlete must be able to visualize as well as feel the rowing motion, however more studies will need to expand in this to see if it can be proven. Lastly, MIQ-R kinesthetic correlated with a lot of performance measures as well as flexibility and best ever ergometer (seconds) score. This must mean that those who have an easier time feeling movements, verses seeing movements, are better at the performance measures than those who do not. Also, those who use kinesthetic imagery are more flexible than those who do not.

After looking at the results of this study, the findings could be limited due to range restriction problems. This meaning that the scores are so close together and it might be better with a greater number of subjects in order to prevent the scores from being so close together. With that being said, there could also be people who did not participate in this study because they have a body image problem or an eating disorder and once they heard what this study was about, they chose not to participate right away because they know how they feel and they are uncomfortable discussing this feeling and perceptions with others even though the experimenter stressed anonymity during the study.

Conclusions

The results of this study yielded the following conclusions:

1. The higher skilled rowers had an easier time imaging kinesthetically versus those athletes who were less skilled.
2. The higher skilled rowers felt that they are more flexible compared to those who are less skilled who felt that they are less flexible.

Recommendations

The following recommendations for further study were made after the completion of this investigation:

1. It may be useful to follow up this experiment in the future with a larger number of athletes from a wider variety of skill levels.
2. It may be worthwhile to examine gender in the study to see if there is a difference between males and females.
3. It may be interesting to follow up this study at a school, most likely a larger institution that has enough athletes to follow weight classes of heavyweight and lightweight teams.
4. In the future, it may be useful to look at athletes involved in other sports that might cause body image difficulties due to tight fitting uniforms. These sports might include, but are not limited to gymnasts, wrestlers, and swimmers.
5. Lastly, in order to prevent coach bias, it might help to have more than one coach rank and rate the athletes and then average the score between the coaches.

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APPENDIX A

INFORMED CONSENT FORM

"Mental imagery and body image in male and female varsity rowers"

Purpose of the Study

The purpose of this study is to compare mental imagery and body image perceptions of male and female collegiate varsity rowers to study the relationships of body perception and imagery type during a competitive season. In addition, we will look to see if there is a difference in body image and imagery among rowers of different skill levels.

Benefits of the Study

The benefits of this study center on knowing if there are gender differences and skill level differences in mental imagery and body image of collegiate varsity rowers. For instance, it would be helpful to see if individuals with body image issues image themselves differently than those without those issues. If differences are found, this will be helpful for both coaches and athletes in the future.

There are no specific benefits to you while participating in this study. You may, however, get insight to your own imagery and body image perspectives.

What You Will Be Asked To Do

You will be asked to fill out two studies used to assess imagery, the Vividness of Movement Imagery Questionnaire (VMIQ) and Mental Imagery Questionnaire-Revised (MIQ-R) and three studies used to assess body image, the Physical Self-Description Questionnaire (PSDQ), Body Esteem Scale (BES), and Body Awareness Questionnaire (BAQ). The imagery questionnaires ask questions about how you use mental imagery (imagery is a mental picture of doing movements). The questionnaires have you do some imagery and then answer question about what you just imaged. The body image questionnaires ask you questions about how you feel about yourself and your confidence in what things you can do.

In addition, you will complete a Sports Participation form, which is used to get basic information about you and your rowing experience as well as past sport experience. We will also take some body measurements, including height, weight, and hip, waist, and abdomen girth.

We will give your rowing coach a questionnaire for him or her to rate the quality of your rowing technique and power on the water. Your coach will also rank your skill level compared to others on the team and report your ergometer scores. You will not get to see any of this information from the coach. Your total time commitment should be no longer than one and half hours over a period of three days.

Initial_____

APPENDIX A (continued)

Risks

The risks to you are minimal. You may feel uneasy with some questions. If you feel uncomfortable and would like to stop, you are free to stop participation in the study at any time.

If You Would like More Information about the Study

Please contact the primary investigator, Heather Reader, to receive more information about this study or to get an abstract of the results. She can be reached at (610)761-4895. You may also contact Dr. Jeff Ives at (607)274-1751 for additional information.

Withdrawal from the Study

If you feel uncomfortable at any time, you are free to withdraw from the study without any questions being asked of you and without it effecting your placement on the rowing team. If you choose to remove yourself from the study, none of your information and data will be used in the study.

Confidentiality of the Data

All data acquired about you during the study will be kept confidential. All hard data will be kept with the experimenter, Heather Reader, and she will not allow others to view it. Computer data will only refer to a subjects' numerical code, which will be assigned by the experimenter while entering data. Data may be used educationally for scholarly publications and presentations, but you will not be referred or identified by name.

Participant's Statement

I have read the above and I understand its content. I agree to participate in this study. I acknowledge that I am of 18 years of age or older. I have received a copy of this consent form for my own records.

_____

Print Name (Participant)

_____ _____

Signature (Participant) Date

APPENDIX B

SUBJECT RECRUITMENT FLYER

Research Study Announcement

Mental imagery and body image in male and female varsity rowers

The Graduate Program of Exercise and Sports Sciences at Ithaca College is looking for intercollegiate rowers that are at least eighteen years of age to participate in a study to look at mental imagery and body image differences in gender and skill level between varsity athletes. Each athlete will fill out five different measurements used to assess mental imagery views (2 measures) and body image views (3 measures). In addition, basic measurements of height, weight, and trunk girth measurements will be collected along with basic demographic information in order to find out more information about his or her rowing history. Total time for the study should take the participant less than one and a half hours to complete over a period of three days. Also, the rower's coach will be asked to rate the rower's technique, power, and strength on the water and on the ergometer. There are no physical risks; however, participants may feel some psychological discomfort knowing you are being assessed while completing the measures and anthropometric data is being gathered. If you feel discomfort or are no longer interested in participating at anytime, you have the option of removing yourself from the study. Non-participation in the study or removing yourself from the study will have no effect with your placement on the rowing team since this is voluntary participation.

For more information, contact:
Heather Reader
1051 Danby Rd. Apt. 2
Ithaca, NY 14850
Phone: (610)761-4895
Email: Hreader1@ithaca.edu

APPENDIX C

SUBJECT RECRUITMENT STATEMENT

I, Heather Reader, am working with the Department of Exercise and Sports Science on studying male and female differences in body image and mental imagery of collegiate varsity rowers. If you are at least eighteen years old, it would help me greatly if you agree to participate in this voluntary study. If you agree to do so, you will be tested by completing two measures relating to mental imagery, three measures relating to body image, and filling out a brief demographics questionnaire about yourself and your rowing background. Total time for the study should take less than one and a half hours to complete over a period of three days. This testing will take place during the spring break training trip in Georgia. The testing will take place during the spring break training trip in Georgia and upon return. In addition, your coach will be asked to complete a form to rate your rowing technique and skill level to compare it to other rowers in the study as well as compare it to your body imagery and mental imagery. You will not be informed of how you compare to others in the study, but you will have access to your own results on the body image and mental imagery measures. There are no physical risks, however, you may feel some psychological discomfort knowing you are being assessed while completing the measures and gathering anthropometric data. If you feel uncomfortable or are no longer interested in participating, you have the option of removing yourself from the study at anytime. Non-participation in the study or removing yourself from the study will have no effect with your placement on the rowing team since this is a voluntary experience.

If you would like more information, please contact me, Heather Reader at:

Email: Hreader1@ithaca.edu
Phone: (610)761-4895

APPENDIX D

VIVIDNESS OF MOVEMENT IMAGERY QUESTIONNAIRE

Name _____ Gender M or F

Directions: Movement imagery refers to the ability to imagine a movement. The aim of this test is to determine the vividness of your movement imagery. The items of the test are designed to bring certain images to your mind. You are asked to rate the vividness of each item by reference to the 5-point scale. After each item, write the appropriate number in the box provided. The first is for an image obtained watching somebody else and the second box is for an image obtained doing it yourself. Try to do each item separately, independently of how you may have done other items. Complete all items obtained watching somebody else and then return to the beginning of the questionnaire and rate the image obtained doing it yourself. The two ratings for a given item may not in all cases be the same. For all items please have your eyes CLOSED.

Think of each the following acts, and classify the images according to the degree of clearness and vividness as shown on the rating scale.

RATING SCALE – The image aroused by each item might be a……..	
1	Perfectly clear and as vivid as normal vision
2	Clear and reasonably vivid
3	Moderately clear and vivid
4	Vague and dim
5	No image at all, you only "know" you are thinking of the skill

Please note when answering the following questions, internally imagery refers to viewing the image from your own eyes and external imagery refers to viewing the image as if watching it on television.

Act	RATING watching somebody else	RATING doing it yourself
1. Standing		
2. Walking		
3. Running		
4. Jumping		
5. Reaching for something on tiptoe		
6. Drawing a circle on paper		
7. Kicking a stone		
8. Bending to pick up a coin		
9. Falling forwards		
10. Running up stairs		
11. Jumping sideways		
12. Slipping over backwards		
13. Catching a ball with two hands		
14. Throwing a stone into the water		
15. Kicking a ball into the air		

APPENDIX D (continued)

RATING SCALE – The image aroused by each item might be a……..	
1	Perfectly clear and as vivid as normal vision
2	Clear and reasonably vivid
3	Moderately clear and vivid
4	Vague and dim
5	No image at all, you only "know" you are thinking of the skill

Act	**RATING watching somebody else**	**RATING doing it yourself**
16. Hitting a ball along the ground		
17. Running downhill		
18. Climbing over a high wall		
19. Sliding on ice		
20. Riding a bike		
21. Jumping into water		
22. Swinging on a rope		
23. Balancing on one leg		
24. Jumping off a high wall		

(Isaac, Marks, & Russell, 1986)

Please answer the following question as it relates to internal (viewing the image from your own eyes) or external (viewing the image as if watching it on television).

Question	**Always use external**	**Usually use external**	**Use external and internal equally**	**Usually use internal**	**Always use internal**
1. When participating in imagery, I……..	1	2	3	4	5

APPENDIX E

MOVEMENT IMAGERY QUESTIONNAIRE – REVISED

Name _____ Gender M or F

Directions: This questionnaire concerns two ways of mentally performing movements which are used by some people more than by others, and are more applicable to some types of movements than others. The first is attempting to form a visual image or picture of a movement in your mind. The second is attempting to feel what performing a movement is like without actually doing the movement. You are requested to do both of these mental tasks for a variety of movements in this questionnaire, and then rate how easy/difficult you found the tasks to be during the last 4 weeks. There are no right or wrong ratings or ratings that are better than others.

Each of the following statements describes a particular action or movement. Read each statement carefully and then actually perform the movement as described. Only perform the movement a single time. Return to the starting position for the movement just as if you were going to perform the action a second time. Then depending on which of the following you are asked to do, either (1) form as clear and vivid a visual image as possible of the movement just performed, or (2) attempt to feel yourself making the movement just performed without actually doing it.

After you have completed the mental task required, rate the ease/difficulty with which you were able to do the task. Take your rating from the following scale. Be as accurate as possible and take as long as you feel necessary to arrive at the proper rating for each movement. You may choose the same rating for any number of movements "seen" or "felt" and it is not necessary to utilize the entire length of the scale.

RATING SCALES

Visual and Kinesthetic Imagery Scale

1	2	3	4	5	6	7
Very hard to see	Hard to see	Somewhat easy to see	Neutral (not easy nor hard)	Somewhat easy to see	Easy to see	Very easy to see

APPENDIX E (continued)

1	2	3	4	5	6	7
Very hard to see	Hard to see	Somewhat easy to see	Neutral (not easy nor hard)	Somewhat easy to see	Easy to see	Very easy to see

1. Starting Position: Stand with your feet and legs together and your arms at your sides.
   Action: Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.
   Mental Task: Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

2. Starting Position: Stand with your feet slightly apart and your hands at your sides.
   Action: Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.
   Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

3. Starting Position: Extend the arm of your nondominant hand straight out to your side so that it is parallel to the ground, palm down.
   Action: Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.
   Mental Task: Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

4. Starting Position: Stand with your feet slightly apart and your arms fully extended above your head.
   Action: Slowly bend forward at the waist and try and touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head.
   Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

APPENDIX E (continued)

1	2	3	4	5	6	7
Very hard to see	Hard to see	Somewhat easy to see	Neutral (not easy nor hard)	Somewhat easy to see	Easy to see	Very easy to see

5. Starting Position: Stand with your feet slightly apart and your hands at your sides.
   Action: Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.
   Mental Task: Assume the starting. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

6. Starting Position: Stand with your feet and legs together and your arms at your sides.
   Action: Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.
   Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

7. Starting Position: Stand with your feet slightly apart and your arms fully extended above your head.
   Action: Slowly bend forward at the waist and try and touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head.
   Mental Task: Assume the starting. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

8. Starting Position: Extend the arm of your nondominant hand straight out to your side so that it is parallel to the ground, palm down.
   Action: Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.
   Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.
   Rating_____

(Hall, & Martin, 1997)

APPENDIX F

PHYSICAL SELF-DESCRIPTION QUESTIONNAIRE

Name _____ Gender M or F

Directions: Please read each statement below and in the right hand columns; check the box that most accurately describes how you feel.

Statements	False	Mostly False	More False than True	More True than False	Mostly True	True
1. When I get sick, I feel so bad that I cannot even get out of bed.						
2. I feel confident when doing coordinated movements.						
3. Several times a week I exercise/play hard enough to breathe hard.						
4. I am too fat.						
5. Other people think that I am good at sports.						
6. I am satisfied with the kind of person I am physically.						
7. I am attractive for my age.						
8. I am a physically strong person.						
9. I am quite good at bending, twisting, and turning my body.						
10. I can run a long way without stopping.						
11. Overall, most things I do turn out well.						
12. I usually catch whatever illness (flu, virus, cold) that is going around.						
13. Controlling movements of my body comes easily to me.						
14. I often do exercises or activities that make me breathe hard.						
15. My waist is too large.						
16. I am good at most sports.						

APPENDIX F (continued)

Statements	False	Mostly False	More False than True	More True than False	Mostly True	True
17. Physically, I am happy with myself.						
18. I have a nice looking face.						
19. I have a lot of power in my body.						
20. My body is flexible.						
21. I would do well in a test of physical endurance and stamina.						
22. I do not have much to be proud of.						
23. I am sick so often that I cannot do the things I want to do.						
24. I am good at coordinated movements.						
25. I get exercise/activity 3-4 times a week for at least 30 minutes that makes me huff and puff.						
26. I have too much fat on my body.						
27. Most sports are easy for me.						
28. I feel good about the way I look and what I can do physically.						
29. I am better looking than most of my friends.						
30. I am stronger than most people my age.						
31. My body is stiff and inflexible.						
32. I could jog 5 kilometers (3.1 miles) without stopping.						
33. I feel that my life is not very useful.						
34. I hardly every get sick/ill.						
35. I can perform movements smoothly in most physical activities.						

APPENDIX F (continued)

Statements	False	Mostly False	More False than True	More True than False	Mostly True	True
36. I do physically active things (jogging, dancing, biking, aerobics, swimming) at least three times a week.						
37. I am overweight.						
38. I have good sport skills.						
39. Physically I feel good about myself.						
40. I am ugly.						
41. I am weak and have no muscles.						
42. My body parts bend and move in most directions well.						
43. I think I could run a long way without getting tired.						
44. Overall, I am no good.						
45. I get sick a lot.						
46. I find my body handles coordinated movements with ease.						
47. I do lots of sports, dance, gym, or other physical activities.						
48. My stomach is too big.						
49. I am better at sports than most of my friends.						
50. I feel good about who I am and what I can do physically.						
51. I am good looking.						
52. I would do well in a test of strength.						
53. I think that I am flexible enough for most sports.						
54. I can be physically active for a long period of time without getting tired.						
55. Most things I do, I do well.						
57. I am graceful and coordinated when I do sports and activities.						

APPENDIX F (continued)

Statements	False	Mostly False	More False than True	More True than False	Mostly True	True
58. I do sports, exercise, and dance or other physical activity almost every day.						
60. I play sports well.						
61. I feel good about who I am physically.						
62. Nobody thinks I am good looking.						
63. I am good at lifting heavy objects.						
64. I think that I would do well on a test measuring flexibility.						
65. I am good at endurance activities like distance running, aerobics, bicycling, swimming, or cross-country skiing.						
66. Overall, I have a lot to be proud off.						
67. I have to go to the doctor because of illness more than most people my age.						
68. Overall, I am a failure.						
69. I usually get stay healthy even when my friends get sick.						
70. Nothing I ever do seems to turn out right.						

*Please include a day and time that works for you upon return to campus to complete the Sports Participation Form (15-20 minutes), which is the last part of the study _____. The experimenter, Heather Reader, will contact you as a reminder. Please include a phone number and/or email you can be reached at to be reminded _____.

Thank you!

(Marsh, 1994)

APPENDIX G

THE BODY ESTEEM SCALE

Name _____ Gender M or F

Directions: On this page are listed a number of body parts and functions. Please read each item and indicate how you feel about this part or function of YOUR OWN BODY using the scale below.

1 = Have strong negative feelings
2 = Have moderate negative feelings
3 = Have no feeling one way or the other
4 = Have moderate positive feelings
5 = Have strong positive feelings

1. Body scent _____
2. Appetite _____
3. Nose _____
4. Physical stamina _____
5. Reflexes _____
6. Lips _____
7. Muscular strength _____
8. Waist _____
9. Energy level _____
10. Thighs _____
11. Ears _____
12. Biceps _____
13. Chin _____
14. Body build _____
15. Physical coordination _____
16. Buttocks _____
17. Agility _____
18. Width of shoulders _____
19. Arms _____
20. Chest or breasts _____
21. Appearance of eyes _____
22. Cheeks/cheekbones _____
23. Hips _____
24. Legs _____
25. Figure or physique _____
26. Sex drive _____
27. Feet _____
28. Sex organs _____
29. Appearance of stomach _____
30. Health _____
31. Sex activities _____
32. Body hair _____
33. Physical condition _____
34. Face _____
35. Weight _____

(Franzoi, & Shields, 1984)

APPENDIX H

BODY AWARENESS QUESTIONNAIRE

Name _____ Gender M or F

Directions: Listed below are a number of statements regarding your sensitivity to normal, nonemotive body processes. For each statement, select a number from 1 to 7 that best describes how the statement describes you and place the number in the box to the right of the statement.

Not at all true of me						Very true of me
1	2	3	4	5	6	7

Question Answer

1. I notice differences in the way my body reacts to various foods.
2. I can always tell when I bump myself whether or not it will become a bruise.
3. I always know when I've exerted myself to the point where I'll be sore the next day.
4. I am always aware of changes in my energy level when I eat certain foods.
5. I know in advance when I'm getting the flu.
6. I know I'm running a fever without taking my temperature.
7. I can distinguish between tiredness because of hunger and tiredness because of lack of sleep.
8. I can accurately predict what time of day lack of sleep will catch up with me.
9. I am aware of a cycle in my activity level throughout the day.
10. I *don't* notice seasonal rhythms and cycles in the way my body functions.
11. As soon as I wake up in the morning, I know how much energy I'll have during the day.
12. I can tell when I go to bed how well I will sleep that night.
13. I notice distinct body reactions when I am fatigued.
14. I notice specific body responses to changes in the weather.
15. I can predict how much sleep I will need at night in order to wake up refreshed.
16. When my exercise habits change, I can predict very accurately how that will affect my energy level.
17. There seems to be a "best" time for me to go to sleep at night.
18. I notice specific bodily reactions to being over hungry.

(Shields, Mallory & Simon, 1989)

APPENDIX I

SPORTS PARTICIPATION FORM

Name _____ Age/Birth date _____ Gender M or F

Rowing

How many years have you been rowing competitively? _____ (#) years

What was your greatest rowing accomplishment in college?

_____

Did you row during high school? _____ (Y or N)

If so, how many years? _____

What was your greatest rowing accomplishment in high school?

_____

Other Sports

Please list all team and individual sports other than rowing when you were in:

Elementary school _____

Middle/Junior high school _____

High

school _____

*Indicate novice (N), junior varsity (JV), or varsity (V)

College _____

Hobbies/sports/activities you play/do on a regular basis without a team or group (i.e., running, cycling, kayaking)

_____

APPENDIX I (continued)

Imagery

Do you use imagery on a regular basis? _____ (Y or N)

If so, how often? _____ (# of days/week) _____ (time in minutes per each session)

How long have you been using imagery? _____ (# of months and/or years)

Do you feel imagery has helped improve your performance? _____ (Y or N)

If you have any more comments on imagery or anything to expand on, please include here _____

Filled Out By Experimenter

Date _____ Height (cm) _____ Weight (kg) _____

Hip _____ Abdomen _____ Waist _____

APPENDIX J

COACH RATING QUESTIONNAIRE

Dear Coach: Please fill out the questionnaire below regarding your rower, _____ and return the questionnaire in the envelope provided. This information will be kept confidential from all rowers. Thank you in advance for your time and help.

2,000 METER ERGOMETER SCORES (time): Best Ever_____, Best This Year _____, Most Recent_____

How would you rank this rower among all NCAA Division III rowers you have had, and in relation to his/her performance against other rowers?

_____Excellent, among the top 10% I have ever had (5)
_____Very Good, among the top 20% I have ever had (4)
_____Good, among the top 30% I have ever had (3)
_____Average, at about the 50% level (2)
_____Fair, at about the 40% level (1)
_____Below average (0)
_____Other? Comment?

Rate the rower's individual technique. Use 5 as excellent and 1 as poor.

RECOVERY					
Posture	5	4	3	2	1
Hand position	5	4	3	2	1
Oar handle height	5	4	3	2	1
Square timing	5	4	3	2	1
Slide speed	5	4	3	2	1
Average score for recovery_____					
BODY PREPARATION					
Release to ½ slide position	5	4	3	2	1
½ slide position to catch	5	4	3	2	1
Rotation of body into rigger	5	4	3	2	1
Average score for body prep _____					
DRIVE					
Sequence of legs-back-arms	5	4	3	2	1
Connection with other rowers	5	4	3	2	1
Posture	5	4	3	2	1
Average score for drive _____					
CATCH					
Placement of oar	5	4	3	2	1
Catch timing	5	4	3	2	1

APPENDIX J (continued)

Quickness	5	4	3	2	1
Blade depth	5	4	3	2	1

Average score for catch______

RELEASE

Cleanness of blade	5	4	3	2	1
Finish height	5	4	3	2	1
Feathering	5	4	3	2	1
Release timing	5	4	3	2	1

Average score for release______

TOTAL SCORES

Recovery______ Body prep______ Catch______ Drive______ Release______

Total Score ________ (25 point maximum)

WOMEN'S COACH ONLY

Hi Becky,

In addition to filling out the Coach Rating Questionnaire, please fill out this ranking sheet. Please rank order the following rowers that participated in my study from best to worst, with 1 = best and 19 = worst. This ranking sheet in combination with the Coach Rating Questionnaire will be used to assess athlete skill level.

If you have any questions, please call 610-761-4895 or email hreader1@ithaca.edu.

Thanks for your help!

Heather

_____ Rower Name (actual names omitted for publication)
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name

APPENDIX J (continued)

_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name

MEN'S COACH ONLY

Hi Dan,

In addition to filling out the Coach Rating Questionnaire for each athlete, please fill out this ranking sheet. Please rank order the following rowers that participated in my study from best to worst, with 1 = best and 5 = worst. This ranking sheet in combination with the Coach Rating Questionnaire will be used to assess athlete skill level.

If you have any questions, please call 610-761-4895 or email hreader1@ithaca.edu.

Thanks for your help!

Heather

_____ Rower Name (actual names omitted for publication)
_____ Rower Name
_____ Rower Name
_____ Rower Name
_____ Rower Name