USE OF EXERCISE-RELATED MENTAL IMAGERY BY MIDDLE-AGED ADULTS

By

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Mental imagery is emerging as an important topic of study for those interested in exercise and health psychology. Recent studies have documented important cognitive (e.g., technique) and motivational (e.g., appearance, health, self-efficacy) functions of mental imagery with various populations and have provided additional theoretical advances. Despite the importance of these findings, few studies have explored how adult exercisers use mental imagery. Therefore the purpose of this study was to explore the content and function of mental imagery used by middle-aged adults between the ages 35 to 65. Thirty adults (M=48.13, SD=8.33) that included 11 males and 19 females participated in this study which was characterized as a mixed-method dominant-less-dominant design. In phase one, all participants completed the Exercise Imagery Inventory, the Leisure-Time Exercise Questionnaire, and the Exercise Self-Efficacy Scale. From these measures participants in phase two were grouped into two categories using a median split on the participants’ scores from each of the surveys: high levels of
activity, high self-efficacy, and frequent user of exercise imagery versus low levels of activity, low self-efficacy, and infrequent user of exercise imagery. During phase two all 30 participants were interviewed to gain a more in-depth understanding of how, why, and what the participants imagined with regard to exercise behavior. The results of grounded theory analytic procedures revealed seven higher-order themes for the entire sample: exercise technique, appearance images, health outcomes, plans and strategies, stress levels/emotions, confidence enhancing images, and motivational images: these themes fit nicely into cognitive and motivational framework of mental imagery. Further comparisons between the active and less active categories of participants using the constant comparative method revealed individuals who were characterized as active, highly efficacious, and frequent users of mental imagery reported greater use of all forms of mental imagery and provided more detailed and vivid descriptions of their mental images as compared to their less active counterparts. Additional differences emerged with regard to the perspective taken as well as when and where each group engaged in mental imagery. These results are the most in-depth assessment of adults’ use of exercise imagery to date and provide numerous theoretical and applied implications.
CHAPTER 1
INTRODUCTION

Before every shot I go to the movies inside my head. Here is what I see. First, I see the ball where I want it to finish, nice and white and sitting up high on the bright green grass. Then, I see the ball going there; its path and trajectory and even its behavior on landing. The next scene shows me making the kind of swing that will turn the previous image into reality. These home movies are a key to my concentration and to my positive approach to every shot. (Nicklaus, 1976)

In the quote above, Jack Nicklaus (1976) described how mentally rehearsing his golf shots was critical to his success. He and many other world class athletes have used mental imagery as an aid in learning important skills, to enhance their performance, and cope with stress (Weinberg & Gould, 2003).

As Weinberg and Gould (2003) have explained, only in the last 20 years have researchers been studying mental imagery in sport and exercise settings. Research and anecdotal accounts have shown that mental imagery has been one aspect of mental preparation used by athletes for years (Weinberg & Gould, 2003). Jack Nicklaus for example, claimed that hitting a good golf shot is 10% swing, 40% stance and setup, and 50% the mental picture of how the swing should occur (Nicklaus, 1976). As studies have shown, athletes use imagery not only to help their performance but also make their experiences more enjoyable (Hall, 1995).

Recently, researchers have begun to study mental imagery in exercise settings (Hall, 1995; Hausenblas, Hall, Rodgers, & Munroe, 1999; Gammage, Hall, & Rodgers, 2000; Giacobbi, Hausenblas, Fallon, & Hall, 2003). As speculated by Hall (1995) and confirmed in recent studies, mental imagery conducted before, during, or after individuals
engaging in exercise behavior, can increase individuals’ self-efficacy and motivation to exercise (Gammage et al., 2000; Giacobbi et al., 2003; Hausenblas et al., 1999; Hall, 1995). From these initial findings, it is possible and even probable that imagery may have a beneficial effect on individuals in exercise settings as well (Hall, 1995; Gammage et al., 2000; Hausenblas et al., 1999). As a result, exercise imagery should be studied in depth to help the individual conjure up positive forms of imagery to promote physical activity behavior. Therefore, the present study focused on the use of exercise imagery by middle-aged adults.

**Study Rationale**

According to the Center for Disease Control and Prevention (CDC) (2004), regular physical activity substantially reduces the risk of cardiovascular disease factors, including coronary heart disease, the nation's leading cause of death, and decreases the risk for stroke, colon cancer, diabetes, and high blood pressure. Exercise also helps to control weight, contributes to healthy bones, muscles, and joints, reduces falls among middle-aged adults, helps to relieve the pain of arthritis, reduces symptoms of anxiety and depression, and increases the feelings of well being (CDC, 2004). Exercise is also associated with fewer hospitalizations, physician visits, and medications. Moreover, physical activity need not be strenuous to be beneficial. People of all ages benefit from participating in regular, moderate-intensity physical activity, such as 30 minutes of brisk walking five or more times a week (CDC, 2004).

Despite the benefits of physical activity, more than 50% of American adults do not get enough physical activity to provide health benefits. Twenty-five percent of adults do not engage in any leisure time physical activity (United States Department of Health and Human Services [USDHHS], 2000). Research also suggests that at least 30% of adults
are inactive, and that approximately 50% of those who start an exercise program will drop out within a year (Dishman, 2001). This is causing a serious problem as more people are becoming inactive and health related problems such as obesity and cardiac arrests are increasing in the United States (CDC, 2004).

Today, baby boom cohorts are over the age of 35, increasing the median age of the population to 35.5 (United States Bureau of Census: USBC, 2000). According to Kart and Kinney (2001, p. 42), baby boomers are defined as people who were born after World War II, typically between 1946 and 1964. This age group is significant to this study because most of the participants were 40 years and older. It is important to note that 25% of the entire population of the United States is 40 years old and above and this large cohort will represent the elderly in a couple of decades (USBC, 2000). The aging of the older population that is expected to occur over the next two decades has important issues for local, state, and federal agencies (Kart and Kinney, 2001, p. 45). According to the Centers for Disease Control and Prevention (2004), the United States is on the verge of a longevity uprising. By 2030, the number of older Americans will have more than doubled to 70 million, or one in every five Americans (CDC, 2004). The growing number and proportion of middle-aged adults places increasing demands on the public health system and on medical and social services. Chronic diseases exact a particularly heavy economic burden on middle-aged adults due to associated long-term illness, decreased quality of life, and greatly increased health care costs. Much of the illness, disability, and death associated with chronic disease are avoidable through known prevention measures such as practicing a healthy lifestyle and regular physical activity.
(CDC, 2004). However, finding inexpensive and effective ways to promote physical activity behaviors with individuals is an enormous challenge.

Table 1 shows the different statistics among age groups in recommended physical activity, insufficient physical activity, inactivity, and no leisure-time physical activity (CDC, 2003). The recommended physical activity for adults according to the Center of Disease Control and Prevention (2003) is defined by moderate-intensity activities in a usual week (i.e., brisk walking, bicycling, vacuuming, gardening, or anything else that causes small increases in breathing or heart rate) for at least 30 minutes per day, at least 5 days per week; or vigorous-intensity activities in a usual week (i.e., running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate) for at least 20 minutes per day, at least 3 days per week or both. This can be accomplished through lifestyle activities (i.e., household, transportation, or leisure-time activities). Insufficient physical activity is defined as doing more than 10 minutes total per week of moderate or vigorous-intensity lifestyle activities (i.e., household, transportation, or leisure-time activity), but less than the recommended level of activity. For the definition of inactive, it is less than 10 minutes total per week of moderate or vigorous-intensity lifestyle activities (i.e., household, transportation, or leisure-time activity).

Table 1-1: National Average: Recommended Physical Activity by Age.

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<tr>
<th></th>
<th>2003</th>
<th>18–24</th>
<th>25–34</th>
<th>35–44</th>
<th>45–65</th>
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<tr>
<td><strong>National Average</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Recommended</strong></td>
<td>56.9</td>
<td>50.1</td>
<td>47.9</td>
<td>42.8</td>
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<tr>
<td><strong>Insufficient</strong></td>
<td>33.2</td>
<td>38.7</td>
<td>39.9</td>
<td>41.1</td>
<td></td>
</tr>
<tr>
<td><strong>Inactive</strong></td>
<td>9.9</td>
<td>11.3</td>
<td>12.2</td>
<td>16.1</td>
<td></td>
</tr>
<tr>
<td><strong>No Leisure-Time Physical Activity</strong></td>
<td>18.4</td>
<td>21.7</td>
<td>22.2</td>
<td>25.8</td>
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activity). And lastly, the definition for no leisure-time physical activity is no reported leisure-time physical activities (i.e., any physical activities or exercises such as running, calisthenics, golf, gardening, or walking) in the previous month (CDC, 2003).

As shown in table 1, the recommended physical activity declines from 56.9 percent in the age group of 18-24 to 42.8 percent in the age group of 45-65. Also, there is an increase of insufficient physical activity, inactivity, and no leisure-time physical activity as age increases. Since patterns show that as an adult gets older, his or her physical activity participation will decrease as their inactivity will increase, there might a difference of an adult’s usage of exercise imagery as age increases as well. No previous research has been done in exploring the usage of exercise imagery in different age groups, and this study will try to explore if there are any differences and how it might effect one’s participation in exercise.

Both Hall (1995) and Hausenblas et al. (1999) have suggested that imagery might be a useful intervention tool to increase exercise behavior. Hall (1995) also argued that exercise imagery might play a role in motivation for exercise behavior. By imagining themselves participating in an activity that they enjoy and achieving goals such as better physical appearance and improvement of technique, exercisers may be more motivated to maintain an exercise program. Based on Bandura’s (1986) social cognitive theory, Hall (1995) proposed that imagery may increase motivation through its influence on self-confidence and outcome expectancy. Hall (1995) suggested that as exercisers image themselves accomplish a certain outcome; both the likelihood of that outcome or goal (outcome likelihood) and the importance of that outcome (outcome value) may be influenced. These two variables in turn lead to positive outcome expectancies. If one’s
outcome expectancy is increased, then motivation to exercise may also increase thereby increasing actual exercise behavior.

There is some support to Hall’s (1995) proposal that exercise imagery might influence exercise motivation through its influence on self-efficacy. Hausenblas et al. (1999) showed that female exercisers reported over 75% of aerobic exercise class participants used exercise imagery for both motivational and cognitive purposes. From this study, the Exercise Imagery Questionnaire – Aerobics Version (EIQ-AV; Hausenblas et al., 1999) was made to further study imagery use by female aerobic exercisers. As part of the construct validation for this questionnaire, three primary factors emerged: (1) Energy, which includes being energized and relieving stress; (2) Appearance, relating both to physique and fitness; and (3) Technique, which involves imagining correct form and body position during exercise. Of these three functions of imagery, appearance imagery was most frequently employed (Hausenblas et al., 1999; Gammage et al., 2000). In addition, Appearance and Energy imagery are considered motivational in nature, whereas Technique imagery clearly has a cognitive function. Therefore, as in sport, imagery in exercise settings may serve both motivational and cognitive roles (Hausenblas et al., 1999).

Unfortunately, there has been no research to date focused on the use of mental imagery by middle-aged adults within exercise settings. Exercise imagery research conducted within the last several years has focused almost exclusively on female college students (Hausenblas et al., 1999; Giacobbi et al., 2003). Thus the present study will expand previous research by focusing on the use of exercise imagery with adults. Also, because most of our knowledge in exercise imagery is relatively new and most of the
research is based on questionnaire studies (Hausenblas et al., 1999; Gammage et al., 2000), this study will utilize quantitative and qualitative procedures (Charmaz, 2000; Strauss & Corbin, 1990) to assess the use of exercise imagery with middle-aged adults. The rationale for this approach is based upon the need for the development of comprehensive theoretical framework related to the psychological characteristics of adults in exercise settings. The research approach being adopted here will be ideally suited for these purposes since social scientific researchers are best served when systematic attempts are made to describe, analyze, and then measure phenomenon (Strean, 1998). Also, starting with qualitative methods and progressing toward more precise, quantitative methods may yield a better picture of social scientific events (Klinger, 1973). Therefore, this study will involve using qualitative interview techniques to provide personal in-depth descriptions of exercise imagery in adults.

Statement of Purpose

The purpose of this study was to replicate and extend the findings of Giacobbi et al. (2003) and examine the content and function of mental imagery used by middle-aged adults between the ages 35 to 65. More specifically, this study was intended to examine when, where, how, what, and why middle-aged adults use imagery focused on their exercise behaviors whether any age differences existed. A secondary purpose of this study was to develop a grounded theory (Charmaz, 2000; Strauss & Corbin, 1998) based on the participants’ experiences that will provide comprehensive information about the use of mental imagery in exercise settings. More specifically, this study was intended to compare and contrast the various uses of mental imagery among adults who meet established guidelines for weekly exercise, were highly self-efficacious in the exercise domain, and who frequently engage in exercise related imagery versus those who do not
meet established guidelines for exercise, were lower in exercise self-efficacy, and less frequently engage in exercise related imagery.
CHAPTER 2
REVIEW OF LITERATURE

Introduction to Mental Imagery

Mental imagery resembles a perceptual experience but occurs in the absence of an appropriate stimuli for the relevant perception (Finke, 1989; McKellar, 1957). Imagery is mostly known by echoes or reconstructions of actual perceptual experiences, such as one’s past or future experiences (Thomas, 2001). Thus, imagery is strongly implicated in memory (Yates, 1966; Paivio, 1986), motivation (McMahon, 1973), and has been studied extensively in sport and physical activity settings (Feltz & Landers, 1983). Researchers in the sport and exercise sciences often view imagery as a form of mental simulation (Weinberg & Gould, 2003) and it is often called visualization.

Imagery has also been referred to as a quasi-sensory experience that mimics real events, situations or experiences (White and Hardy, 1998). We can be aware of an image, be able to feel movements or experience an image using all sensory modalities without actually experiencing the real thing. Imagery differs from dreams because individuals are wide-awake and conscious when images are developed. Everyone has the ability to develop and use imagery but people vary in the extent to which they are skilled or choose to use imagery (Hall, 2001).

Betts (1909) was perhaps the first to formally study mental imagery. He examined the spontaneous use of imagery in a variety of tasks, including simple association and discrimination judgments. Betts found that all of these tasks required mental imagery but speculated that imagery might be more beneficial to some tasks than others. Since Betts’
time there has been an enormous growth in mental imagery that will be reviewed in upcoming sections. What follows is a review of modern theories of mental imagery and studies that test these theories.

**Theories of Mental Imagery**

**Psychoneuromuscular Theory**

Carpenter (1894) proposed the psychoneuromuscular theory and proposed that imagery assists the learning of motor skills by innervating neuromuscular pathways in a manner similar to when individuals actually performed the activity. When someone vividly imagines an event, muscles show movement patterns similar to the way they would when actually performing the skill. While these neuromuscular movements are similar to those produced during actual performance, they are significantly lower in magnitude. Thus, although the magnitude of the muscle activity is reduced during imagery, the activity is a mirror image of the actual performance pattern.

According to Jacobson (1931), motor imagery is basically suppressed physical activity. He reported that the imagined movement of arm bending created small muscular contractions in the flexor muscles of the arm. In research with downhill skiers, Suinn (1972; 1976) monitored the electrical activity in skiers’ leg muscles as they imagined skiing the course. He found that there was muscular activity when they imagined themselves skiing. Muscle activity was highest when skiers were imagining themselves in difficult courses, which would actually require greater muscle activity. Bird (1984) examined EMG recordings of athletes in various sports and showed significant relationship between the EMG of their imagined sport activity and their actual sport activity.
Some researchers have been critical of the research supporting psychoneuromuscular theory (Hall, 2001). They suggest that many of these studies did not have control group participants. More definitive research appears necessary to empirically verify that imagery actually works as predicted by this theory.

Symbolic Learning Theory

Sackett (1934) suggested that imagery may function as a coding system to help people understand and gain movement patterns. He argued that imagery can help individuals understand their movements. Actions are symbolically coded as a mental map or blue print (Vealey & Walter, 1993); while imagery strengthens this blueprint, enabling actions to become more recognizable and automatic. According to this theory, skills that are more cognitive in nature (e.g., playing chess) are more easily coded than pure motor skills (e.g., lifting weights). One way that individuals learn skills is to become familiar with that skill and learn what needs to be done in order to become successful. By making a motor program in the central nervous system, a mental blueprint is formed for successfully completing the movement.

Sackett (1934) demonstrated support for the symbolic learning theory on a cognitive task (a finger maze) that could be symbolized. Three groups of twenty subjects each learned a finger maze under the same conditions. Afterwards, each group was given a different set of instructions regarding rehearsal. After seven days, the groups relearned the maze under different circumstances. One group was told to draw the maze pattern as much as they wanted during the interval and subjects in this group were required to make five drawings right after learning and five directly before learning. Another group was told to think through a pattern as much as possible during the week but not to draw or trace the maze. The last group was told not to draw, trace or think about the maze during
the interval. Verbal reports regarding the activities during the learning, relearning, and rehearsal periods were taken. The results showed that symbolic rehearsal does have a beneficial influence upon retention through drawing and thinking. When the rehearsal was in the form of thinking through the pattern, 80% of the subjects studied the pattern in visual terms and 20% employed in the verbal mode.

Hird, Landers, Thomas, and Horan (1991) compared the effects of different ratios of physical to mental practice on the performance of tasks classified as cognitive (pegboard) or motor (pursuit motor). Seventy-two participants were randomly assigned to one of the six conditions that included different amounts of combined mental and physical practice. Their results showed that physical practice was more effective than mental practice in improving pegboard and pursuit motor performance. However, mental practice was effective in improving performance when compared with no practice at all. This finding supports symbolic-learning theory, which showed that mental practice was relatively effective in enhancing tasks that are cognitive. However, mental practice was effective to a lesser extent in tasks that were predominately motor. This was possible due to the limited number of cognitive components in tasks that were predominately motor such as weight lifting (Hird et al., 1991).

Symbolic-learning theory may explain how imagery helps in situations where physical practice may be limited by due to expense, time constraints, fatigue, or potential for injury (Hird et al., 1991). However, various combinations of physical and mental practice or mental practice alone are not an effective alternative to physical practice. Rather, mental practice can be used as an effective supplement to physical practice (Hird et al., 1991).
Bioinformational Theory

Lang (1977, 1979) proposed the bioinformational theory to explain the psychophysiology of imagery especially in anxiety and phobia disorders. Based on the assumption that an image is a functionally organized set of propositions stored in the brain, the model states that a description of an image contains two main types of statements: stimulus and response propositions.

Stimulus propositions are statements that describe specific stimulus features of the situation to be imagined. For example, a swimmer at a major competition might imagine the crowd, his starting block, locker room conditions, and his teammates. Response propositions are statements that describe the imager’s response to the particular situation and are designed to produce physiological activity. For example, response propositions in swimming might involve a swimmer feeling the water with his body, and feeling his heart beating and muscles cramping up as the lactic acid builds up.

The important point in the bioinformational theory is that response propositions are a fundamental part of the image structure in Lang’s theory. In this sense mental imagery is not only a stimulus in the person’s head to which he or she responds but also contains response propositions created for more physiological responses (Bakker, Boschker, & Chung, 1996; Budney, Murphy, & Woolfolk, 1994). From this standpoint, mental imagery scripts are recommended to contain both stimulus and response propositions to create a more vivid image than stimulus propositions alone. Also, it has been argued that the differences between stimulus and response propositions are functionally similar to the differences between external and internal imagery (Hale, 1994). For instance, Hale (1982), Harris and Robinson (1986) showed that imagery from an internal perspective produced more EMG activity than from an external perspective.
Although this theory is an improvement over the psychoneuromuscular theory and the symbolic learning theory, it has little explanation with regard to the motivational functions served by imagery (Hall, 2001). It also does not address the role of imagery in connecting an action with other forms of information processing such as language (Hall, 2001).

**Dual Coding Theory**

According to Paivio (1986), the dual coding theory states that two discrete coding systems are involved in language processing. These coding systems are independent but partly interconnected symbolic systems specialized for encoding, organizing, storing, and retrieving. One system, the image (or imagery) system, is specialized for processing, perceptual information with nonverbal objects and events and for making mental images for such events. The other system, the verbal (or linguistic) system, is used for processing linguistic gestures and generating speech. Annett (1994) proposed a dual coding model that is more detailed to the motor domain. He called the model, action language-imagination (ALI). In his model, there are two main routes in which a person can get information about a skill; these skills are matched up to demonstration and verbal instruction and are based on two independent encoding channels; the motor channel, which is specialized for encoding human actions, and the verbal channel, which encodes linguistic information and speech, including inscriptions. A link is connected between the two channels to describe and generate an action, and to act on verbal commands. This link according to Annett (1994) is called the action-language bridge and explains how encoding information in both action and languages systems should produce better learning rather than encoding in only one of the systems. Hall, Moore, Annett, and Rodgers (1997) gave some evidence for this explanation. They investigated the recall of
movement patterns presented by demonstration or guided movement without any vision. Participants studied the patterns using one of three strategies—imagery, verbal labeling, imagery and verbal labeling—or no rehearsal strategy (control condition). Results in this study showed that more patterns were recalled if the participant used a combination of imagery and verbal labeling compared to imagery alone.

Kim, Singer, and Tennant (1998) also showed support for the dual coding theory. Their study compared the relative effectiveness of auditory, visual, and kinesthetic imagery in a golf-putting task. Sixty participants were randomly assigned to one of the five conditions: (1) visual imagery, which the participants watched a ten minute videotape that contained golf putting stroke demonstrations without any verbal instructions, (2) auditory imagery, which the participants listened to an audio taped set of instructions, (3) kinesthetic imagery, which the participants listened to specific action instructions (e.g., backswing, hit the ball) presented with a tape recorder, (4) irrelevant imagery, which the group was provided with general imagery information about thinking of all kinds of animals for ten minutes, and (5) control group, which the participants were asked to count numbers from 1 to 600. Their results showed that auditory and kinesthetic imagery lead to better retention performance accuracy than with visual, irrelevant, and control conditions. Auditory imagery, which would call for the dual coding of the information according to the ALI model, led to better retention performance accuracy than to kinesthetic imagery for the performance measures.

Functions of Imagery

Paivio (1985) proposed a framework focused on how imagery can influence physical performance. He suggested that imagery serves at two functions: cognitive and motivational and these functions operate at a specific or general level. A rehearsal of
skills or an image of a specific motor skill would be a cognitive function operating in a specific level (cognitive specific imagery; CS). An example of a cognitive skill would be a swimmer imagining about his underwater technique. A cognitive function operating in a general level (cognitive general imagery; CG) would include using imagery to rehearse entire game plans, strategies of play, and routines. For instance, a quarterback imagining specific strategies throughout a football game would be an example of cognitive general imagery. The motivational function, at the specific level, involves imagining one’s goals and the activities needed to achieve these goals (motivational specific imagery; MS). MS imagery may include a 100-meter hurdler imagining winning the Olympics and receiving the gold medal in front of millions of people. At the general level (motivational general imagery; MG), images relate to the general physiological arousal and affect. A golfer might include a quick relaxation technique by imaging a quiet place between shots to keep him calm. Hall, Mack, Paivio, and Hausenblas (1998) recently identified two components of motivational general imagery specific to sport. Motivational general-arousal imagery (MG-A) is related to stress and arousal while motivational general-mastery imagery (MG-M) is related to images of being in control, confident and mentally tough.

Based upon the above theoretical review, an important empirical question for sport scientists has been to determine the most effective use of imagery to enhance, supplement, or replace physical practice. A vast majority of studies addressing this question have supported the dual functions of imagery in sport settings (Munroe, Giacobbi, Hall, & Weinberg, 2000). The majority of the studies have examined the use of CS imagery (Hall, 2001). Rawlings, Rawlings, Chen, and Yilk (1972) found that
imagery practice is as effective as physical practice and reported best to worst order in performance is physical practice, imagery practice and control conditions. Considering the results of these studies, it is accepted that CS imagery assists the learning and performance of motor skills (Driskell, Copper, & Moran, 1994; Hall, Schmidt, Durand, & Buckolz, 1994), but not as good as physical practice (Hall, 2001). Durand, Hall and Haslam (1997) found that a combination of physical and imagery practice is usually no better than 100% physical practice. Also, it is often possible to substitute some CS imagery practice for physical practice without affecting learning and performance. This has important implications for athletes. Although athletes should not substitute imagery practice for physical practice, sometimes there are situations such as travel, injury, where it is only possible to engage in mental rehearsal or mental imagery. In these situations, by using imagery, athletes may be able to maintain their usual levels of practice and perhaps gain some of the positive benefits of physical practice. However, an important future research question to be addressed is whether similar recommendations could be made for individuals within exercise settings.

Hall (2001) questioned the theoretical discussions concerned with the optimum amount of CS imagery practice that should be added to physical practice. He suggested that research on the functional equivalence of imagery and action might provide some guidance to this issue. The concept of functional equivalence can be simplified in the context of performing motor skills because both types of activity, imagining and performing the activity, are characterized by the need to generate a temporally extended event on the basis of memory (Hall, 2001). From this perspective, imagery can be seen
as the process of a “pure” event generation whereas action essentially needs the combination of this generative process to the articulatory system (Vogt, 1995).

Two general approaches have been studied to look at the functional equivalence issue (Hall, 2001). Some researchers have examined the neurophysiological basis of motor imagery. This approach involves examining changes in EEG activity in both motor and sensory areas with the use of imagery. The second approach has compared the effects of imagery practice and physical practice on learning and performance. Ericsson, Krampe, and Tesch-Römer (1993) have shown that CS imagery practice should be treated similarly to physical practice. He also claimed that there is no optimal level of practicing CS imagery. Rather, athletes and exercisers are encouraged to use CS imagery as much as possible when doing a physical activity. CS imagery is viewed as a way to train the mind in conjunction while physically training the body, and not as a replacement for physical practice. In other words, imagery can be like a vitamin supplement to physical activity, one that could give individuals an edge in improving performance (Vealey & Walter, 1993).

In addition to using imagery to rehearse specific skills (CS imagery), many athletes report using imagery to prepare entire game plans, routines, and strategies of play (Madigan, Frey, & Matlock, 1992). This is called cognitive general (CG) function of imagery. There have not been any controlled studies but in case reports, athletes have shown the performance benefits of CG imagery for rehearsing slalom canoe races (MacIntyre & Moran, 1996), football players (Rushall, 1988) and artistic gymnastic routines (White & Hardy, 1998).
When one imagines their goals, such as winning or positive reinforcement for good performance, they are using motivational-specific (MS) imagery. Bandura (1997) remarks how imagery may influence the self-standards against which performance is appraised and evaluated. When athletes use comparable images with their performances, they have more realistic self-standards and are less likely to give up when they fail. Martin and Hall (1995) suggested that when it comes to enhancing motivation, imagery and goals may go hand in hand. Also, Munroe, Hall and Weinberg (1999) found out by interviewing varsity athletes that, goal setting is the first effective step in an intervention program, and the next rational step should be for athletes to use these goals as a basis for mental imagery.

In order to develop, maintain, or regain confidence in sport, one should imagine performing in a confident manner (Mortiz, Hall, Martin, & Vadocz, 1996). This is called motivational general mastery (MG-M) imagery. Bandura (1997) argues that confidence is a nondescript term that refers to strength of belief but fails to identify what the assurance is about. In contrast, self-efficacy is the belief of one’s capability that he or she can perform a certain behavior and execute actions required to produce specific accomplishments or goals. Bandura also proposed that positive visualizations enhance self-efficacy by preventing negative visualizations in situations where one may begin to question their own abilities. Again, the implications for these findings within exercise settings remain to be fully explored but it seems intuitive that exercisers could benefit from the use of imagery in a variety of ways. Additionally, we are only beginning to understand the content and function of mental imagery used by regular and non-regular exercisers (Giacobbi et al., 2003; Giacobbi, Hausenblas, & Penfield, In Press).
As MG-M imagery is related to self-confidence and self-efficacy, there is evidence that MG-A imagery is related to arousal and anxiety. Some athletes use MG-A to increase arousal levels (Caudill, Weinberg, & Jackson, 1983; Munroe et al., 2000; White & Hardy, 1998). It has also been shown that competitive anxiety can be influenced by the use of imagery (Gould & Udry, 1994; Orlick, 1990), but this has been difficult to empirically assess.

Overall, research shows that athletes use imagery for both cognitive and motivational reasons. Why they use imagery depends on their goals or what they hope to attain. For instance, imagery use may differ if they want to rehearse a specific skill or a whole game plan, increase self-efficacy, or increase their arousal levels. Since most of the research has been done in the context of sport, a logical next step is to extend this line of inquiry to exercise settings.

**Variables Influencing the Use of Imagery**

Mental imagery has also been widely used in sport settings. Many athletes report using imagery in both training and competition and even non-elite athletes make considerable use of imagery (Barr & Hall, 1992; Hall, Rodgers, & Barr 1990; Salmon, Hall, & Haslam, 1994).

A number of variables are known to influence how imagery would be effective when used by an athlete or an exerciser which include the specific activity, performer’s skill level, gender, and imagery ability (Hall, 2001). Each of these issues will be discussed here. For the purposes of this review the discussion that follows will only focus on gender issues and imagery ability since these two areas of investigation appear to be most pertinent to the study of imagery.
Gender Differences in the Use of Imagery

Within sport settings there is no evidence that imagery is more effective for one gender than the other in sport and only minor differences have been noted between men and women on their reported use of imagery (Hall, 2001). But, within exercise settings, gender does seem to be a determinant of exercise imagery use. Gammage et al. (2000) reported that women used appearance imagery significantly more than men while men reported the use of technique imagery more frequently than women. Gammage et al. (2000) explained how weight training is competitive in nature and men tend to exercise for more competitive reasons than women. Additionally, females tend to engage in exercise behavior to attain certain cultural ideals with regard to their shape and figure and therefore these motives for exercise may impact how women use exercise imagery.

Imagery Ability

Athletes’ ability to use mental imagery, in terms of vividness and controllability, is a distinguishing factor between novice and elite athletes or successful and less successful performers (Hall, 2001). Rodgers et al. (1991) supported this by administering the Movement Imagery Questionnaire (MIQ; Hall & Pongrac, 1983) to figure skaters both before and after a 16-week imagery-training program. This study investigated the effects of an imagery (IM) training program on ability, use, and figure skating performance and compared the influence of IM training to that of verbalization training. Twenty-nine figure skaters were divided into IM and verbal training groups and were assessed for movement IM ability, their use of IM, and free skating performance prior to and following a 16-wk training program. A 3rd group of 11 aged served as controls. Results showed that the IM group was more likely to use IM before practice sessions, to use IM after practice sessions, to visualize parts of their jumps more easily, and to see themselves
winning competitions more often. They could also "feel" (i.e., kinesthetically imagine) themselves skating better than the other groups. The results also suggested that those skaters who became better at visual IM also became more successful at completing their program elements, particularly the more difficult ones.

Goss, Hall, Buckolz and Fishburne (1986) also administered MIQ to study three kinds of imagery ability groups: low visual/low kinesthetic (LL), high visual/low kinesthetic (HL), and high visual/high kinesthetic (HH). Participants were taught to learn simple movements to a criterion performance level and were then tested on their retention and reacquisition of these movements after a week. The results showed that imagery ability is related to the learning of movements. The LL group took the most trials to learn the movements and the HH group learned the movements in the least number of trials. The same trend was found in the reacquisition stage but the support was weaker for a relationship between imagery ability and retention. Findings support the position that high imagery ability facilitates the acquisition, but probably not the short-term retention, of movements.

Types of Imagery

Internal imagery refers to imagining the execution of a technique or skill from a first-person perspective (Weinberg & Gould, 2003, p. 286). From this perspective you would only see what you actually execute as if there was a camera on top of your head or as if you were actually performing the skill. For example, if you imagined walking in the woods, you would be able to see the whole environment around you such as the trees, birds, and houses, but you would not be able to imagine anything out of your normal range of vision. The images would also emphasize the feel of movement since it is a first person perspective (Weinberg & Gould, 2003).
External imagery is when you imagine yourself from an external perspective or as if you were watching yourself perform the skill on a movie screen (Weinberg & Gould, 2003). For example, if a basketball player imagined shooting from an external perspective, he would not only see himself shoot, but see all the other players run, jump, block, and be able to see the crowd. But there would be little emphasis on the kinesthetic feel of the movement because the basketball player is simply watching himself perform it.

Overall, many people may switch back and forth between internal and external imagery perspectives (Weinberg & Gould, 2003). The more important issue is whether the individual is able to mentally create clear, controllable images regardless of whether they are from an internal or external perspective.

**Exercise Imagery**

Since the vast majority of research on imagery has been in sport and athletes, the study of exercise related imagery is relatively new. Hall (1995) was the first to propose that exercisers might use mental imagery. He also proposed that imagery may be a powerful motivator for exercisers through its impact on self-efficacy expectations. He thought that regular exercisers may imagine themselves engaging in their individual physical activity, enjoying their workouts, and achieving their goals. Such images may then enhance an exercisers self-efficacy and motivation to exercise.

Past research has found that exercisers use imagery for three main reasons; energy, appearance, and technique (Gammage et al., 2000; Hausenblas et al., 1999). Energy imagery refers to images that are associated with increased feelings of energy and relief of stress. Appearance imagery is related to images of a leaner, fit, and healthy body. Lastly, technique imagery refers to the proper execution of body positioning when doing
a certain exercise. Energy and appearance should be most closely associated with motivation, while technique imagery is related with a cognitive function. Hausenblas et al. (1999) asked 144 aerobic exercisers who were mostly full time female college students about their use of imagery.

Although not directly asked where they used imagery, it is clear that most of the participants used imagery in conjunction with their exercise (i.e., just before, during, and just after). They also used imagery in other places such as work, school, and home and at various times throughout the day such as before going to bed and when studying. It was also hypothesized that exercisers might use imagery when injured to obtain benefits while doing rehabilitation, similar to injured athletes (Hall, 2001).

Three studies (Hausenblas et al., 1999; Rodgers, Hall, Blanchard, & Munroe, 2000; Giacobbi et al., 2003) found that exercisers use imagery for three primary reasons: energy, appearance, and technique. In other words, exercisers might use imagery to reach goals such as losing or maintaining weight, improving technique and appearance, and developing a social image. Of these three exercise functions, appearance imagery was most frequently used (Hausenblas et al., 1999). Seeing that imagery might be used for motivational purposes, one can see how imagery might be related to other social cognitive variables like self-efficacy, that are known to influence exercise participation. Hall (1995) proposed that exercise imagery might be an important source of self-efficacy and efficacy expectations can come from many sources such as performance accomplishments, physiological arousal, verbal persuasion, observing others, and mental imagery (Hall, 1995). In support of these views, Hausenblas et al. (1999) found that over 75% of aerobic exercise class participants reported using exercise imagery for both
motivational and cognitive purposes. They also found that as exercise imagery is increased, so too did the participants’ self-efficacy. So by increasing self-efficacy through imagery, it may be possible to indirectly increase motivation to exercise.

According to Hausenblas et al. (1999) the content of exercisers’ images are quite varied due to individual differences and their responses were organized into nine categories: body image, techniques/strategies, feel good about oneself, motivation, general exercise, fitness/health, music, goals, and maintaining focus. These contents reveal the reasons why exercisers are using imagery (e.g., body image corresponds with the appearance function of exercise imagery).

A similar descriptive study regarding exercise imagery was conducted Giacobbi et al. (2003) study. In this study, 16 female regular exercisers were interviewed to understand the content and function of their exercise related imagery. Using major quotations from the interviews and grounded theory procedures (Strauss & Corbin, 1990), the results revealed the following higher order themes: exercise technique, aerobic routines, exercise context, appearance images, competitive outcomes, fitness/health outcomes, emotions/feelings associated with exercise, and exercise self efficacy. Several participants said that appearance related images served as an important motivation in starting and sustaining exercise behavior. This idea supported the results of Hausenblas et al. (1999) study and again suggested that exercisers might use imagery as a function of their goals and aspirations such as an improved appearance, and fitness benefits. Also, appearance related images might have important motivational functions for exercisers. Overall, this study offered future researchers a descriptive and exploratory means of assessing exercisers use of imagery (Giacobbi et al., 2003).
Measurement of Exercise Imagery

Exercise Imagery Questionnaire

The Exercise Imagery Questionnaire (EIQ) developed by Hausenblas et al. 1999 was originally validated on female aerobics participants. The EIQ is a 9-item measure, in which participants rate the frequency of their imagery use on a 9-point scale (1 = never and 9 = always). The measure consists of three subscales, each made up of three items: appearance, technique, and energy. Appearance is a motivational function that focuses on imaging about a fit-looking body. An example of an appearance item is “I imagine a ‘fitter-me’ from exercising.” Energy imagery is also closely associated with one’s motivation and it focuses on images related to getting psyched up or feeling energized from exercising. An example of an energy item is “To take my mind off work, I imagine exercising. The last subscale, technique imagery, is more cognitive in nature and focuses on performing skills and techniques correctly with good form. An example of technique imagery will be “When I think about exercising, I imagine my form and body position.”

Estimates of internal consistency, or Cronbach’s alphas, in previous research have indicated reliable results for the EIQ subscales (Hausenblas et al., 1999: appearance = .84; energy = .90; technique = .86; Rodgers, Hall, Blanchard, & Munroe, 1999; appearance = .87; energy = .88; technique = .90) and the scale demonstrated acceptable factorial validity.

By administering the EIQ to regular aerobics exercisers, results showed that participants used imagery for three primary reasons: to imagine increased energy levels and relief from stress; to imagine appearance related images associated with a leaner, fitter look; and to imagine correct execution of technique while exercising. Analyses also
revealed that individuals who exercised regularly used more appearance, energy, and technique imagery.

The EIQ was revolutionary in creating a survey-based assessment of exercise imagery. However, the EIQ was developed and validated with a sample of aerobics participants making it hard to generalize to other exercise groups (Giacobbi, Hausenblas, & Penfield, In Press; Hall, 1998). Hall (1998) suggested that a more general measure of exercise imagery was needed to allow for the valid and reliable assessment for exercise imagery with individuals who participate in other forms of exercise (e.g., swimmers, weight lifters).

Giacobbi et al., (2003) expressed another concern related to the factor structure of the EIQ as this measure only includes appearance, technique and emotion-related imagery but other dimensions such as health outcomes, exercise context, beliefs and perceptions about completing workouts, and images associated with increased exercise self-efficacy are not measured by the EIQ. Specifically, because self-efficacy has been linked to the initiation (Armstrong, Sallis, Hovell, & Hofstetter, 1993; McAuley, Bane, & Mihalko, 1998), and maintenance (Marcus & Owen, 1992; Marcus, Pinto, Simkin, Audrain, & Taylor, 1994) of exercise behavior and because fitness and health related images elicit important motivational processes within exercise settings (Giacobbi et al., 2003), the Exercise Imagery Inventory was subsequently developed and will now be elaborated upon.

**Exercise Imagery Inventory**

The Exercise Imagery Inventory (EII) was created by Giacobbi et al. (In Press) and originally consisted of a 41-item measure developed from previous relevant exercise psychology literature (Hall, 1995; Hausenblas et al., 1999; Giacobbi et al., 2003; Rodgers
& Gauvin, 1998; Rodgers et al., 2001). The scale was anchored on a 7-point Likert scale with 1 indicating rarely and 7 meaning often and a three-stage measurement study was implemented with the EII with 1,737 research participants who participated in varying levels of exercise. During phase one the measure was created and administered to 504 undergraduate students. The results of exploratory factor analysis supported a 19-item measure that resulted in four interpretable factors accounting for 65% of the response variance. These were labeled as Appearance/Health Imagery (8 items), Exercise Technique (5 items), Exercise Self-efficacy (3 items), and Exercise Feelings (4 items) and were consistent with our a priori expectations.

In phase two, a separate sample of participants were administered the 19-item version of the EII while four- and five-factors were tested using confirmatory factor analysis. The rationale for testing four- and five-factor models was that the Appearance/Health imagery items appeared to be conceptually different and may in fact correlate differentially with external variables (e.g., exercise behavior). The results of this analysis demonstrated nearly identical fit indices for both models suggesting support for the more parsimonious four-factor model.

Lastly, in phase three the researchers recruited a diverse sample of adults throughout the age span, and administered the EII along with measures of exercise behavior (Leisure Time and Exercise Questionnaire: Godin & Shephard, 1985) and a measure exercise self-efficacy (Exercise Self Efficacy: McAuley, 1992). The major purposes of phase three were to replicate phase two and assess correlations with other relevant measures (i.e., exercise self-efficacy and behavior). Overall results supported a four-factor model to explain the underlying structure of the 19-item scale. The four
exercise imagery factors were labeled Appearance/Health imagery, Exercise Technique, Exercise Self-efficacy, and Exercise Feelings. The EII also demonstrated positive correlations with exercise behavior and self-efficacy as individuals who reported using engaging in more leisure-time exercise also used more exercise imagery for all subscales particularly Exercise-Technique.

**Study Rationale**

As discussed throughout this literature review, the study of exercise imagery is a new area of inquiry especially compared to the vast amount of research conducted in sport settings (Hall, 2001). While previous exercise imagery investigations have demonstrated links between exercise behavior, exercise self-efficacy, and mental imagery (Gammage et al., 2000; Giacobbi et al., 2003; Giacobbi et al., In press; Hausenblas et al., 1999) the majority of these studies were conducted with college-aged individuals. Much information remains to be investigated with regard to how, why, and under what circumstances individuals use exercise related imagery. The potential application of mental imagery within exercise settings is vast and I would argue that middle-aged adults in particular could enhance their exercise behavior with this mental technique. However, before such intervention studies can be implemented it is important for researchers to systematically investigate the specific use of mental imagery by adults who engage in varying levels of exercise. It is my hope the current study will lead to future intervention efforts intended to foster exercise behavior.
The present study used a mixed-method dominant-less-dominant design (Giacobbi, Poczwardowski, & Hager, 2005). Figure 3-1 describes both the dominant and less dominant portions of this design. Specifically, the less dominant portion involved administration of the surveys described below while the dominant portion consisted of qualitative interviews.

![Figure 3-1: Procedure Outline using a Dominant-less-dominant Design](image-url)

Purposive Sampling

- Demographics Questionnaire
- EII (Giacobbi, Hausenblas, & Penfield, 2005)
- Self-Efficacy Scale (McAuley, 1992)
- LTEQ (Godin & Shephard, 1985)

Participants

Less Dominant: PHASE I

Asked to do interview

- YES
  - Interview
  - Dominant: PHASE II

- NO
  - Completion of study

Figure 3-1: Procedure Outline using a Dominant-less-dominant Design
Participants

Thirty community dwelling adults between the ages of 35 to 65 (M = 48.13; SD = 8.33) participated in this study and included 11 males and 19 females. Out of the 30 participants, eleven were between the ages of 35 – 45 while 19 of the participants were between the ages of 46 – 65. Out of the 30 participants, twenty-one participants described themselves as Caucasian, seven as Asians, one as Latino, and one African American participated in this study. When asked about their highest education achieved, fourteen participants answered that they had a master in arts or science, ten answered that they had a bachelor in arts or science, five answered that they had a doctor of philosophy degree, and one answered that they had a high school diploma.

The participants engaged in a wide range of aerobic and anaerobic exercise activities (e.g., running, walking, swimming, weight lifting, and the use of cardiovascular machines) and none of them had any conditions that would limit them from daily activities and/or exercising.

Study Measures

Demographic Questionnaire. A demographic questionnaire was administered to assess each participant’s age, gender, and race/ethnicity. Additionally, the participants were asked to indicate their phone number, email address, and physical address along with an indication of whether they would participate in an interview if asked.

The Exercise Imagery Inventory (EII). The EII is a 19-item scale developed through a construct validation approach (Giacobbi et al., 2005). It consists of the following four subscales: Exercise Technique, Exercise Self-efficacy, Exercise Feelings, and Appearance/Health images (See Appendix C). Evidence for the validity of the EII has been demonstrated through exploratory and confirmatory factor analysis with
separate samples of college students and adults throughout the age span. Additionally, assessments with the EII subscales, exercise behavior, and exercise self-efficacy have yielded positive and significant associations that ranged between .10 and .46. Giacobbi et al. (2005) reported subscale reliabilities for the EII were .91 for the Appearance/Health imagery scale, Exercise Self-efficacy .76, Exercise Technique .88, and Exercise Feelings .81. The scale is anchored on a 7-point Likert scale with 1 indicating rarely and 7 meaning often.

The Leisure-Time Exercise Questionnaire (LTEQ). The LTEQ (See Appendix D) is a three-item scale that asks respondents to rate how often they engage mild (i.e., minimal effort), moderate (i.e., not exhausting, light sweating), and strenuous (i.e., heart beats rapidly) leisure-time exercise during a typical week (Godin & Shephard, 1985). The LTEQ allows researchers to calculate a total MET score by weighting the intensity level and summing for a total score using the following formula: 3(mild), +5(moderate), and +9(strenuous). The LTEQ is a reliable and valid self-report measure of exercise behavior in adults (Godin, Jobin, & Bouillon, 1986; Jacobs, Ainsworth, Hartman, & Leon, 1993).

Exercise Self-Efficacy. The barriers self-efficacy scale (See Appendix E) was used to assess participants’ self-efficacy towards exercise (McAuley, 1992). This 12-item scale asks respondents to indicate their confidence in overcoming commonly described barriers to engage in exercise behavior and has demonstrated reliability and validity (McAuley, 1992).
The participants indicate their confidence on a scale of 0% (no confidence at all) to 100% (completely confident); their responses are summed and divided by the total number of items to provide a total score that can range between 0% to 100% with higher scores indicating greater self-efficacy to overcome barriers to exercise.

Procedure

At the beginning of phase one, all participants were given a brief introduction about the purpose of this study and information about how their data will be used and issues related to confidentiality. Procedures regarding confidentiality and informed consent were all part of the trust and rapport building process between the interviewee and interviewer (Fontana & Frey, 2000). Approval to recruit participants was obtained from the University of Florida Institutional Review Board (IRB Protocol #2004-U-97). After the surveys were completed during phase one the participants were contacted and asked if they would be willing to be interviewed. All participants agreed to the interview.

Interview Guide. At the beginning of this interview, a brief introduction about the purpose of this study, the use of the interview data, procedures for tape recording, confidentiality and anonymity of responses was assured. Then, consistent with the procedures of Hall et al. (1998), Munroe et al. (2000), and Giacobbi et al. (2003) the participants were read the following definition of exercise imagery:

Imagery involves mentally seeing yourself exercising. The image of your mind should approximate the actual physical activity as close as possible. Imagery may include sensations like hearing the music, feeling yourself move through the exercises, and feeling your heart beating. Imagery can also be associated with emotions. Some examples are imagining yourself getting psyched up or energized and feeling exhilarated after a workout. Imagery can also be used as a motivation to exercise. Some examples of motivational imagery are staying focused on exercise and not being distracted, setting exercise plans and goals such as imaging achieving goal of losing weight. Imagery can also be used to imagine proper form, technique, and routines.
Next, using an interview guide developed by Giacobbi et al. (2003), general open-ended questions and specific probes were employed to follow up on the participants’ responses regarding exercise imagery (See Appendix F). The probes were developed by the author in order to obtain more specific information concerning the relevant issues that arose throughout the interview process (Patton, 1990). At the end of the interview, the participant was given the opportunity to express any comments or questions that they felt important and not covered from the interview.

**Data Analysis**

**Phase I: Study Measures.** The author took a subset of 35 to 65 year olds (N=401) from the Giacobbi et al. (2005) study and computed a median for the EII, and the Barriers self efficacy scale. The results of this analysis revealed a median of 89.44 for the EII and 49.73 for the Barriers self-efficacy scale.

According to the guidelines from the Center of Disease Control and Prevention (2003), most adults should do aerobic exercise three to five times a week for about 30 to 45 minutes of moderate intensity. These guidelines were used to classify individuals as those who participate in recommended or insufficient amounts of exercise (CDC, 2003). If a participant scored three days or more of strenuous activity or five days or more of moderate activity they were categorized as a high exerciser. If the participant scored lower than three days of strenuous activity or lower than five days of moderate activity, they were considered as a low exerciser. Any participant who scored in mild activity alone was also considered a low exerciser. Based upon these characterizations the participants were then placed into one of two categories in order to make comparisons from their interview data (phase II): high imagery user, high exercise self-efficacy, high exerciser versus low imagery user, low exercise self-efficacy, and low exerciser.
Table 3-1 shows the participants scores on all study measures. A median score of 49.73 on the Barriers Self-Efficacy Scale (McAuley, 1992) was used to categorize participants as high versus low self-efficacy. Nineteen participants scored above the computed median of 49.73 and were considered participants who had a high level of self-efficacy to barriers while eleven of the participants scored below the median and were considered people who had a low level of self-efficacy to barriers. With regard to exercise participation if the participant reported lower than three days of strenuous activity or lower than five days of moderate activity, they were considered as a low exerciser. Any participant who scored in mild activity alone was also considered a low exerciser. Twenty participants reported that they exercised on a high level. Ten participants reported that they exercised in a low level. Out of the 30 participants, twenty-one exercisers reported that they exercised in a strenuous level of exercise (range: 2 – 7 days) while six participants reported that they exercised at a moderate level (range: 3 – 5 days). Three participants reported that they exercised at a mild level of exercise (range: 2 – 6 days). Finally, with regard to exercise imagery, any participant who scored higher than 89.4 on the EII was considered as high exercise imagery user while any participant who scored lower than 89.4 were considered as a low exercise imagery user. In summary, fifteen participants met the criteria of the active group and eight participants met the criteria for the less active group. The remaining participants (n=7) scored neither high nor low in one or more of the three assessments. These characterizations then provided a means to compare individuals’ interview responses as will be described in the next section.
Table 3-1: Descriptive Results from the Barriers Self-Efficacy, LTEQ, and the EII measurements

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barriers Self-Efficacy</td>
<td>58.03</td>
<td>24.22</td>
</tr>
<tr>
<td>LTEQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strenuous Level</td>
<td>3.2 days</td>
<td>2.57</td>
</tr>
<tr>
<td>Moderate Level</td>
<td>0.77 days</td>
<td>1.59</td>
</tr>
<tr>
<td>Mild Level</td>
<td>0.37 days</td>
<td>1.25</td>
</tr>
<tr>
<td>Exercise Imagery Inventory</td>
<td>97.11</td>
<td>21.14</td>
</tr>
</tbody>
</table>

Interview Analysis

Phase II: Interview Analysis. Guided theory analytic procedures guided the collection and analysis of all interview data (Charmaz, 2000; Strauss & Corbin, 1998). All interviews were tape recorded and transcribed verbatim by the author. After all the interviews were transcribed, the author then focus coded each interview emerging data themes and quotes that the author thought was relevant to the study. A comparison between the high profile group versus the low profile group (i.e., high exerciser, high self-efficacy, and high imagery user vs. low exerciser, low self efficacy, and low imagery user) was done in the analysis. Grounded theory procedures allow researchers to construct and generate a new theory grounded in data collected with specific individuals. The researcher did not begin with predetermined ideas; rather the theory was allowed to emerge during the research process. The specific approach taken here was to utilize inductive procedures during the initial coding process whereby specific utterances from each participant were coded and given labels based upon the nature of the responses. A secondary part of the analysis was to use deductive procedures in order to make sense of the data with regard to the extant literature. This inductive-deductive approach has been employed frequently in the sport and exercise psychology literature (Giacobbi et al., 2003; Rees & Hardy, 2000).
The goal of grounded theory analysis was to interpret raw data to detect concepts and relationships between concepts and then to organize the data into a theoretically descriptive diagram (Strauss & Corbin, 1998). In this study, a progressive series of analytic steps were involved that began with a careful line-by-line analysis of each interview transcript conducted by the researcher and other trained qualitative researchers (Charmaz, 2000; Strauss & Corbin, 1990, 1998).

From the development and recommendations of Strauss and Corbin (1998) and Charmaz (2000) the following steps took place during the grounded theory analysis:

1. Each interview was audiotape recorded. Each interview was transcribed verbatim and combined with extensive notes taken by the lead researcher. The primary investigator summarized the transcribed interviews.

2. The researcher then conducted a thorough reading of all interview transcripts. The researcher became familiar with the participants’ interviews and underwent line-by-line coding in order to pull out raw data themes in the form of quotations from the participants (Charmaz, 2000). Strauss and Corbin (1998) perceived coding to be the analytic procedures by which data are fractured, conceptualized, and integrated to develop theory. The labeled raw data themes were grouped into categories by comparing labels with similar themes and assigning a classification that the researcher felt best captured the substance of the topic. The emergent categories were then discussed during research meetings until theoretical saturation was reached.

3. During the process of line-by-line coding, “sensitizing concepts” were used as starting points from the interview text to further our understanding of exercise imagery in middle-aged adults and begin the process of building a theory (Giacobbi et al. 2003). Sensitizing concepts served as “points of departure” from which to study the data (Charmaz, 2000) and are an important part of the deductive analysis taken during the latter stages. For example, previous sport imagery research and exercise imagery research served as a sensitizing concept in the present investigation (Munroe et al., 2000, Hausenblas et al., 1999, Giacobbi et al., 2003). Additionally, Paivio’s (1985) extensive theorizing was used to interpret the major functions of exercise imagery. It has shown that motivational processes might be involved by the use of mental imagery by exercisers and the limited research in exercise imagery appears to support this notion (Hausenblas et al., 1999, Giacobbi et al., 2003). However, the previous theory and research offers only a starting point from which to study the use of exercise imagery by middle-aged adults. Therefore, specific instances of exercise imagery discussed by the participants were examined
for a range of possible motivational and cognitive functions similar to but different from the ways athletes and regular exercisers use mental imagery.

4. Following the line-by-line coding, the researcher built a set of categories, each of which were mentioned on one or more occasions by the participants. Grounded theory allows researchers to generate theory through close inspection and analysis of qualitative data (Henwood & Pidgeon, 1992). By doing this, a constant comparative method was used to find similarities and differences in the participants’ responses (Charmaz, 2000; Strauss & Corbin, 1990). This involved making constant comparisons between participants who had high or low self efficacy as determined by the Barriers Self-Efficacy Scale (McAuley, 1992), participants who were high or low exercisers determined by the LTEQ (Godin & Shephard, 1985), and participants who used different types of mental imagery as measured by the EII (Giacobbi et al., in press). Constant comparison was also done with different participants, information in the form of quotations derived from the same participant, incidents experienced by the same or different participants, data coming from a general dimension or category, and data coming from different dimensions with other dimensions (Giacobbi et al., 2003). Giacobbi et al. (2003) explained how this constant comparison allowed for a close examination of how, where, when, and why individuals used exercise imagery.

5. Axial coding was then performed to relate categories to subcategories along the lines of their properties and components (Strauss & Corbin, 1998). This involved amplification on the raw data themes into the more general and abstract dimensions. Selective coding also occurred at this stage to integrate and refine categories, which allowed for the formation of a larger theoretical structure (Strauss & Corbin, 1998). In terms of the present study, the researcher closely analyzed specific incidents described by the participants in order to understand the conditions of using exercise imagery and to find if there were multiple functions, consistencies, and/or inconsistencies within and among the individuals (Giacobbi et al., 2003).

6. Research group meetings with a qualitative data researcher were conducted throughout the data collection and analytic process (Dale, 1996). During these meetings, several interviews were read whereby one person would read the participant’s statements and another would read the interviewer’s questions. The major purposes of these meetings were for those unaffiliated with this study to play “devils advocate” and to examine the researchers’ clarifications and understandings of the interview text (Dale, 1996). This process worked as a social validation process that allowed the researchers to remain open with their ideas and beliefs about the evolving thematic framework (Pollio, Henley, & Thompson, 1997).

7. With previous research on mental imagery in sport and exercise have revealed important findings (Hausenblas et al., 1999, Giacobbi et al., 2003), the researchers’ past experiences, ideas, and beliefs about this phenomenon were nearly impossible to separate from the analysis of the transcripts (Charmaz, 1990: Charmaz, 2000). Charmaz (1990) describes that as long as researchers are not “wedded” to their
prior knowledge and preconceived ideas, it is actually advantageous for the grounded theorist to use previous beliefs about a phenomenon because it allows greater emphasis to be placed on the development of new theories that emerge from the data (p. 1165). In this study, all interview transcripts were inductively analyzed during most of the analysis. Every effort was made to precisely represent each participant’s experiences using mental imagery associated with exercise (Giacobbi et al., 2003). After the inductive analysis, previous research on mental imagery helped interpret the data with regard to the present literature through the use of sensitizing concepts and constant comparisons. Labels were created that described higher-order themes largely derived from previous research (e.g., exercise appearance). Thus, consistent with previous writings by grounded theorists, a combination of an inductive and deductive analytic procedures were used during the analysis of the interview transcripts. (Charmaz, 2000; Rees & Hardy, 2000, Giacobbi et al., 2003).

8. Coding continued until theoretical saturation was reached. Theoretical saturation occurred when no further properties, components, or relationships emerged during analysis (Strauss & Corbin, 1998).

9. A conceptual framework was constructed beginning with the raw data themes from the interviews and progressing to first order and higher order themes. From the conceptual framework, a grounded theory was developed to show relationships, meanings, interpretations, and the perceived and theoretical results of exercise related imagery in middle-aged adults.

Issues of Reliability, Validity/Trustworthiness

Several procedures were taken to establish trustworthiness, validity, and reliability in the current study. Rapport was built through an informal opening session and body signs such as nodding, and/or with words of thanks, support, and praise in accordance with Côté’s (1999) recommendations. An introduction of the study and the researcher and why it was being conducted also served as an opening introduction. Each interview began with the participant filling out the informed consent form and a demographic form regarding questions like their age, sex, and what kinds of exercise they participated in. This served to familiarize the participants with the format of the interview and allowed them to feel comfortable conversing with the researcher. Participants were assured of their confidentiality and anonymity at the beginning of the interview. They were also
told that they did not have to answer any questions that they felt uncomfortable answering. Participants were encouraged to think back in their lives and share any thoughts or perceptions they had regarding imagery in exercise settings. The researcher continued to assist the discussion throughout the interview by using words of acknowledgement, nodding, smiling and probes to thoughts and ideas that the researcher felt important.

Many methods were employed to establish reliability and validity, thereby verifying the precision of the interview data (Sparkes, 1998). First, the author had meetings with his advisor and a research assistant trained in qualitative methods on a regular basis to discuss the interview results (Maxwell, 1996). This allowed for the triangulation of the data by multiple coders with the ability to investigate discrepant findings (Sparkes, 1998). Second, research group meetings were conducted between the principal investigator and another individual trained in qualitative methods. This allowed the principal investigator to remain flexible and unbiased during the process of coding and developing theory (Pollio et al., 1997). Dale (1996) and Sparkes (1998) showed that a research groups closely parallel an external inspection which serve to establish credibility and dependability of qualitative data. Finally, a researcher unaffiliated with the present study who possessed previous training and experience with qualitative data analysis was given twenty eight random quotes from the interviews and seven higher order themes created by the author. This individual was then asked to match the quotes and higher-order themes with a list of labels presented in the results below. This independent audit resulted in 79% agreement between the analysis presented in this thesis and the auditors’ findings.
CHAPTER 4
RESULTS

The analysis consisted of higher-order themes that came from an inductive analysis of the interviews (Giacobbi et al., 2003) and comparison examples from each category. The first part of the result section consists of where and when the participants used exercise imagery. Table 3 summarizes these findings.

The second part of the analysis focuses on the major functions of imagery and is represented diagrammatically between Figures 5-1 to 5-3. This model was adapted from Giacobbi et al. (2003) and served as a sensitizing concept for my analysis. What follows is an explanation about where and when exercise imagery was used and then a description of the more specific content or major functions imagery served for the participants.

Table 4-1: Analysis of Where/When Participants (n=30) Used Exercise Imagery

<table>
<thead>
<tr>
<th>Where</th>
<th>Number of Participants (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Exercise Environments</td>
<td>11</td>
</tr>
<tr>
<td>Out of Exercise Environments</td>
<td>15</td>
</tr>
<tr>
<td>In and Out of Exercise Environments</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to Exercise</td>
<td>12</td>
</tr>
<tr>
<td>During Exercise</td>
<td>9</td>
</tr>
<tr>
<td>Prior/During/After Exercise</td>
<td>9</td>
</tr>
</tbody>
</table>

As shown in Table 3, 11 participants (37%) reported that they used exercise imagery in exercise environments (e.g., gym, swimming pool), 15 participants (50%)
reported using imagery both in and out of exercise environments while 4 (13%) reported using imagery both in and out of the exercise context. With regard to when they used imagery, 12 participants reported using imagery prior to exercise, nine reported using imagery during exercise, and an additional nine indicated that they used imagery before, during, or after exercise participation.

Functions of Exercise Imagery

Figure 5-1 shows a conceptual framework that represents the inductive analysis of the participants’ quotations. As shown, seven higher-order themes of exercise imagery were revealed though inductive analysis. These were labeled: exercise technique, appearance images, health outcomes, plans/strategies, stress levels/emotions, confidence enhancing images, and motivating images. Additionally, two supplemental themes were labeled as self-images, perspective, and final thoughts. Also shown in Figure 5-1 are the theoretical linkages between the major cognitive and motivational functions of imagery proposed by Paivio (1985) with the higher-order themes reported below. As described in the previous chapter, Paivio’s (1985) work served as a sensitizing concept from which to analyze the present data. Each of these themes will be described below along with exemplar quotations.

Exercise Technique. Inductive analysis from the raw data themes and deductive analysis from previous exercise imagery research resulted in the emergence of exercise technique. In sport settings, research has consistently shown that athletes use cognitive specific imagery to improve technique. Similarly, almost all the participants (n=26) reported using some kind of imagery related to technique. One participant reported the importance of using technique imagery while working out in the gym. He said, “I also try to imagine using proper form for each rep, such as bending your arms at the proper
angle, keeping your back still, lifting the bar smoothly.” One participant reported how she thought about her technique when she was biking. She quoted, “I guess I do a lot of thinking when I’m biking. Cause I also think about my form, how I pedal and how I try to create the least resistance to get the fastest kind of momentum.”

Another participant thought about her elbows when she was swimming. She reports, “I think oh well, you’re dropping your elbow, get your elbow up, and then I try to picture the technique that you’re supposed to use.” One participant thought about technique imagery to create the least stress to her body. She said, “When exercising, I try to keep my body aligned properly to get the most out of the exercise without stressing my body…” One participant thought about her heart rate when running on the treadmill. She said “…I think about my heart rate, I’m trying to increase my effort level while I’m walking sometimes, and burning more calories, and playing with the incline, and with the speed on the treadmill.” This participant thought technique when he swam and also when he played golf. He reports, “When I think about technique, like in swimming, I try to think about trying to perfecting my stroke and to get the maximum out of my workout. In golf, I try to imagine the swing and follow through and to try to get the shot I’m trying to achieve…”

Other responses like thinking about heel to toe when running, most efficient steps, doing the right stretching techniques, thinking about posture, taking long smooth strokes, and having good mechanics with speed and control were also recorded with relation to technique. These quotes will be supported in the following sections of high exerciser, high imagery user, and high self-efficacy group and low exerciser, low imagery user, and low self-efficacy group.
Appearance Images. Twenty-five participants used imagery with concerns of appearance when exercising. A close analysis showed that many participants thought about their younger self when thinking about appearance. This one participant thought about her appearance images as a motivator to exercise as if she thinks about her appearance it would help her “think about the benefits of exercise, how it will make me skinner and healthier.” This participant reported how she motivates herself to exercise by recalling her appearance from 30 years ago. “Physical appearance I do think about it too. It is the same kind of deal like the health thing. I recall my past self and think about how I looked 30 years ago. I also keep on reminding myself of how I look now and try to keep in shape for my future.” One participant thought about being thinner and the only way to look thinner was to exercise more and have a strict diet. She reports,

I picture myself thinner, keep doing this and I’ll get thinner, you know and I think most women think about nowadays which is why people are exercising and with all this diet stuff going on, low carb, high carb, antioxidant, south beach, Atkins, I don’t think anyone knows what to do, less in and more exercise, works no matter what you eat.

Reports of losing weight, trying to fit in certain size dresses, and looking younger were constant responses among female participants. Like this one participant thought about a certain bathing suit she would think about and how it would be nice to fit in that bathing suit. She reports,

I picture myself looking better in my bathing suit, by doing this exercise than when I do when I’m swimming. Ok, those are ones to do to lose weight and get in shape and swimming, I love to do it and I’m good at it and want to look better in a bathing suit…so I picture myself with weight loss…

Also, participants thought about fitting in a dress like this participant thought about “…fitting in certain size dresses without covering up the bulges.” Also this participant thought about how nice she would feel when she swam if she lost her baby fat. She said,
“I would definitely picture myself swimming and using how much better I was going to feel and much better I was going to look once I got rid of the baby fat and got into shape and felt good about myself again, so that would be 35 up until now, 17 years.” This participant both had an image of fitting in a certain dress and also thinking about her past.

Imagining what I look like 20 years ago and wanting to get back to that kind of body style. Middle age has caught up a little bit and that’s certainly a motivator knowing that there’s clothes I’d like to wear again that are in my closet and are a little tight, and wanting to keep on looking as young as possible. Not wanting to get old before my time.

One participant thought about her present self and how she thought about future images to prevent herself of becoming fat in the future. She reports,

I just think about my present physical appearance and also my future appearance. Kind of preventing of not becoming who I don’t want to be. So I think about a healthy me in present time and I really try to think about not getting fat and just being healthy.

Some male participants thought about their body tone and muscle growth when thinking about exercise imagery. For example this one participant thought about he “thought myself become stronger and have bigger muscles…” Also, another participant thought about his muscles when thinking about exercise. He reports, “Every time I go do weights and look in the mirror, I try my best to focus on my chest area as I feel much better if I have a bigger chest…”

Other responses like thinking about getting younger, fighting with gravity, having a healthy looking face, thinner thighs, skincare models, toned body, and thinking about more definition. These main themes will be supported with quotes in the following sections of high exerciser, high imagery user, and high self-efficacy group and low exerciser, low imagery user, and low self-efficacy group.
Health Outcomes. Twenty-five participants indicated that they thought of some kind of health image when thinking about exercise. Most of the participants thought about how to stay healthy and how to prevent diseases from occurring. Some thought about their parent’s health or genetic family health and how it affected them to keep on exercising so they can prevent the disease to come into them. Like this participant, who she thought about her family history of chronic diseases and how thinking about that helped her to keep on exercising. She said,

I think well my mom died young of pancreatic cancer not of a stroke or heart attack or anything…I’m more aware of my cholesterol level…I mean anyone can become a diabetic if you’re obese enough and don’t exercise and anybody can have stroke, so I kind of, so that’s in the back of my mind, yea, high blood pressure

Another participant had similar thoughts about how prone she is to diseases especially as she ages and how that motivated her to exercise. She reported,

Trying to kind of visualize my heart rate, being lower when I workout rather than going higher as I work harder just so it doesn’t get out of control, train to visualize myself as being healthier because I’m doing this, I’m 50 so I’m thinking about risks of stroke, and heart disease and all that, and this is a good thing to prevent me from having these problems. I’m trying to get out of my workout, so that I can spend a little less time and still get the same benefits, kind of my goal at this point.

This participant also had similar thoughts of how she constantly thought about diseases and having a freedom of illness from it. She quoted, “Oh, I really think about my health when I am exercising…I have images of like lower blood pressure, freedom from illness, aerobic conditioning, and stress relief…”

Other responses like thinking about prevention of injury, being more alert with energy, lowering heart rate, what to do to stay healthy, heart beat and blood pressure, and improved endurance and fitness. These quotes will be supported in the following sections of high exerciser, high imagery user, and high self-efficacy group and low exerciser, low imagery user, and low self-efficacy group.
Plans/Strategies. Seventeen participants indicated that they used some sort of cognitive general image related to exercise. Most of these participants were exercisers who did weight training and used plans or thought about programs in their head before they would start a workout. Like this participant where he said, “…Would think about all the exercises…would do on that certain day, such as working on my chest, what kinds of exercises will I work today, bench, incline, chest files…” This participant also had similar thoughts. He quoted, “…Like when I work out, a few hours before, I would start thinking about what areas of muscle I would ‘hit’, and I know what regiment I will be doing, and the only difference would be what I’ll be doing in the gym that particular day.” He also quoted how he planned out very specifically before a workout.

I would just like to know what I’ll be doing, what areas of body I work out to, primarily because I want to work out the same muscle for one week…before I go to the gym, like what area of body I’m going to working on that day. I already know what I’m going to be doing, once I determine what area. So the next thing would be, am I going to heavy or light, am I going to try different exercises, more reps, less reps, those kinds of things I think about once I get to the gym…

This participant made a checklist of what exercises he wanted to do before he went to the gym. He quotes,

I do a checklist, like what body parts I’m going to do today. You see, since I go to the gym everyday, I try to exercise different body parts each day. So if one day I’m just exercising my chest, the next I’ll try to exercise my legs, and the back or abs, or arms and so on. So each day, I try to see what exercises are available in the gym and think about each specific exercise, like you know, if I’m doing bench, how many reps of how much weight and how many sets.

Also one participant planned a different workout before she exercised so it would not be boring. She quoted,

I’m trying to plan my schedule where I can go regularly, now I’m thinking about how I can change the workout around and not get bored. I’ve actually scheduled a meeting with the trainer so that I can kind of customize the workout and help me come up with ways to do that, cause I don’t know what to change and in the routine
to make it better for me. And then sometimes when I leave I think about what I can
do next time to be different and keep this moving.

Another participant thought about having someone next to her when she did the
stair master. She reported,

When I’m on the step machine or stair master, I usually try to visualize somebody
beside me and we are competing against each other. You know how running
machines or stair masters can get really boring especially if you are just looking at
a TV screen while you are exercising, so I try to imagine that I am somewhere else
like climbing up the pyramids or running on a beach.

One participant thought about getting into the rhythm when she ran by thinking
about a certain song. She stated, “I think about a certain song that really motivates
me…when I’m thinking about this song, especially when I am running and I’m bored, it
will keep my rhythm and therefore help me to keep on finishing my run.”

One participant thought about the specific certain steps she took when she when
biking. She states,

I try to concentrate on pulling through the bottom of the stroke, like wiping mud off
your shoe, and pulling up through the top of the stroke. I will be aware of my
cadence, and what gear I’m using. I try to experience the feel in my feet and legs
while you shift through gears as I climb or descend. And most importantly I let my
muscles be relaxed.

One participant used goal setting by stating, “I like to set goals when I run…if I ran
3 miles today, I am going to set a goal to run 3.2 miles the next time I run on the
treadmill.”

Stress Levels/Emotions. This kind of imagery is the motivational general arousal
images associated with exercise, such as stress reliever or stress creator. Twenty-four
participants stated that they used some kind of imagery that related to their emotions.
Many participants had the same thoughts of how thinking of exercise during the day
reduced their stress like this participant, “…That’s definitely mental health thing, yeah,
cause I have a desk job, and uh the doctor even told me that you be better off building houses, than sitting doing no activity all day, sit in front of the computer, so, it’s just like a stress reliever.” This participant used to consume alcohol as a stress reliever but now, thinking and doing exercise has become his stress reliever. He explains,

It just relieves tension. Before I used to exercise, I would just drink beer every night, when I’m working because of my stressful job. I work 11 hours a day and 4 hours in weekends sometimes so I get wound up at the end of the day. So I would drink a lot to relieve my stress. A six pack wouldn’t even last 2 days. Now I only drink socially on weekends. Because back then, alcohol was my relieving stress, now I relieve stress by working out. I think it works better.

Out of the 24 participants, five stated that thinking of imagery created some kind of stress. Like this participant, “Thinking of exercise is ok, but it is not ok when I want to workout and cannot because of time constraints. This causes great stress for me sometimes and I would feel really guilty throughout the day.” This participant also had similar ideas.

It has been helpful in a way that keeps me focused and maintains my focus towards exercise. I think without setting goals or thinking about accomplishing them I don’t think I would be very healthy. Now, it has been harmful sometimes when I really think about exercise, and I just don’t have the time to do it. That’s when it gets pretty stressful.

One participant said how thinking about a joyful exercise experience motivated her to exercise. She stated, “Exercise is very enjoyable to me so imagining exercising triggers a joyful memory that I want to experience again and again.”

One participant reported that thinking of imagery was a starting block of her becoming a better person. She quoted,

I exercise because I imagine myself as a better person after I exercise. I have that constant vision in my head that somehow I will be a better person after I exercise…Imagery is what motivates a person to exercise. I think facilities around the world are also aware of this principle. I mean when I walk into a gym, I see posters of men and women in great shape. Then I start to conjure up images of my own. What would I look like after I exercise? Would I look like them? I think that
these posters act as a trigger in helping me think of a better newer me. Like I’ve been saying from the beginning, imagery is the starting point of my exercise.

Confidence Enhancing Images. In order to develop, maintain, or regain confidence in sport, one should imagine performing in a confident manner (Mortiz, Hall, Martin, & Vadocz, 1996). Paivio (1985) described this function in imagery called motivational general mastery (MG-M) imagery. Since we are only beginning to understand the content and function of mental imagery used by regular and non-regular exercisers (Giacobbi et al., 2003; Giacobbi, Hausenblas, & Penfield, In Press), it was important to find if exercisers used imagery in regard to confidence.

Twenty participants reported using imagery in relation to confidence. This participant thought how confidence helped him to stay in shape. He said, “I’m more confident of myself, and I feel I can do more things. And I seem to be able to concentrate much better when I’m physically in shape. So it’s related physically and mentally. Cause when I’m physically in shape, I tend to be more mentally in shape as well.” This participant also thought how imagery was a confidence booster. He quotes,

I think imagery is a great confidence booster. Especially when lifting weights, you won't accomplish something you've never done before unless you're confident you can do it. I think when you can picture yourself succeeding, your mind gets more comfortable with it and therefore the more you picture it, the more automatic it becomes to you, and that’s how it may become a confidence booster!

Motivational Images. Thirteen participants reported using exercise imagery in regard with their motivational levels. One participant claimed that getting bigger and stronger motivated him to go to the gym more. He stated,

I actually like weight training, I like to go to the gym and sometimes I wonder what keeps you from doing it, since I like to do it, and so thinking about going in and doing the reps and getting my arms stronger and everything, it does give me more confidence when I feel better and when I do it and feel better and then I have more confidence.
This one participant will get motivated by thinking about exercise while he was at work. He quotes,

When I'm sitting and I'm typing and writing a grant and I'm getting a little bored or a little tired of that what I probably do and its not consciously doing it, its unconscious motivation I will get up and I will walk around and as I'm walking around I’ll thinking about the workout I’ll have at swim, not so much swimming, but the relaxation I get from swimming.

Losing weight was a big motivator for this participant. She said,

Losing weight is a big motivator and actually the feeling after exercise now is starting to become I think a bigger motivator. So I before I go, I try to remember that even though I’m tired I am going to feel better then when I go do it, rather than saying, ah, I’ll do it tomorrow and just go home.

One participant thought about the terrible outcomes when not exercising and that was a motivator for her. She said, “I imagine the terrible effects of not exercising and that is really motivational to me.”

**Perspective.** With regard to perspective taken (e.g., internal versus external), 16 participants reported using primarily an internal perspective, 9 reported external, while 5 reported both. For instance, this participant reported using internal imagery by actually using senses like smelling the air. She reports,

I will usually visualize a place where I usually have an enjoyable ride, what it looks like, what it smells like, how it feels. I enjoy being there, noticing the greens and browns of the landscape, and feel the warmth of the sun and the coolness of the breeze. I can still smell the aromas or scents that I smelled at that time. I can smell the flowers, pine exhaustion fumes, and the car pollution.

Nine participants reported using imagery from an external perspective, like how this participant reported seeing herself bike from a mirror perspective. She said, “I use an external imagery perspective as if I were watching myself in a mirror on the bike pedaling perfectly and building intensity.”
Final Thoughts. At the end of the interview, the participant was asked if they had anything to add. Eighteen participants provided extra thoughts and suggestions that they felt was important with regard of exercise imagery. These ideas included teaching imagery to exercisers and how it will benefit to them, using positive imagery, and to people who are not that active should stop thinking about food and start thinking about exercise. Here is an interesting quote that one participant reported.

I think the body imagery can encourage exercising a lot. Especially for obese people or people who want to lose weight. Many people worry about mass media’s influence on the stereotypical body image, but those images egg many couch-potatoes, such as me, to actually go out and exercise to have better appearance...

One other participant had similar thoughts.

By using exercise imagery, it should motivate you to get up off your chair and do exercise. People who are not active should stop seeing themselves eating good food or drinking and should start finding ways and thinking about how they can lose weight. That way there will be some motivation to start exercising...

This participant requested to exercisers that motivation was the starting block to a good exercise program.

My advice is to just be motivated. You just have to be able to do something and that image would come naturally…let’s say when I’m working out, you don’t think about, you know there is no text saying, bend your arm 90 degrees and it’s not like that. You see your arm bending, you don’t see in text. You think of an image, you don’t think in text. Everyone does. Motivation is the hardest part. Most people don’t exercise cause they are not motivated. That’s such a cliché. Of course you are not motivated, you just don’t want to do it. And when you are not motivated to do it, you can’t imagine yourself doing it. So you have to be motivated. Once you are motivated enough, the image will come naturally. Everybody has that capability.

A couple of participants had conflicts with trainers in their gym and hoped if they would pay more attention to their exercise. This participant had a conflict with her trainer which effected her motivation to go to the gym.

I just had a slight confrontation with a trainer. That lost a lot of my motivation to go…so what I want to say to exercise leaders is that just saying I’m doing well
doesn’t really matter to me…I feel they’re saying that cause it is their job…however in the case of the conflict I had my motivation was quite effectively stuffed, because the trainer didn’t ask why I didn’t want to participate he just told me to do it…and then he just went to encouraged others while totally ignoring me.

Comparative Analyses

The quotations and labels above consisted of first-person descriptions from all the participants’ data and served to answer research purpose one. The second purpose of this study was to compare and contrast the various uses of mental imagery among adults who meet established guidelines for weekly exercise, were highly self-efficacious in the exercise domain, and who frequently engage in exercise related imagery versus those who do not meet established guidelines for exercise, were lower in exercise self-efficacy, and less frequently engage in exercise related imagery. Figures 5-2 and 5-3 highlight the major functions of imagery reported by both groups of participants respectively.

High Imagery User, Active Exerciser, and High Self-Efficacy participants: Active Participants

Fifteen participants scored high on all three preliminary assessments and these individuals consisted of ten females and five males. Additionally, nine of the high scorers were between the ages of 46 to 65 while the remaining six were 35 to 45 year olds. What follows is a summary of when and where participants in each category used imagery followed by more in-depth descriptions of the content and function of imagery reported.

When/Where. As shown in Table 4, seven active participants reported that they used imagery out of exercise environments, five reported the use of imagery in and out of exercise environments, and 3 used imagery only in the exercise environment. These individuals used imagery before, during, and after exercising. With regard to the less active group, seven out of the eight participants reported that they used imagery out of the
exercise content only prior to exercising. The remaining analysis consisted of
descriptions of exercise imagery between those individuals characterized as active versus
those who were less active. Figures 5-2 and 5-3 represent the major functions of imagery
reported by the active and inactive participants respectively.

Table 4-2: Analysis of Where/When Active/Less Active Participants (n=15) Use Exercise
Imagery.

<table>
<thead>
<tr>
<th>Where</th>
<th>Number of Less Active Participants</th>
<th>Number of Active Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Exercise Environments</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Out of Exercise Environments</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>In and Out of Exercise Environments</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>When</td>
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<tr>
<td>Prior to Exercise</td>
<td>7</td>
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<td>During Exercise</td>
<td>0</td>
<td>3</td>
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<tr>
<td>Prior/During/After Exercise</td>
<td>0</td>
<td>5</td>
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</tbody>
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**Exercise Technique.** All the participants reported that they used some kind of
technique imagery. One participant thought about his form when he was biking and how
he could create the less resistance when he pedaled. “I guess I do a lot of thinking when
I’m biking. Cause I also think about my form, how I pedal and how I try to create the
least most resistance to get the fastest kind of momentum.” This other participant
thought about her biking form,

> When I’m cycling, I try to think about my body position on the bike, staying over
the saddle, pulling up on the paddles…switching lead leg…relaxing hands, arms,
upper body…feeling the burn in my quads, hamstrings…imagining elongated
muscles after workout…

Many participants thought about their form in the weight room. Like this
participant where he would think about his whole body form when doing weights. He
quoted, “Usually I’m more involved with technique, making sure my back’s straight, my
shoulder’s straight, and depending what areas of muscles I’ll be doing that day, using
proper technique.” Also this other participant thought about not only his body form but how to achieve the routine smoothly. He quoted, “I also try to imagine using proper form for each rep, such as bending your arms at the proper angle, keeping your back still, lifting the bar smoothly.”

This one participant thought about her breathing when she did imagery. She quoted, “I try to focus as much as I can on maintaining proper form, and um getting my breathing right, controlling my breathing, making sure that everything works fine, that I’m properly stretched and all that.” One other participant quoted that she really thought about heel to toe when running.

I am very realistic about proper running form, such as the knees bent, good heel placement, no bouncing, right hand positions, very specific about my technique. It’s all natural to me since I taught students and also was an athlete myself. In weight lifting, I try to think about good mechanics, speed, form and control.

One participant thought about her stretching when she was doing yoga and how it improved her concentration. She quoted,

After I became more attached to yoga, I started imagining about my technique… Each time I do the split, I imagine the muscles in my leg elongating and stretching. Thinking about my muscles stretching out causes pain, but thinking and imagining about how my muscles are stretching inside my body increases my concentration…

Another participant thought about stretching and how it helped her relax her muscles. She quoted, “During my yoga sessions, I just try to relieve strain on my muscles… I think to increase my flexibility relieving body stress, relaxation improvements and try to muscle toning…”

One participant quoted how she thought about getting the most efficient steps when she was walking. “I think about my form when I’m walking and how I can get the most efficient steps when I walk. I also think about how good it feels after my workout, how
my day will be lively and how I can feel great throughout the day.” Another participant used imagery in relation to technique when he felt tired and explained how it helped him to stay focused. He reported,

> I am especially tired or fatigue, it is really prone to develop some bad habits by working out when you're tired, but if you visualize the correct technique, you won't have the physical wear-and-tear. I also think imagery can also help you stay focused on the task at hand, such as if a weightlifter is distracted by problems going on at work, he might not lift as much as he's physically capable of.

**Appearance Images.** All of the 15 participants reported some kind of appearance images. Most of the responses were about body tone and looking younger. One participant thought about when she was young. She quoted, “I recall my past self and think about how I looked 30 years ago. I also keep on reminding myself of how I look now and try to keep in shape for my future.” Another participant thought about having a healthy face. She quoted, “I try to think of having a healthy face. I really try to think about how my facial structure looks healthy and my skin color looking healthy as well.”

Another participant also thought about her facial appearance. She reported, “When you do a headstand, the blood rushes to your face and that is supposed to be good for your facial skin. At this very instance, I usually get an image of blood rushing to my face from my feet. I also get images of skincare models holding a fruit with massage cream all over their face.” One participant thought about her younger years and explained how trying to have a young image of her kept her motivated to exercise. She said,

> I’ve always had this image of when I was young. About 30 years ago, I would say…back then I was really toned and pretty…even though I didn’t workout at all! But now I got to try really hard just to keep my appearance looking healthy and strong. So looking back 30 years and having a constant image of myself 30 years ago, it’s a constant reminder for me to try to stay young and pretty.

**Health Outcomes.** Twelve participants reported that they thought about health images when exercising. Many of these participants thought about having a healthy
lifestyle and how exercise helps them have a healthy life. Similar to a healthy lifestyle, some participants had an image of themselves living with no diseases and feeling younger. This one participant thought about his parent’s health problems and how he wanted to prevent it. He quoted,

I want to exercise so I can prevent getting any diseases or prevent of a heart attack. I am more concerned about my health because I am getting old now, and I know that my parents at my current age had bad health problems. So I keep that on the back of my mind so I can prevent that from happening. So it’s kind of a health issue.

Another participant actually felt like he felt healthier when he thought about his health. He quoted, “It’s like a maintenance work, like a preventative medicine type of work. I workout so I can prevent from getting hurt, or sick. It makes me feel better, my self confidence goes way up…and I don’t seem to get sick very well anymore.” This other participant thought about freedom of illness when he used imagery. He said, “Oh, I really think about my health when I am exercising…I have images of like lower blood pressure, and aerobic conditioning.” One participant thought about being more aerobically fit. “My goal is to become more aerobically fit, so that I’m more functional as a person, I know that overall will improve my health and plus I do enjoy it.” Another participant thought about his eating and exercise when thinking about a healthy lifestyle. He quoted, “I know that a healthy lifestyle is the result of eating correctly and exercise…I have always done that so I exercise to maintain my image of a healthy person.”

**Plans/Strategies.** Ten out of the fifteen participants used imagery in relation to making plans or strategies during exercise. Some used plans before working out, checklists in head, relaxation exercises, back up plans, goal setting, and strategies to beat their opponent. One participant used an index card that had positive messages.
Whenever he felt like he was losing confidence he took a look at this card and he reported that it really helped him. Here is his quote.

I wrote my life's greatest accomplishments on an index card, and I keep the card with me. In this card I thought of something in my life that I didn't think I could do. Such as, bench 300 or run a marathon, or even earn a million dollars. And any time I feel like I’m losing confidence, I pull the card out and read it. I mean it's like my best friend putting his arm around you and saying, 'You can do it.' And everytime I read it I actually feel a change in my body.

One participant did a checklist in his head of the different motions required when doing his exercise. He quoted,

Before I do a particular set, the 10 repetitions or whatever, I sit down, look at myself in the mirror, or look at the ground, and I’ll do a checklist ok, A is your breathing right, once the breathing is under control, how you are going to get into thing, make sure you got that down, and I go through seeing myself, doing it in my head, um, and doing the exercise in my head, and it doesn’t hurt when I do it in my head.

One participant made a relaxation exercise that helped her relieve her muscles. She reported,

I like to strategize when I’m relaxing and thinking about imagery. Enjoy the feelings of both arms being heavy, at ease, completely relaxed. Relax all the muscles of your back, spinal column, relax the muscles of your chest, your abdomen, relax the muscles of your pelvic area...Lie or sit there for a moment enjoying the feeling of total relaxation. That is the kind of guide I use to relax myself when I’m at home doing nothing.

She also thought about a pretty scene when she ran. She quoted,

I think about a pretty scene or environment and I think about my route when I’m thinking about running. It’s a long 4 mile loop around this neighborhood that I can image in my mind, and I can follow the whole route in my mind.

This participant reported that she needed a partner to exercise.

I get very bored if I’m by myself exercising. I mean, swimming and running are boring sports anyways so I need someone to talk to, enjoy it you know. I don’t like to just go back and forth without any talking. I need to talk to someone, you know, be happy be able to laugh and enjoy my workout.
This participant reported that he had a backup plan just in case the gym was closed.

I like to know what to expect...like expect the unexpected...so I try to have like a back up plan in case the gym is closed or the weather is bad...I also think about the next exercise session and how I can improve myself from the previous exercise session.

One participant did goal setting before she went for a jog.

I think of many different images throughout my jogging routine. Before I start jogging, I usually set my short-term goals such as where I will be running to and at what speed for how long. I think during the highlight of my jogging I start to think about other matters concerning my own self and body – such as will I be gaining a more toned body after I do this exercise, or if I am thinking about matters concerning work, friends, or family, I'm usually thinking – how am I going to solve that problem?

Another participant thought about making up strategies to beat her opponent when she was playing tennis. She quotes, “I guess thinking about defeating my opponent, use some strategies like assessing the weaknesses of the opponent and trying to take advantage.”

**Emotions/Feelings.** Fourteen participants reported some kind of imagery regarding emotions and feelings. Most participants thought about relief of stress when they thought about exercise like this participant. “I think about swimming during the day, getting in the cool water and actually feeling good about myself. That is a good stress reliever.” Another participant reported that thinking about exercise might relieve stress but also might create stress. She quoted, “Imagery relieves stress as I set goals like losing weight, or doing good in a workout, but then it creates stress when I try to find the time to exercise and I cannot.” This participant also had similar views. “Imagining exercise generally relieves stress but not always...if I haven’t exercised in a few days then thinking about it does not help relieve stress.”
One participant reported thinking about pleasant places to relieve her stress.

I then try to let go of all the tension and stress I had been feeling that day. I think and imagine about the places that I’ve been meaning to go to but haven’t been able to because of work. I usually imagine a place where there is no people but only the sound of the environment - no sound just peace. These days, I imagine and think about a nice solitary beach with white sand and blue waves.

Another participant used exercise imagery to relieve stress while she was working.

“Oh course it relieves stress…when I sit in my office during the whole day I always think about exercising, thinking about sweating and breathing hard….those kinds of images help my stress levels down.”

Some participants related their feelings when using imagery. Quotes like, “I really like to think about the benefits of using imagery. Such as feeling great after a workout or feeling strong and big.”; “I look forward to the good feeling I have about myself after exercising.” and “I know how refreshing it feels after a workout, I want to get that feeling and I feel so good after a workout, that I can do many things without feeling guilty. It’s like a flowing feeling where I can be more compatible with my life with my day.”, were all quotes taken from participants who reported feeling good after a workout.

**Confidence Enhancing Images.** Twelve participants reported using imagery in relation to their confidence. One participant believed that imagery can increase one’s confidence by thinking that one can achieve one’s goals. He reported,

> When I’m in the gym or doing some kind of exercise, I strive to always go beyond my previous abilities…and thinking about beforehand really gives me confidence to actually do the activity. It’s like trying to do 300 pound bench when I can really do 200…if I have a constant image in my head that I can really do that then even though I couldn’t bench 300 pounds, I think I could lift more than I did in the past. So I believe thinking about abilities you can’t normally do can really help.

This participant also had similar ideas. She stated, “I imagine it I know that I’ve achieved it and that its possible and its achievable in that respect I know that I’ve done it
before and I can do it again.” One participant stated how using imagery prevented him from injuries. He said,

When I first started working out, and I didn’t use imagery, some 10 years ago or something, I used to get injured more often, not injured as in severe injuries, but just minor sprains and aches, that could be a fact that I wasn’t thinking too much when I was doing it, but I think it’s because I would just go the gym with my music in my headphones really loud and say “oh, let’s do this! Dun, dun, duh, duh” so you know, it definitely helps too; so I think if you think about it more, the more confident you will be.

This participant also stated similar ideas. He said, “Imagery makes me focused and self centered enough that even though I’m doing dangerous amounts of weight, it will help me from getting injured. I think, imagery really helps prevent injury.” This participant reported how achieving bigger weights in the gym gave her confidence to exercise better. She quotes, “I really get a lot of confidence after I workout. Cause after I workout I really feel good about myself, especially after a good workout.”

**Motivational Images.** Seven participants reported using imagery in relation to their motivation. Participants reported how feeling great after a workout motivated them to exercise again. Like this participant,

I’m always feeling great after a workout. So that kind of feeling really gets me going…really motivates me to go to the gym again and feel that kind of sensation. And the more I feel that I way, the more likely I will be going to the gym and busting my…

This participant had images about how she rewards and goals motivated her to exercise.

I set goals before I go to the gym and also give rewards to myself if I achieve these goals. It’s a big stimulator and motivator for me as if I achieve those goals, I get really happy and excited because I will be getting my reward! So whenever I feel unmotivated, I set goals and rewards…

Other participants who used imagery in relation to motivation had remarks like, “Getting that feeling of achievement to be stimulated to workout again.” or “having a
wonderful experience when working out motivated them to comeback to workout.”

These positive experiences gave participants motivation to workout again.

Low Imagery User, Less Active Exerciser, and Low Self-Efficacy participants: Less Active Participants

**Description.** Eight participants scored low on all three preliminary assessments and these individuals consisted of three males and five females. With regard to age, three individuals in the less active group were between 35 to 45 while the remaining five were 46 to 65 year olds.

**When/Where.** As shown in Table 4, seven participants reported using imagery out of exercise environments. Also seven participants used imagery only prior to exercise. One participant thought about skiing when she was at work. She quoted, “When I daze off during my work, I think about the beautiful snow covered mountains and I think about skiing in that kind of environment.” Also one participant reported how he only thought about exercise only before he went to the gym. He explains, “I don’t think about doing weights until I am at the parking lot of my gym. Then I start thinking of what exercises I will be doing and how long I plan to stay in the gym.”

**Technique.** Four participants reported using exercise imagery in relation to their technique. One participant thought about her form when she was running in the gym. She quoted,

I try to think about my form and technique a lot. Like how you explained. I try to think about how my form looks if my back is not hunched or my arms are swinging. I try to look at the mirror when I’m running on the running machine and if I look silly I try to correct my technique.

Also, “I run, I really think about my running technique. Like if my running position is correct and if I’m maintaining the right amount of speed and tension to get an exercise.”
This participant thought about her form when she walked to prevent herself from injury. She quoted, “I do try to think about walking straight, taking big strides, and thinking about whether my knees hurt or not, you see I have a slight case of arthritis in my knees so sometimes if I exercise too hard, the next day it will cause pain in my knees.

One participant thought about a famous swimmer’s stroke that he saw on television and imagined to mimic the famous swimmer’s stroke to his. He said,

I like to think about perfecting my technique and how my stroke would compare to my stroke when I was a college swimmer. I also try to visualize Michael Phelps stroke. Since he has such a beautiful stroke, when I see him at competitions and on TV, I try to recreate his stroke to mine when I’m actually swimming…So when I’m swimming, I like to compare his stroke to mine, really think that I’m Michael Phelps…so thinking about perfecting my stroke and getting feedback from the coach is a great thing.

One participant reported the importance of technique in skiing and how he thought about it when he skied.

I love skiing…Skiing involves high skills of perfection…in order to get that perfect form I always think about perfecting that form…I always believe that through thinking you can get a better improvement in actual activity…This participant also stated how technique was important in the sports he played.

I have to imagine where my hand is going and stuff, so I imagine more of technique and not as much as when I would win and stuff. For ping-pong, I think about my stroke a lot. The useful functionality wise, it’s the same thing, but right now, it’s clearer now, than before.

Also, a participant reported using imagery to make movements easier than she actually could do. She said, “I imagine stretching and moving more easily than I actually am able to move…”

Appearance. Four participants reported using imagery concerned with appearance. One participant thought about her appearance and how she would like to look healthier and younger. She said, “I imagine myself as a healthy middle aged woman with no injuries and also think about being younger.” This participant also had similar ideas. “I
really think about my appearance…I try to think about the benefits of exercise, how it will make me skinner and healthier.” Also one participant thought about his appearance after he had a big meal and felt guilty of eating too much. He stated,

I do think about how to get rid of this fat once I eat it! But then again I do think about what I’m eating and how it will make a difference to my stomach if I don’t exercise after a meal…I would think about my stomach when I’m eating and if I don’t exercise. So I guess that’s kind of thinking about my appearance prior to exercise.

One participant thought about the effects of when she would not exercise. She stated.

I do fear that if I don’t exercise, I will turn fat and be one of those people who are in McDonalds eating hamburgers. I fear that. And in order not to be an obese person, I need to exercise.

She also was concerned about her body appearance after she exercised.

As I said before every time before I work out I try to think about an improved physical appearance. Also after working out I try my best to encourage myself, by saying you lost a lot of weight today because you sweated a lot and that means you lost a lot of calories and those extra pounds on your thighs and buttocks!

Health Outcomes. Four participants reported using imagery in relation to their health. One participant thought about her health and how exercise could prevent her from disease. “Since I am an exercise physiology major, thinking about my health is always a concern when I’m thinking about my exercise…especially when I’m jogging, I think about my heartbeat going up…my increased blood pressure, temperature and sweat.” This participant also had similar ideas. “I’m thinking about 20 years from now, I don’t want to be at a point where I can’t walk or not be able to touch the floor or get up and down, so I guess more and more I’m using exercise to think about health as I age.” Another participant was concerned of her weight when she exercised.

One thing I’m very conscious of is weight and the statistics on obesity and I don’t want to become one of those and my husband is very much involved in that,
working on his PhD, so I have someone around me that I learn all these statistics from and I don’t want to become one of them and I know the consequences are and poor health, that’s influence from him.

Another participant thought about exercising more after he injured his back.

Since my back is a lot better and I’ve been going to physical therapists and I’ve been having all sorts of exercises that I do for my back now, and I do think about the back, the stretching and everything to keep my back stronger, I think that now I’ve come around too, I thinking more about I have got to start exercising so.

**Plans/Strategies.** Four participants who were in the low category reported thinking about a plan or strategy when exercising. This participant created a mental map of what he wanted to do that day in the gym.

> When I go into my gym, I take a look around I think to myself, what exercises I’m going to do today, and how many reps I’ll be doing for each exercise. I create a mental map across the gym and see what exercises I’m doing first and what I should do next.

One participant set goals during her exercise regime.

> I do set goals, um, and I try visually imagine myself what it would be to achieve the goal…like we did a half marathon this past year, and so we set that goal, and we did it, but it was mostly just I’m going to do it, so now next year, we’re going to do, and we are going to shave 30 minutes off, of what we done before.

One participant imagined before bed planning out exercises without any pain. She quoted, “The night before I workout, I imagine myself working out and being done with my routine without any pain.”

**Emotions/Feelings.** Although some participants reported using exercise imagery as a stress reliever, it was interesting to notice that most participants thought that thinking of exercise was a stress creator. Overall, five participants stated that using imagery in regard to exercise created stress. Like this participant who quoted, “I guess it is helpful by motivating myself to exercise, but I guess it also can be harmful if you think about something and you don’t see the results. Like if you imagine the perfect workout, but the
body does not always respond the way it did in the past, which can be discouraging.”

This participant felt stressed when she imagined about the results she wanted, but in reality when she could not reach it, it created stress. She quoted, “It sure does, when I think about a better self appearance and when I don’t see results. Especially if I work out really hard for about a month, and I don’t see results, I get stressed.”

Although most participants reported imagery as a stress creator, this participant had mixed thoughts about exercise imagery. She reported,

Thinking about exercise it is a stress reliever or it can be a stress reliever, probably you can make it stressful too, if you’re thinking, oh I got to do this, I got to do, I don’t want to do, but I got to, have to do it, then that can provide extra stress, a different kind of stress, but extra stress, but it certainly is a great stress reliever for what’s going on at work and in your life, sure.

Confidence Enhancing Images. Three participants reported imagery in relation to confidence. This participant reported how going to the gym and achieving weights that she could not do before and thinking about them motivated her and gave her confidence.

I like to go to the gym and sometimes I wonder what keeps you from doing it, since I like to do it, and so thinking about going in and doing the reps and getting my arms stronger and everything, it does give me more confidence when I feel better and when I do it and feel better and then I have more confidence.

Although some of the participants thought using imagery was a confidence builder, many of the participants did not see imagery in relation to confidence. This participant said she never thought that imagery can relate to her confidence. She said, “I never had the experience where I would think about an exercise just to raise my confidence.”

Motivational Images. Three participants used imagery in relation to motivation. One participant used music as a motivation tool to exercise. She quoted, “I always see myself exercising and moving to a strong beat…music always makes me imagine a fast paced elliptical workout.” This participant needed a partner to exercise with for
motivation to exercise. She stated, “I’ll usually walk at least a hour a day, but, if we end up going together to a class, we go in there and do the class, and I would say, I’m a very social exerciser, I don’t want to things by myself, I have no interest in that” Another participant thought about how thinking about losing weight motivates her to exercise. She quotes, “My biggest motivation is getting a skinner self, which is a never ending process, but when I do think about the benefits of exercise and how exercise will help me lose weight, I tend to think about a beautiful skinny me!” This participant also had similar ideas before she went to the gym. She stated, “Trying to achieve something like running longer or faster, those are the motivations during exercise, but before I go to the gym, my big motivator is thinking, Ok! Let’s go lose some weight!” One participant reported that thinking about a healthy body helped her motivate to exercise. She quoted, “Exercising itself doesn’t give a motivation but future health, and healthier body image, gives me motivation.”

**Summary of Group Comparison**

As described above, the time and place participants in the active group reported using imagery differed from the less active group. Specifically, the more active group reported using imagery in and out of the exercise environment unlike the less active group who used imagery only out of the exercise context. While differences were observed with regard to where and when the participants report using imagery, minimal differences that involved the content of the images were observed. It is interesting however the individuals in the active group appeared to provide more descriptions and especially more vivid descriptions of their images than the less active group. Finally, age and gender differences were observed and are graphically displayed in Figures 5-4 and 5-5. As shown, 60% of all male participants used technique imagery the most while the
female participants used appearance images the most (47%). In addition, 70% of the respondents in the 35 to 45 year old group reported using technique imagery the most while the 46 to 65 year olds used appearance and health imagery more. It is noteworthy that only the 46 to 65 year olds reported imagery focused on health outcomes.
The purpose of the current study was to replicate and extend the findings of Giacobbi et al. (2003) and examine the content and function of exercise imagery used by middle-aged adults between the ages 35 to 65. More specifically, this study examined when, where, how, what, and why middle-aged adults used imagery focused on their exercise behaviors. Another purpose of this study was to compare the various uses of mental imagery among individuals with different characteristics using the Exercise Imagery Inventory (EII, Giacobbi, Hausenblas, and Penfield, in press), Leisure-Time Exercise Questionnaire (LTEQ: Godin & Shephard, 1985), and the Exercise Self-Efficacy Scale (McAuley, 1992). As explained, each participant was categorized as either active (High scores in EII, LTEQ, and Barriers Self-Efficacy Scale) or less active (Low scores in EII, LTEQ, and Barriers Self-Efficacy Scale) in phase one. These characterizations then allowed for direct comparisons in phase two. Overall, the study results are in accordance with theoretical predictions of Hall (1995) and Paivio (1985) as well of the research findings of Hausenblas et al. (1999), Gammage et al. (2000) and Giacobbi et al. (2003). Findings from this research will be discussed in terms and contributions to the extant research on exercise imagery, study limitations, and future research directions.

Integration and Extension of Previous Studies

Participants in this study engaged in mental imagery both and in and out of exercise environments. Most of the participants used imagery prior to exercise usually in the
morning, while others used imagery during and after exercise. Several participants reported using imagery before exercise and also reported that they usually planned a workout or thought about exercise prior to for motivational purposes. With regard to the content of the participants’ images, the results showed the content and function of exercise imagery to be consistent with previous research (Giacobbi et al., 2003). Specifically, the major content of the participants’ images were coded as technique imagery, appearance, images, health outcomes, plans/strategies, emotions/stress levels, confidence enhancing images, and motivating images. Similarly, Giacobbi et al. (2003) found the content of female aerobics participants consisted of exercise technique, aerobic routines, exercise context, appearance images, competitive outcomes, fitness/health outcomes, emotions/feelings, and exercise self-efficacy. In addition to these consistencies, appearance-related images served as important motivators to sustaining exercise behavior, especially for younger female participants in this study and previous research (Hausenblas et al. 1999; Gammage et al., 2000; Giacobbi et al. 2003). This finding is reasonable as most of the participants were female in previous investigations and the pressure placed on women to maintain a physically ideal body weight and appearance is crucial (McAuley & Burman, 1993; Silberstein, Streigel-Moore, Timko, & Rodin, 1988). Likewise, an additional consistency with previous work (Gammage et al., 2000) was that most of the male participants reported using technique related images while females focused mainly on health and appearance imagery. Others have suggested that differential images between males and female are due to motivational aspects of exercise as men tend to exercise more for competitive reasons, both against themselves and others as compared to women (Biddle & Bailey, 1985; Markland & Hardy, 1993;
Mathes & Battista, 1985). According to Gammage et al., (2000), weight training culture can be very competitive, as individuals attempt to lift more weight and work harder than others around them. With this type of competitive exercise motive, men may image themselves perfecting their form and technique and in turn lifting more weight.

As discussed in the literature review, Paivio (1985) proposed a framework focusing on how imagery might influence physical performance. The results shown in this study were somewhat consistent with Paivio’s framework as the content of the participants’ images were in accord with the motivational and cognitive functions of imagery predicted by Paivio (1985). Specifically, technique and plans/strategies were consistent with the cognitive functions of imagery while appearance, health, and stress levels/emotions were associated with the motivational functions. The theoretical linkages between the major cognitive and motivational functions of imagery proposed by Paivio (1985) with the higher-order themes reported here are graphically displayed in Figures 5-1 through 5-2.

While the findings from this study confirmed previous research there were three important extensions that deserve attention here. First, the value of health related images of the participants in this study cannot be underestimated. The vivid descriptions provided the potential for health improvement in exercise and how exercise imagery focused on health outcomes impacted participants’ motivation were astonishing. It would appear that health related images are an important source of motivation for older adult exercisers and should be incorporated into future intervention studies. While health related images were reported by Giacobbi et al.’s participants, there was a stark contrast in the number of participants who discussed these images here and in the level of specificity
reported in this study. For instance, 83% of the participants reported health related images while only 31% reported such images in Giacobbi et al (2003).

Second, it would appear the more active individuals in this study engaged in exercise imagery more often and with more vivid images than their less active counterparts. These latter findings are important because a theoretical linkage between exercise imagery, motivation, and self-efficacy is suggested. Indeed such a linkage was recently discussed by Munroe-Chandler and Gammadge (In Press) who provided a theoretical model that focuses on how imagery may impact exercise behavior. In short, they predicted that exercise imagery involves five components: antecedents (e.g., experience of exerciser, goals, setting, and impression motivation), major cognitive and motivational functions of imagery, cognitive and behavioral outcomes of imagery, self-efficacy beliefs, behavioral outcomes, and cognitive outcomes. In addition, a range of moderating factors that include gender, activity type, exercise frequency, age, and physical health status to name a few were included in the model. These factors are predicted to moderate relationships between self-efficacy beliefs and behavioral/cognitive outcomes. In the current study, the antecedents offered by Munroe-Chandler and Gammadge (In Press) were evaluated with regard to when and where exercise imagery was used. Similarly, all five functions of imagery were supported but additional more specific uses of imagery were documented (e.g., technique, health outcomes) and self-efficacy expectations were assessed. The findings presented here also suggest that mental imagery contribute to the long-term maintenance of exercise behavior through a complex interplay between motivation, self-efficacy, and behavior.
A third way this study extended previous exercise imagery research was the focus here on age and activity level comparisons. Specifically, the author made an effort to compare age groups in terms of when and where they used imagery and the specific content of their images. The interviews revealed the younger age group (35 – 45 years old) thought about technique the most while the older age group (46 – 65 years old) thought about health images the most. These differences suggest motivational differences for engaging in exercise between younger and older individuals and warrant future research.

One important issue in this study was the finding regarding plans, routines, and strategies used by exercisers. Previous research has shown that many athletes strategize or rehearse entire game plans and use those strategies to excel in their respective sport (Munroe et al., 2000). The results here showed how more than half (63%) of the participants reported using some kind of plan or routine with regard to their exercise imagery. For instance, planning out a workout before exercise, imagining someone competing next to me, doing checklists in the head while exercising, and setting up goals during a workout program were all poignant points made by participants citing that these aspects were important motivators. While these findings are consistent with previous qualitative work in exercise imagery by Giacobbi et al. (2003), none of the current measures of exercise imagery have subscales related to routines or strategies (Giacobbi et al., 2005; Hausenblas et al., 1999).

**Active vs. Less Active Groups**

This study might be considered unique in a way that there was an attempt to categorize each participant to either an Active or Less Active group according to the results of three assessments: LTEQ, EII, and Barriers Self-Efficacy Scale. By creating
these two groups, the author could identify and compare the similarities and differences among their usage of imagery. On a bigger note, these results can be referred and applied to future studies by trying to learn the thoughts and responses used by active group participants and apply those ideas and concepts to people who are not that motivated to exercise or have a low exercise level.

Results showed clear differences between high exerciser, imagery user, and self-efficacy participants versus low exerciser, imagery user, and self-efficacy participants when and where they used imagery. Less than half (47%) of the participants who were categorized in the high exerciser, imagery user, and self-efficacy group reported using imagery out of exercise environments and prior to exercise. These participants use imagery when they wake up at home or when they park in the gym, they think about what exercises they will be doing and plan out a scheme of what they want to do that day. More than half (53%) of the participants in the high category reported using imagery in and out of exercise environments and used imagery prior, during, and after exercise. The results show how people who are active exercisers, imagery users, and have high self-efficacy use imagery regardless of time and place. On the other hand, 88% of the participants in the Low category reported using imagery only prior to exercise and only out of exercise environments. These results reveal that participants who reported low levels of exercising, using imagery and self-efficacy do not use imagery in exercise environments and also not during or after exercise.

One of main differences noticed between the active and less active groups was the general way participants responded to the questions asked during their interview. When interviewed, the responses of the participants in the active group were descriptive,
expressive and vivid. Many of the participants in the active groups also thought about the benefits and positive consequences related to imagery and even at times when they felt ‘down’ or ‘stressed’. Also, many of these participants had no hesitations reporting what, when, why, where, and how they used imagery. The goals and expectations responded were clear, challengeable but attainable and most of the participants were confident that they could reach their goals. The author barely made an effort to probe questions and it seemed to the author that the participants in this group felt very confident of their imagery use in exercise.

Most of the participants in the less active group did not show much interest in imagery. The author sometimes had to make an effort to probe them with more questions as their responses were mostly short and simple (e.g. yes, no, I think so). Most of the responses were undecided, unclear and most of them had a difficult time reporting their overall use of imagery. Also it was interesting to see that most of these participants at first reported not using imagery, but as the interview progressed, they began talking about what they would think before, during, and after exercise. Many of these participants reported having high goals and objectives, but hardly any of them did not have plans or routines to achieve those goals. Lastly, most of the participants knew how beneficial imagery could be, but did not know or did not use imagery as frequently.

In summary, it is interesting to note what the differences were between the active and less active groups. Clear and vivid versus fuzzy and unclear images, positive versus negative images, descriptive and expressive versus straightforward and simple images, are just a few of many differences noted between the groups. The framework (Figure 5-2) from the active group might be a good tool for enlightening the low profile group for
using imagery such as using MG-M imagery to improve confidence, staying focused, and remaining positive. As well, the framework can be used as an educational tool to teach exercisers the richness of imagery content. Low profile exercisers should learn to be positive in nature, accurate, vivid, and include all sensory modalities (Munroe et al., 2000).

Study Limitations

Despite being an innovative study involving qualitative and quantitative methods, a few limitations from this study must be revealed. One limitation of this study was determining which participants were considered active versus less active. Since there were no previous studies determining what scores were high and low for the EII and Barriers Self-Efficacy measures, the author relied on median splits and Center of Disease Control guidelines regarding exercise behavior. Although the majority of the participants had absolute scores to clearly put them into a category, some participants may have scored closer to the median making it more difficult to clearly classify them as high in self-efficacy or imagery use. Therefore, the comparisons between these groups may not have been sensitive enough. A second limitation was that results were based on relatively a small sample. Nevertheless, in spite of a small sample, similarities and differences were shown between active and less active individuals, those in different age groups, and between males and females. Finally, the sample here consisted of mainly Caucasian and Asian participants. Future researchers may wish to focus on African-Americans and Hispanics since individuals from these racial and ethnic groups were not adequately represented.
**Applied Implications**

Exercise imagery has tremendous potential as an intervention tool (Giacobbi et al., 2003; Giacobbi et al., 2005; Hall, 1995; Hausenblas et al., 1999; Munroe-Chandler & Gammage, In press). Murphy and Jowdy (1992) quoted, “Many myths and misconceptions have gathered around the use of imagery…Future research needs to be directed toward a better understanding of the roles that imagery plays in human performance so that we can help all persons to optimally utilize their innate capacities (p. 245). Dishman (1994) has pointed out that despite continuing research addressing exercise adherence and the development and assessment of possible interventions; adherence rates have not appreciably increased from the late 1980s, suggesting that current interventions are not very effective. Given that exercise imagery has motivational functions (Hausenblas et al., 1999; Munroe et al., 2000; & Giacobbi et al., 2003) researchers need to determine if imagery is an effective intervention to enhance exercise adherence. That is why in this study, there was a comparison between high exercisers, imagery users, and self-efficacy participants versus low exercisers, imagery users, and self-efficacy participants. By comparing these two categories, one can compare the differences between the two extremes and try to find different intervention methods on how to increase exercise adherence with people who are less active. Researchers should also be encouraged to explore the relationships between exercise imagery and other variables that influence exercise participation and adherence. Although some research suggest that exercise imagery is related to self-efficacy (Rodgers et al., 2000; Giacobbi et al., 2003; Giacobbi et al., 2005), focus should now turn to whether exercise imagery can directly or indirectly impact exercise behavior.
Summary

In summary, this study was intended to investigate exercise imagery use by middle-aged adults. This study represents a descriptive basis for research in exercise imagery by using grounded theory analysis and the development of three conceptual frameworks. More specifically, exploring the information regarding the four W’s in imagery: where, when, why, and what and incorporating Paivio’s four functions of imagery (CS, CG, MS, MG) among middle-aged exercisers, this study provides a descriptive resource for researchers interested in applied uses for exercise imagery. The present study also examined the different characteristics between a high exercise, imagery, and self-efficacy participants and a low exercise, imagery, and self-efficacy participants. By creating these comparisons, we now have a better view of what active and less active participant imagine with regard to their exercise behavior.
Figure 5-1: Participants Conceptual Framework

**Raw Data Themes**

**Exercise Technique**
- N=26
- Proper exercise form
- Biking, running, think about long strides and good technique
- Best technique to have least stress on body
- Thinking about heart rate when running
- Visualizing the perfect stroke
- Perfecting stroke in golf and swimming
- Thinking about heel to toe when running
- Most efficient steps
- Doing the right stretching techniques
- Long and smooth stroke
- Good mechanics, speed, form and control

**Appearance Images**
- N=25
- Looking skinner and healthier
- Comparing from 30 years ago and thinking about how to keep in shape for future
- Thinking thinner by thinking of diet
- Fitting in certain size dresses, bathing suits
- Trying to look ten years younger
- Lower body fat, better body physique
- Thinking of future image
- Getting bigger muscles
- Being 50 and trying to fight with gravity
- Staying in shape
- Healthy looking face, skin color
- Thinking of a healthy middle aged women
- Thinner thighs
- Thinking about skincare models
- More toned body
- Thinking about definition
- Lower body fat, better body physique
- Looking thinner by thinking of diet
- Fitting in certain size dresses, bathing suits
- Trying to look ten years younger
- Lower body fat, better body physique
- Thinking of future image
- Getting bigger muscles
- Being 50 and trying to fight with gravity
- Staying in shape
- Healthy looking face, skin color
- Thinking of a healthy middle aged women
- Thinner thighs
- Thinking about skincare models
- More toned body
- Thinking about definition

**Health Outcomes**
- N=25
- Thinking about family history health
- Prevent from diseases
- Freedom from illness
- Feeling refreshed, motivate to prevent injury
- Lower Blood Pressure, Lower Cholesterol
- Being more alert, more energy
- Having a healthy lifestyle
- Lowering Heart rate
- Think of what to do to stay healthy
- Flexible muscles, healthy looking face
- Think of improving fitness and endurance
- Think about heartbeat, blood pressure, temperature

**Cognitive Specific (CS)**

**Motivational Specific (MS)**
Figure 5-1. Continued
Exercise Technique
N=15

Appearance Images
N=15

Health Outcomes
N=12

Cognitive Specific (CS)

Motivational Specific (MS)

Higher Order Themes: Major Themes of Exercise Imagery (n=15)

Raw Data Themes

Thinking about long strides when biking
Proper exercise form
Good mechanics, speed, form and control
Thinking about heel to toe when running
Best technique to avoid injuries
Most efficient steps

Think of past and how to keep in shape for future
Thinking about body tone, definition
Muscles getting bigger, stronger
Trying to fight with gravity
Healthy looking face, skin color
Thinking about skincare models
Looking slimmer
Trying to look ten years younger

Being more alert, more energy
Freedom from illness
Healthy looking face
Think about how much weight to lose
Being functional
Having a healthy lifestyle
Healthy younger self

Figure 5-2: High Imagery User, High Exerciser, High Self Efficacy Conceptual Framework
Figure 5-2. Continued

- **Plans/Strategies**
  - N=10
  - Plan before working out
  - Checklist in head
  - Relaxation exercises, imagery running course
  - Socialize when exercising
  - Back up plans
  - Thinking about certain songs
  - Goal setting
  - Strategies to beat opponent

- **Stress Levels/Emotions**
  - N=14
  - Think about daily events
  - Relaxation
  - Relief of stress
  - Sensations felt during exercise
  - Feeling refreshed after workout

- **Confidence Enhancing Images**
  - N=12
  - Sensations felt during exercise
  - Confidence builder
  - Sense of achievement
  - Seeing the results
  - Images of success, rewards and goals
  - Confidence in self
  - Accomplishing bigger weights
  - Strong enough to try a new exercise
  - Think if exercise is achievable

- **Motivational Images**
  - N=7
  - Sense of achievement
  - Seeing the results
  - Images of success, rewards and goals
  - Motivated to succeed
  - Motivation to go workout

- **Motivational General – Mastery (MG-M)**

- **Motivational General – Arousal (MG-A)**

- **Cognitive General (CG)**
Figure 5-3: Low Imagery User, Low Exerciser, Low Self Efficacy Conceptual Framework
Figure 5-4: Gender Comparisons of Major Functions of Imagery

Figure 5-5: Age Group Comparisons of Major Functions of Imagery
APPENDIX A
INFORMED CONSENT FORM

PLEASE READ THIS ENTIRE DOCUMENT CAREFULLY

TO: All Research Participants
FROM: Dr. Peter Giacobbi, Jr., BH Bryan Kim
RE: Informed Consent

STUDY TITLE: The Use of Exercise-Related Mental Imagery by Middle-Aged Adults

PURPOSE OF THIS STATEMENT: The purpose of this statement is to summarize the study I am conducting, explain what I am asking you to do, and to assure you that the information you and other participants share will be kept completely confidential to the extent permitted by law. Specifically, nobody besides the Principal Investigator will be able to identify you in this study and your name will not be used in any research reports that result from this project.

WHAT YOU WILL BE ASKED TO DO: If you agree to participate in this study, you will be asked to fill out the Exercise Imagery Inventory, Leisure Time Exercise Questionnaire, Barriers Self-Efficacy Scale, and participate in one 30 to 40 minute interview from June 15th 2004 till February 16th 2006. The interview will be audio tape-recorded and you will be asked a series of questions about your thoughts, feelings, and experiences in imagery related to exercise. You do not have to answer any question you do not wish to answer. Your responses to the questionnaires and the interview will be kept completely confidential to the extent permitted by law. Your interview will be transcribed by a research assistant and the questionnaires and tape-recorded interviews will be kept in my office in a locked file cabinet. After your interview is transcribed, the tape will be destroyed.

TIME REQUIRED: Approximately 50 minutes.

RISKS AND BENEFITS: There are no risks expected from participating in this study. As a result of your participation, you may develop insights about yourself that could help you exercise. No more than minimal risks are anticipated from participation in this study.

COMPENSATION: No compensation is given as a result of this study.

CONFIDENTIALITY: Your identity will be kept confidential to the extent provided by law. Your transcribed interview will be assigned a code number and all surveys will be kept in my office (Room 124 Florida Gym) in a locked file cabinet. Your name will not be used in any report.

VOLUNTARY PARTICIPATION: Your participation in this study is completely voluntary. You should not feel compelled in any way whatsoever. There is no penalty for not participating.

RIGHT TO WITHDRAW: You have the right to withdraw from the study at anytime without consequence.

WHOM TO CONTACT IF YOU HAVE QUESTIONS ABOUT THIS STUDY:

Dr. Peter Giacobbi, Jr., Department of Applied Physiology and Kinesiology, 100 Florida Gym, PO Box 118207, Gainesville, FL, 32611; ph. (352) 392-0584; email. pgiacobbi@hhp.ufl.edu

BH Bryan Kim, Department of Applied Physiology and Kinesiology, 2725 SW 27th Ave. #A-8, Gainesville, FL 32608; ph. (352) 375-3475; email. kimbh@ufl.edu
WHOM TO CONTACT ABOUT YOUR RIGHTS AS A RESEARCH PARTICIPANT IN THE STUDY:
UFIRB Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; ph. 392-0433.

AGREEMENT:
I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description.

Participant:_________________________________________ Date:___________
Principal Investigator:_______________________________ Date:___________
APPENDIX B
DEMOGRAPHIC AND EXERCISE PARTICIPATION FORM

Demographics and exercise participation

Date ______

Sex (circle one):    Male    Female    Age_________

Race/Ethnicity: Caucasian     African-American    Native American    Asian
(Specify) _______ Pacific Islander    Hispanic    Other (Specify)

Highest Educational Level Achieved __________________

What physical activities or exercise do you participate in?

Would you be kind enough to allow me to interview you in the near future?  Yes or No

If yes, may I call you?  What is your phone number?_______________________ or
Email Address-___________________
APPENDIX C
THE EXERCISE IMAGERY QUESTIONNAIRE

The following questions deal with imagery and exercise participation. Imagery involves “mentally” seeing yourself exercising. The image in your mind should approximate the actual physical activity as closely as possible. Imagery may include sensations like hearing the aerobic music and feeling yourself move through the exercises. Imagery can also be associated with emotions (e.g., getting psyched up or energized), staying focused (concentrating on aerobic class and not being distracted), setting exercise plans/goals (e.g., imaging achieving goal of losing weight), etc. There are no right or wrong answers so please answer as accurately as possible. Please answer the following questions with regard to how often you use mental imagery (rarely to often).

<table>
<thead>
<tr>
<th></th>
<th>Rarely</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Often</th>
</tr>
</thead>
</table>
| 1 | I imagine a “fitter-me” from exercising _____.
| 2 | I imagine completing my workout _____.
| 3 | When I think about exercising, I imagine the perfect technique _____.
| 4 | I imagine being more relaxed from exercising _____.
| 5 | I imagine a “leaner-me” from exercising _____.
| 6 | I imagine having the confidence to exercise _____.
| 7 | When I think about exercising, I imagine my form and body position _____.
| 8 | I imagine how I will feel after I exercise _____.
| 9 | I imagine being toned from exercising _____.
| 10 | I imagine having the confidence to complete my workout _____.
| 11 | I imagine being healthier from exercising _____.
| 12 | I imagine losing weight from exercising _____.
| 13 | When I think about exercising, I imagine doing the required movements _____.
| 14 | I imagine becoming more fit _____.
| 15 | I imagine the perfect exercise technique _____.
| 16 | I imagine getting in better shape _____.
| 17 | I imagine reducing my stress from exercising _____.
| 18 | I imagine a “firmer-me” from exercising _____.
| 19 | I imagine feelings associated with exercising _____.
APPENDIX D
LEISURE-TIME EXERCISE QUESTIONNAIRE

Instructions. This is a scale that measures your leisure-time exercise (i.e., exercise done in your free time). Considering a typical week, please indicate how often (on average) you engage in strenuous, moderate, and mild exercise for more than 20 minutes. Please write 0 if you did not perform any physical activity that corresponds to the question.

1. Strenuous exercise: heart beats rapidly (e.g., running, basketball, jogging, hockey, squash, judo, roller skating, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes, heavy weight training).

   How many times during a typical week do you perform strenuous exercise for 20 minutes or longer? _________

2. Moderate exercise: not exhausting, light sweating (e.g., fast walking, softball, tennis, easy bicycling, volleyball, badminton, easy swimming, dancing).

   How many times during a typical week do you perform moderate exercise for 20 minutes or longer? _________

3. Mild exercise: minimal effort, no sweating (e.g., easy walking, yoga, archery, fishing, bowling, lawn bowling, shuffleboard, horseshoes, golf).

   How many times during a typical week do you perform mild exercise for 20 minutes or longer? _________
APPENDIX E
BARRIERS EFFICACY SCALE

The items below reflect common reasons preventing people from participating in exercise sessions or, in some cases, dropping out or quitting exercise altogether. Using the scale below, please indicate how confident you are exercising in the event that any of the following circumstances were to occur. Place you answer in the space provided after each answer.

<table>
<thead>
<tr>
<th>%</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Confidence at all</td>
<td>Somewhat Confident</td>
<td>Completely Confident</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For example, if you have complete confidence that you can continue to exercise, even if you are bored by the activity, you would circle 100%. However, if you are absolutely sure that you could not exercise if you failed to make or continue to make progress you would circle 0% (no confidence at all).

I believe that I can exercise 3 times per week if:

1. The weather is very bad (hot, humid, rainy, cold)_______
2. I was bored by the program or activity._______
3. I was on vacation._______
4. I felt pain or discomfort when exercising._______
5. I had to exercise alone._______
6. Exercise was not enjoyable or fun._______
7. It became difficult to get to the exercise location._______
8. I didn’t like the particular activity program that I was involved in._______
9. My work/school schedule conflicted with my exercise session._______
10. I felt self-conscious about my appearance when I exercised._______
11. The instructor did not offer me any encouragement._______
12. I was under personal stress of some kind._______
*Part A: Introduction and Demographics Information

Thank you for agreeing to participate in this interview project. Shall we begin? We are talking to exercisers such as yourself about imagery use. The purpose of our study is to better understand imagery use by exercisers. I want to emphasize that your interview information will remain confidential. In the presentation of results, we will be focusing on group data. We may want to use selected quotes from the interviews in order to illustrate important ideas. These will be strictly anonymous, and we will ensure that your identity is protected. We are using a tape recorder to get complete and accurate information, and to make the interview process more efficient.

If you have any questions as we go along please ask them. Also, ask for clarification if at any time you do not understand what I am asking. Since you may have to think back in time, you might not be able to immediately remember some things. Take your time to recall; pauses are fine. If you still cannot remember after thinking back, then let me know, but please do not guess.

Do you have any questions now about what I have talked about so far? Ok. Then let’s get started. The interview will be broken up into several parts. First, I will describe what imagery is. Second, I am going to ask you about some background information on your exercise involvement. Third, I will ask several questions related to your imagery use and exercise participation. Finally, at the end of the interview there will be an
opportunity for you to add anything that you felt was important and not covered in the questions asked. Are you ready to begin?

*Part B: Introduction to imagery

I will now give a definition of what imagery is. Imagery involves mentally seeing yourself exercising. The image in your mind should approximate the actual physical activity as closely as possible. Imagery may include sensations like hearing the music, feeling yourself move through the exercises, and feeling your heart beating. Imagery can also be associated with emotions. Some examples are imagining yourself getting psyched up or energized and feeling exhilarated after a workout. Imagery can also be used as a motivation to exercise. Some examples of motivational imagery are staying focused on exercise and not being distracted, setting exercise plans and goals such as imagining achieving goal of losing weight. Imagery can also be used to imagine proper form, technique, and routines. Do you have any questions regarding what imagery is? Do you use imagery in relation to exercise?

*Part C: Exercise and Imagery Use Questions

1. I would like to know when you imagine yourself exercising. Could you describe in as much detail as possible when you have imagined yourself exercising?

   Probes:
   
   At what time of the day do you imagine yourself exercising?
   
   Do you imagine yourself exercising when you are not actually exercising?
   
   How long (in minutes) do you imagine yourself exercising in a day?
   
   Are there any other times when you imagine yourself exercising?
What are you doing when you image yourself exercising?

2. I would now like to know what you imagine about exercise. Please describe in as much detail as possible what you imagine about exercising.

Probes:

Do you imagine yourself becoming healthy?

Do you imagine your Physical Appearance?

To keep yourself going during the day, do you imagine exercising?

To relieve your stress, do you imagine exercising?

To get energized during the day, do you imagine exercising?

3. When you think about exercising, do you imagine perfecting your technique? When you thing about exercising, do you imagine your form and body position?

Probes:

1. Was there anything else in your imagery use that was significant?

2. I need to fully understand what it was about each thing you mentioned in regards to your imagery use. So thinking back, what was it about...?

*Part D: General Imagery Questions

1. Does imagining yourself exercise motivate you to exercise? How does imagining yourself exercise motivate you to exercise?

2. Does imagining yourself exercise give you the confidence to exercise? How does imagining yourself exercising give you confidence to exercise?

3. Are your imagines clear and vivid and controllable?

*Part E: Internal and External Imagery Questions
I would now like to describe two types of imagery perspectives. The first is an internal perspective, which is imagining the execution of a skill from your own vantage point. As if you had a camera on your head, you see only what you would see if you actually executed the particular skill. For example, as a jogger running through the woods, you would see the surrounding area such as trees, bushes, and water, but you would not imagine anything out of your normal range of vision. Because internal imagery is done from a first person perspective, the images would emphasize the feel of the movement. As a jogger, you would feel your heart beating, your shoes hitting the ground, the stride as you jog, the sweat coming down your brow. The second type is an external perspective. In external imagery you view yourself from the perspective of an external observer. It is as if you are watching yourself in the movies or on videotape. For example, if you were a weight lifter or aerobic participant imagining from an external perspective, you would see everything that is going on in the gym or studio.

1. Do you use an internal imagery perspective? Do you use an external imagery perspective?
2. How has imagery use been beneficial to your exercise participation?
3. How has imagery use been harmful to your exercise participation?
4. Thinking back in time, how long have you been imagining yourself exercising?
5. How was your imagery changed over time? Has it improved? Are you images more vivid or clear? Do you image more now or in the past?
6. Do you think that you could benefit from imagery training?

*Part F: Conclusion*
As I mentioned when we began the interview you would have the opportunity to add anything that you felt was important and not covered in the questions asked. Do you have suggestions or final thoughts? What advice do you have to offer others on how imagery use can influence their exercise attitudes and behaviors? What advice do you have to offer exercise leaders (or fitness professionals) regarding imagery use and exercise? Thank you for your help.
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Bang Hyun Bryan Kim was born in Seoul, Korea, on June 25, 1979. He received his Bachelor of Science degree in psychology at the University of Florida in Gainesville, Florida, where he also was on the varsity men’s swim team. He competed in two Olympics for Korea during his undergraduate years and also represented the University of Florida in four NCAA swimming championships. After graduating from Florida, Bryan continued his education by pursuing a Master of Science degree in applied physiology and kinesiology at the University of Florida. During his graduate years, he still continued to swim and represented Korea at the 2004 Athens Olympics. He also currently has the national record in the 400 meter Individual Medley. Bryan is currently pursuing his Doctor of Philosophy degree in kinesiology with a concentration in sport and exercise psychology at Temple University in Philadelphia, Pennsylvania. He is also currently a teaching assistant at Temple University, teaching basic instruction programs.