2003

Imagery use in dependent and non-dependent male weight lifters.

Arvin J. Kim
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UMI®
IMAGERY USE IN DEPENDENT AND NON-DEPENDENT MALE WEIGHT LIFTERS

By

Arvin J. Kim

A Thesis
Submitted to the Faculty of Graduate Studies and Research
Through the Faculty of Human Kinetics
in Partial Fulfillment of the Requirements for
the Degree of Master of Human Kinetics at the
University Of Windsor

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2003

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ABSTRACT

Exercise addiction has been referred to in the literature as exercise dependence (Frederick & Morrison, 1996), compulsive exercise (Diekhoff, 1984), and obligatory exercise (Thompson & Pasman, 1991). Hall (1995) originally proposed that imagery might be linked to exercise addiction. Based on Hall’s proposal, Rodgers, Hall, Blanchard, and Munroe (2001) examined the use of imagery by obligatory exercisers involved in a variety of activities. Results indicated that energy imagery and technique imagery, when combined, accounted for approximately 20% of the variance in exercise dependence. Sport imagery research has found that imagery use differs from sport to sport (Munroe, Hall, Simms, & Weinberg, 1998). It is conceivable exercisers may use imagery differently (i.e., aerobic exercisers versus weight lifters). The purpose of this study was to examine imagery use with dependent and non-dependent weight lifters.

Participants were 422 male weight lifters ages 18 to 62 years (Mean age = 25.91, S.D. = 7.55). The Bodybuilding Dependency Scale (BDS; Smith, Hale, & Collins, 1998) was used to assess dependency in weight lifting. Imagery use was assessed by the Weight Lifting Imagery Questionnaire (WLIQ) which examines three functions of imagery: appearance, technique and energy. The WLIQ was derived from the Exercise Imagery Questionnaire (EIQ; Gammage, Hall, & Rodgers, 2000; Hausenblas, Hall, Rodgers, & Munroe, 1999), which has received considerable recognition in recent years. Results revealed that dependent weight lifters used all functions of imagery more than non-dependent weight lifters. Moreover, appearance imagery was the best predictor of weight lifting dependency accounting for approximately 6% of the variance.
An intervention program incorporating the various functions of imagery may help individuals who are new exercisers or less dependent to weight lifting adhere to a weight lifting program. Furthermore, the results could also help practitioners develop intervention programs to help alleviate dependence to weight lift by reducing the use of appearance imagery or changing the content of the images. Future research will also be discussed.
DEDICATION

This thesis is dedicated to my family and friends for all their love and support.
ACKNOWLEDGEMENTS

There are a few people I would like to extend a special thank you to, for helping me complete my thesis.

I want to begin by extending a sincere thank you to my advisor Dr. Krista Munroe for all her guidance and support on this project. I have learned so much from her in a short period of time and I hope to continue to learn from her in the future. I would also like to thank my committee members, Dr. Kim Gammage, Dr. Marge Holman, and Dr. Scott Martyn for their assistance and for their insightful comments. Additionally, I would like to thank Silvia Jimenez for her technical software expertise. Two other individuals deserving special recognition are Pat Amlin and Diane Dupuis, who with a smile can brighten up your day.

I would also like to acknowledge my roommates and my girlfriend, Aaron Martin, Jaime Stevenson and Samantha Lee, for enduring my nights of ranting and raving about the joys of completing my thesis. And to my fellow Human Kinetic grads, thank you for supporting me throughout my tenure and reminding me that balance is the key to life.

This thesis would not be possible without the support and love from my family. Their belief in me that I could accomplish anything and encouraging me to pursue my dreams was unconditional. Thank you all for your love and support.
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INTRODUCTION

Historically, the study of imagery has focused on motor learning and sport performance. It has not been until recently that imagery research has been conducted with exercise participants (Hauserblaus, Hall, Rodgers, & Munroe, 1999). Hall (1995) suggested that exercise participants might use imagery due to the fact that imagery may be as powerful a motivator in exercise as it is in sport. White and Hardy (1998) defined imagery as:

an experience that mimics real experience. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing. Sometimes people find that it helps to close their eyes. It differs from dreams in that we are awake and conscious when we form an image.

(p. 389)

To date, the few published research studies involving exercise imagery use involve either general exercise, including a variety of participants such as runners and weight lifters, or specific exercise such as aerobic exercise class participants (Giacobbi, Hauserblaus, Fallon, & Hall, in press; Hauserblaus et al., 1999; Rodgers, Hall, Blanchard, & Munroe, 2001). The participants in Hauserblaus and colleagues' (1999) and Rodgers et al.'s (2001) studies were found to use imagery for various functions. However, a limitation with previous exercise imagery studies is that weight lifters have not been examined independently. Weight lifters who have been studied have been categorized with aerobic exercise participants (Gammage, Hall, & Rodgers, 2000).

In today's culture, images depicting the ideal physique saturate the media (Lantz, Rhea, & Mayhew, 2001). Lantz and his colleagues (2001) stated that although these images are only the current ideals of beauty, health, and fitness, many people desire and are motivated to obtain the physiques of these individuals (e.g., fashion models, athletes, entertainers). The desire and motivation to obtain the ideal physique has increased the awareness of exercise psychologists
that exercise can become a potentially compulsive behavior (Smith, Hale, & Collins, 1998). This behavior has been referred to in the literature as obligatory exercise (Brehm & Steffen, 1998), compulsive exercise (Diekhoff, 1984), addiction to exercise (Rudy & Estok, 1983) and exercise dependence (Frederick & Morrison, 1996). Blumenthal, O'Toole, and Chang (1984) defined an exercise dependent person as someone who exercises compulsively, maintains a strict schedule of intense workouts, resists temptations to stop or to take a break from exercising, feels guilty when the exercise schedule is violated, increases the intensity of the workouts to compensate for lapses, exercises when ill, tired or injured, is preoccupied with exercise, and keeps a detailed log of his/her workouts.

Recently, the dependence syndrome in weight lifters has been termed muscle dysmorphia, based on research with anabolic steroid users (Pope, Gruber, Choi, Olivardia, & Phillips, 1997). This dependence is a process that compels an individual to weight lift in spite of obstacles and results in physical and psychological symptoms when weight lifting is withdrawn. Although there are no studies examining the use of imagery in dependent weight lifters, Rodgers and colleagues (2001) did examine the use of imagery in exercise dependents who reported participating in a number of activities, such as aerobic exercise classes, weight lifting, and running. It was found that the best predictor for exercise dependence was energy imagery (images related to becoming energized) and technique imagery (images related to technique) which combined accounted for about 20% of the variance in exercise dependence (Rodgers et al., 2001). Just as Munroe, Hall, Simms and Weinberg (1998) found that imagery use differed from sport to sport, it is possible that dependent weight lifters use imagery differently than aerobic exercise class participants or runners, or even other exercise dependents. Therefore, the purpose of the present study was to examine the use of imagery with dependent and non-dependent weight lifters. Enhanced knowledge about how dependent and non-dependent weight
lifters image could prove to be beneficial. Designing an intervention program aimed at changing how people dependent on weight lifting imagine their participation and the outcomes they hope to achieve while exercising, may help them become less dependent (Hall, 1995).
LITERATURE REVIEW

Imagery

Sport Imagery

Paivio (1985) proposed a framework for how imagery affects human motor performance, suggesting that imagery plays both a motivational and cognitive role in mediating behavior. Paivio (1985) argued that motivational and cognitive roles are divided into either general or specific behavioral roles. A two-by-two model represents the relations between the motivational-cognitive construct as one dimension and the general-specific construct as the other (See Figure 1). On the motivational side, imagery can represent goal oriented responses, such as imagining winning an event or receiving an award (motivational specific: MS), as well as arousal images, such as imaging being relaxed or increasing the arousal levels of an individual (motivational general: MG). On the cognitive side, imagery relates to the performance-related aspects of the game and can be focused exclusively on game strategies, such as imagining executing a break out in basketball (cognitive general: CG) or specific motor skills, such as imagining performing a slap shot in hockey (cognitive specific: CS). It is possible for an individual to use two or more types of imagery at the same time, for example imagining being relaxed (MS) while performing a foul shot in basketball (CS). Also, an individual may visualize just one type of image (Paivio, 1985), such as an emotional situation without a goal image or imagining a skill being performed without any other type of imagery.

Hall, Mack, Paivio, and Hausenblaus (1998) also examined the motivational and cognitive functions of imagery in sport by developing the Sport Imagery Questionnaire (SIQ). Through a series of three experiments, Hall and his colleagues (1998) discovered that the motivational general component of Paivio’s (1985) model separated into two sub-categories, mastery and arousal. Motivational general-mastery (MG-M) imagery is associated with being in
Figure 1
Paivio’s Analytic Framework of Imagery Effects

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<td>Mastery)*</td>
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*Note. Based on the study by Hall et al. (1998).*
control, being mentally tough and confident (e.g., imagining performing a sport skill correctly to give you confidence). Motivational general-arousal (MG-A) imagery is associated with arousal and emotions (e.g., imagining the feelings you receive after performing a difficult sport skill correctly). Thus, there are five components in the functional model of imagery: motivational general-mastery, motivational general-arousal, motivational specific, cognitive general, and cognitive specific (See Figure 1).

The studies by Paivio (1985) and Hall and colleagues (1998) examined the functional aspects of imagery use: the why of imagery use. In a qualitative study, Munroe, Giacobbi, Hall, and Weinberg (2000) examined the four Ws of imagery use: the where, when, why, and what. Munroe and her colleagues (2000) reported athletes used imagery in both training and competition. Within those two domains, athletes used imagery during practice, outside practice, pre-competition, during competition, and post-competition. The most frequent time athletes were found using imagery was before competitions. Athletes believed imagery was most effective during practice and pre-competition.

It has been proposed that an external imagery perspective (e.g., watching yourself on television) has superior effects on the acquisition and performance of skills that depend heavily on form and their successful execution (Hardy, 1997; White & Hardy, 1995). The internal imagery perspective (e.g., imaging as if you were actually performing the skill) is superior for the acquisition and performance of open skills that depend heavily on perception and anticipation for their successful execution, such as a figure skating jump (Hardy, 1997; White & Hardy, 1995). Support for this proposal came from a study by Hardy and Callow (1999). In three experiments, the external perspective was superior to the internal perspective for the acquisition and performance of skills that depend on form for their successful execution, such as a karate
kata. Also, it was found that kinesthetic imagery (i.e., feeling the movements) could be effectively combined with both the internal and external perspectives (Hardy & Callow, 1999).

An image can be either positive or negative. Munroe and her colleagues (2000) found that positive images were most frequently reported during practice and pre-competition. Negative imagery was found to be used most often during competition. Although negative imagery can have a damaging effect on performance (Powell, 1973; Woolfolk, Parrish, & Murphy, 1985), studies have found that athletes usually imagine themselves performing the sport skill properly and often imagine themselves winning and seldom losing (Barr & Hall, 1992; Hall, Rodgers, & Barr, 1990).

The study of imagery use in athletes has produced some significant findings, which have paved the way for more effective interventions. Moreover, the imagery studies conducted within the sport realm have laid the foundation for research examining imagery in other activities, such as exercise. Only recently have researchers begun to study imagery use in the exercise population (Hall, 2001).

**Exercise Imagery**

In one of the first studies to examine the use of exercise imagery, 144 volunteer aerobic exercise class participants from a university community were asked basic questions about their imagery use (Hausenblas et al., 1999). The majority of the participants reported using exercise imagery (75.7%), and more specifically, participants reported using exercise imagery before going to bed, while studying, watching T.V., and when stressed out. Based on participant responses, the Exercise Imagery Questionnaire-Aerobic Version (EIQ-AV) was developed. The authors found that exercisers used imagery for three main reasons: energy, appearance, and technique. Energy imagery includes mental images related to becoming more energized or relieving stress. The use of appearance imagery included images associated with a leaner, fitter.
and healthier appearance. Technique imagery included imagery related to the execution of proper body positioning and form while exercising. Hausenblas and colleagues (1999) further concluded that appearance imagery was used more than technique and energy imagery. Energy imagery was used the least. In addition, low frequency exercisers (less than three hours per week) reported significantly less imagery use than high frequency exercisers (eight or more hours a week) on all three subscales. Although Hausenblas et al.'s (1999) research was a great beginning to exercise imagery research, there were several limitations to this study: first, only aerobic exercise class participants were measured; second, it was correlational in nature and; third, the participants were mainly female undergraduate students who exercised at least three times a week.

In an attempt to expand the exercise imagery research, Gammage et al. (2000) examined how exercise imagery varied with gender, frequency of exercise, and activity type. The participants were 577 (264 male, 312 female) exercisers who completed the Exercise Imagery Questionnaire (EIQ) which is a modified version of the EIQ-AV. The EIQ was developed to include all exercisers, such as weight lifters and runners. Gammage et al. (2000) supported previous findings in that regardless of gender, frequency of exercise, or activity type, participants used appearance imagery the most, followed by technique, then energy imagery. Men used technique imagery more than women, while women used appearance imagery more than men. Furthermore, Gammage and colleagues (2000) supported Hausenblas et al.'s (1999) findings in that participants exercising three or more times per week used all types of imagery more frequently than participants who exercised two or fewer times per week. Gammage and her colleagues (2000) also found that the type of activity did make a difference in the use of imagery among the participants. Runners used significantly less appearance imagery than the other types of activities, and weight lifters used significantly more technique imagery than those who used the cardiovascular equipment. There are some limitations that Gammage and her colleagues
identified within their study. Some of the results were based on relatively small samples, potentially jeopardizing the validity of the results. Moreover, the participants were able to list as many activities in which they participated as they wished, thereby possibly being influenced by their most recent exercise session. Finally, individuals who indicated participating in multiple activities were excluded from the 'type of exercise' analysis.

Using Munroe et al.'s (2000) four Ws paper as a model, Giacobbi et al. (in press) re-examined exercise imagery in an in-depth qualitative study. Giacobbi et al. (in press) conducted interviews with 16 female college students who exercised regularly. The authors examined the 'when,' 'what,' 'where,' and the reasons 'why' exercisers use imagery. A conceptual framework for exercisers' use of imagery was produced from the findings (See Appendix A). The authors found eight 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. Further, results from the study indicated that appearance and fitness outcome imagery had important implications for sustaining exercise behavior within exercisers. One limitation that existed within the study was the homogeneous sample. The sample consisted of female college students, thus prohibiting generalizations to be made outside that population (e.g., age and university sample). The possibility of differences between male and female experiences and their reasons for using imagery is thereby required.

**Imagery Theories**

There are four theories that are used to explain how imagery works. Although these four theories have focused on how the cognitive specific aspect of imagery facilitates the learning and performance of skills (Hall, 2001), the theories have not tried to explain the motivational aspects of Paivio's (1985) functional model. Nevertheless, these theories have been supported by research and are still used to explain how imagery works (cf. Weinberg & Gould, 1999).
Symbolic Learning Theory: Sackett (1934) was the first to propose the symbolic learning theory. This theory simply states that actions are coded as "mental blueprints" (Vealey & Walter, 1993). Imagery can strengthen the mental blueprint of an action, which enables these actions to become more automatic when needed (Hall, 2001). The theory states that the more cognitive in nature the skill, the more easily coded the skill will become. A pure motor skill, such as strength tasks, will not be as easily coded.

There are several problems associated with this theory. It explains how novice performers can benefit from using imagery by strengthening the mental blueprints of the new skills being learned. However, the theory does not explain how an expert performer can enhance one's performance after having already mastered the skills required (Hall, 2001). Moreover, the theory does not take into account the motivational aspects of imagery.

Psychoneuromuscular Theory: The psychoneuromuscular theory states that imagined actions produce low levels of impulses through the nerves from the brain to the muscles. These impulses are similar to those produced during the actual physical execution of actions. Jacobson (1931) stated that motor imagery is essentially suppressed physical activity. Imagery can strengthen the "muscle memory" (Vealey & Walter, 1993) of a motor skill. The psychoneuromuscular theory states that imagery allows the muscles to fire in the correct sequence for an action at very low levels, without actually physically executing the skill (Hall, 2001).

The research that has supported this theory has been heavily criticized citing a lack of appropriate controls (Feltz & Landers, 1983). Most of the experiments have used electromyographical activity (EMG) data, which have been confined to examining the strength of the signals, as measured by the amplitude. The use of amplitude measures may have different factors affecting the results of the measurement, such as the placement of the electrodes on the
muscle and may be an inadequate measure. Hale (1994) stated the frequency and duration of the images should be assessed to fully support this theory.

**Bio-informational Theory.** The bio-informational theory was first introduced by Lang (1977, 1979) to explain the psychophysiological aspects of imagery. The bio-informational theory contends that an image contains two classes of statements: stimulus propositions and response propositions. The stimulus propositions describe the content of a scenario to be imagined. Response propositions relay information regarding the behavioral activity, which are modifiable. The response propositions represent how an individual may react in a certain real life situation. The imaged response propositions can have a potent impact on subsequent behavior (Lang, Melamed, & Hart, 1970). Furthermore, Bakker, Boschker, and Chung state (1996) that response propositions should produce more vivid images and elicit far more physiological responses than images that contain only stimulus propositions.

The distinction between stimulus and response propositions has been argued to be functionally similar to the differences between external and internal imagery (Hale, 1994). Research has shown that imagery from an internal perspective produces more EMG activity than imagery from an external perspective (Hale, 1982; Harris & Robinson, 1986; Suinn, 1980).

Using EMG data does have methodological weaknesses, as stated with the psychoneuromuscular theory. Although the bio-informational theory does focus on the psychophysiological aspects of imagery, it explains very little about the motivational aspects served by imagery (Hall, 2001). Also, bio-informational theory does not attend to the role imagery plays in linking action to other processes such as language (Hall, 2001).

**Dual Coding Theory.** Annett (1994) proposed an action-language-imagination (ALI) model that is specific to the motor domain (See Appendix B). The model depicts two pathways from which a performer can acquire information about a skill, by demonstration and by verbal
instruction. The first pathway, the motor channel, is specialized in encoding human action (demonstration). The second pathway, the verbal channel, encodes the different speech or linguistic gestures, including written language (verbal). An action-language bridge links the two channels together. This bridge allows for the description of an action, the generation of an action, and allows the individual to act on verbal instructions. Annett suggested that images are essential to translate action from motor to verbal codes (as cited in Hall, 2001).

The theory suggests that encoding information in both the action and language systems should produce better learning than just encoding the information in only one of the systems. Hall, Moore, Annett, and Rodgers (1997) found support for this principle. The authors found that using a combination of imagery and verbal labelling produced better recollections of movement patterns than using imagery alone.

Even though the dual coding theory provides a good explanation for how imagery links action and language (Hall, 2001), it is not comprehensive enough to explain all of the functions of imagery within the motor domain. Although these four theories have limitations they all have found support from research indicating that imagery can help an athlete perform physically and mentally (cf. Weinberg & Gould, 1999).

Variables Influencing the Use of Imagery

There are four variables that can influence the use of imagery: type of activity, level of skill and activity, gender, and imagery ability (Hall, 2001).

Type of Activity: The activity an athlete selects can affect the use of imagery in several ways (Hall, 2001). First, the opportunity an individual has to use imagery for different sports varies. For instance, there is more time before discrete tasks to use imagery (e.g., dart throwing) than there is for continuous tasks (e.g., cycling) (Hall, 2001). Second, the imagery content will vary from sport to sport depending on the skills needed to perform the necessary sport (Hall.
For example, a hockey player can image the correct technique needed to perform a slap shot, while a basketball player can image the correct technique to perform a set shot at the foul line.

Further, Feltz and Landers (1983) found that the more cognitive the skill, the larger the effect size imagery has on the task. Tasks such as finger mazes or peg boards had a greater effect size on imagery due to their cognitive nature compared to tasks such as dart throwing and strength exercises that required less cognitive attention.

Hall, Schmidt, Durand, and Buckolz (1994) found that the easier the skill is to imagine, the easier the learning and performing of that skill will be. It was found that different movements have different ratings on how well the movement can be imagined. The easier a movement is to imagine the better it is remembered (Hall & Buckolz, 1981).

In a study investigating 350 varsity athletes from 10 different sports, Munroe and colleagues (1998) found that the five functions of imagery (CS, CG, MS, MG-M, and MG-A) were used in different degrees in the various sports. Furthermore, the authors found that the athletes' use of imagery changed over the season, and this was also dependent on the sport. This was supported in the exercise setting by Gammage et al. (2000) who found that individuals who weight trained used more technique imagery than those who trained by running or by using the cardiovascular machines. Also, runners used less appearance imagery than individuals who weight trained, exercised in aerobics classes, and used the cardiovascular machines.

Level of Skill. There has been a long debate to determine whether imagery use is more beneficial for novice or skilled performers (Hall, 2001). Wrisberg and Ragsdale (1979) have argued that imagery use is most effective during the early stages of learning, while Noel (1980) has argued that imagery use is most beneficial when the performer is skilled at the task.
Blair, Hall, and Leyshon (1993) examined novice and elite soccer players and their use of CS imagery to acquire a soccer task. This task was designed to include most of the basic soccer skills. Players were tested on the task before and after six weeks of imagery practice. It was found that improvement in the task was about the same for the novice and elite soccer players, suggesting that players of all levels of ability can benefit from using CS imagery.

In another study examining soccer players, Salmon, Hall, and Haslam (1994) investigated the motivational and cognitive functions of imagery use within national, provincial, and recreational soccer players. Results indicated that all three levels reported using imagery more for its motivational purposes than its cognitive functions. Moreover, elite players used more imagery than the non-elite players, regardless of the function of imagery served.

*Gender.* Overall, the differences in the uses of imagery found between males and females in sport is so minor that gender is many times not included as a variable in any of the analyses (Hall, 2001). However, with exercisers, Gammage and her colleagues (2000) found that women use appearance imagery more than men. Also, men were found to use more technique imagery than women. Males and females used energy imagery about the same. In order to support Gammage et al.’s (2000) findings on gender differences, future examinations are warranted.

*Imagery Ability.* Paivio (1986) believes an individual’s ability to imagine is a product of experience interacting with genetic variability. Most of the early studies on imagery ability have produced equivocal results (Epstein, 1980; Ryan & Simons, 1982; Start & Richardson, 1964). Hall, Pongrac, and Buckolz (1985) suggested the reason equivocal results were found was due to the failed attempts to specifically measure imagery ability for motor skills. Specific imagery questionnaires have been produced to assess imagery ability, such as the Movement Imagery Questionnaire (MIQ: Hall & Pongrac, 1983) and the Revised version (MIQ-R; Martin & Hall, 1995). With the use of specific imagery questionnaires, researchers have found that imagery
ability is related to the learning of movements (Goss, Hall, Buckolz, & Fishburne, 1986). Furthermore, individual differences in imagery ability can influence the learning and performance of motor skills (Hall, Buckolz, & Fishburne, 1989).

Rodgers, Hall, and Buckolz (1991) examined the possibility that imagery is a skill that an individual can improve upon rather than ability, which is more stable. Figure skaters were examined before and after a 16-week imagery program using the MIQ. It was found that the figure skaters who experienced the training program improved in their imagery MIQ scores, while the scores for the control group remained unchanged. This may suggest that imagery is a skill as well as an ability, which can be improved with regular and deliberate practice.

**Exercise Dependence**

Based on the dependence criteria in the Diagnostic and Statistical Manual for Mental Disorders-IV (DSM-IV; American Psychiatric Association, 1994), Veale (1995) operationalized exercise dependence as a maladaptive behavior, leading to clinically significant impairment or distress. Hausenblas and Symons-Downs (2002) suggested that three or more of the following could diagnose exercise dependence:

1. **tolerance**: defined as a need to significantly increase the amounts of exercise to achieve or diminish the desired effect with the continued use of the same amount of exercise.
2. **withdrawal**: symptoms (e.g., anxiety, fatigue) from withdrawal from exercise will take place or exercise is taken to relieve or avoid the withdrawal symptoms.
3. **intention effects**: exercise is often longer in duration and frequency than what was intended.
4. **loss of control**: there is a persistent desire or unsuccessful effort to control exercise.
5. **time**: a great deal of time is spent in other activities related to exercise, such as vacations related to exercise.
6. **conflict**: social, occupational, or recreational engagements are less important and are either given up or reduced because of exercise.
and (7) continuance: continuing to exercise despite the knowledge of a persistent or recurrent physical or psychological problem which was caused or exacerbated by exercise. (p. 113)

According to an extensive review by Hausenblas and Symons-Downs (2002), exercise dependence research has been classified into three general approaches: (a) comparing exercisers to eating disorder patients; (b) comparing ‘excessive’ to ‘less excessive’ exercisers; and (c) comparing exercisers to non exercisers. There have been equivocal results regarding exercise dependence (Hausenblas & Symons-Downs, 2002). The reasons for the inconclusive results are due to the lack of experimental research, the control groups being inconsistent or nonexistent, failing to control for biases by the participants, different operational definitions for exercise dependence, and the measures for exercise dependence are either not valid or inappropriate (Hausenblas & Symons-Downs, 2002). Out of 77 exercise dependent studies, the most frequently examined mode of activity was running (50%, n=38), followed by general exercise (27.7%, n=21), and weight lifting (7.8%, n=6), while the other 12 studies examined a combination of activities (Hausenblas & Symons-Downs, 2002). Although Smith and his colleagues (1998) suggested that exercise dependence could occur in a variety of physical activities, only 7.8% of the studies found by Hausenblas and Symons-Downs (2002) were of weight lifting.

Recently, exercise dependence was examined in bodybuilders (Smith et al., 1998). The Bodybuilding Dependence Scale (BDS) was first introduced in this study to 47 bodybuilders, 31 recreational weight lifters and 24 Olympic weight lifters. Bodybuilders lift weights for the purpose of competing in bodybuilding competitions. Recreational weight lifters train for general fitness purposes, to improve appearance, to create or maintain an identity, and or for social reasons, such as maintaining friendships. Olympic weight lifters lift weights in competition in an attempt to lift as much weight as possible. The Athletic Identity Measurement Scale (AIMS;
Hale. James. Stambulova. 1999). the Physical Self-Perception Profile (PSPP: Fox & Corbin, 1989). and the 13-item short form of the Marlowe-Crowne Social Desirability Scale (Reynolds, 1982) were also administered to the participants. Smith and his colleagues factored out three subscales within the BDS: social dependency, training dependency, and mastery. Social dependency items reflect the need to be in the weight lifting environment. Training dependency items measure the need to engage in weight training. The last subscale, mastery, reflects the need to exert control over training schedules. All three of the BDS subscales were correlated with training frequency.

The aforementioned study (Smith et al., 1998) was a useful starting point for further research in dependent weight lifters. In a subsequent study by Hurst. Hale. Smith and Collins (2000). 35 experienced bodybuilders. 31 inexperienced bodybuilders. and 23 weight lifters completed the BDS. the AIMS. the Social Physique Anxiety Scale (Hart. Leary. & Rejeski, 1989) and an adapted version of the Social Support Survey (Richman. Rosenfeld. & Hardy, 1993). Experienced bodybuilders scored significantly higher than the inexperienced bodybuilders and weight lifters on the BDS, social identity and exclusivity subscales of AIMS. and social support scales. Moreover. it was found that experienced bodybuilders scored significantly lower on social physique anxiety than the inexperienced bodybuilders and weight lifters. In regards to the BDS subscales. Hurst et al. (2000) found that bodybuilders scored significantly higher than weight lifters on the social dependency subscale. Also, experienced bodybuilders scored significantly higher on the training dependency and mastery subscales than inexperienced bodybuilders and weight lifters. Although Hurst and colleagues (2000) found positive results from their study. the use of the BDS is still exploratory.

The studies conducted by Hurst and colleagues (2000) and Smith and colleagues (1998) have found some correlations between bodybuilding dependence and social physique anxiety.
bodybuilding identity, and social support among weight lifters and bodybuilders. However, the concept of imagery use in the weight lifters has not been examined.

Based on Hall’s (1995) proposal that imagery might be linked to exercise addiction, Rodgers and colleagues (2001) investigated the relation between imagery and dependent exercisers. The authors hypothesized that if exercise dependence is motivated similarly to eating disorders, it would be predicted by appearance motives, and thus appearance related imagery would be able to predict dependence to exercise. Participants (N=243) engaging in a variety of activities such as aerobics, weight training, and running were administered the EIQ and the Obligatory Exercise Questionnaire (OEQ; Pasman & Thompson, 1988). As with previous imagery research (Hausenblas et al., 1999), the participants reported using appearance imagery the most and energy imagery the least. Furthermore, the authors did not find support for the hypothesis that appearance imagery does predict exercise dependence. However, imagery did account for 20% of the variance in exercise dependence with energy and technique imagery exhibiting statistically significant and meaningful predictive relations. The findings support the suggestion by Hall (1995) that imagery is an important predictor of exercise dependence. The Rodgers et al. (2001) study presents some important motives regarding exercise dependence within physically active individuals. However, the findings suggest that the motivation underlying exercise dependence is not rooted exclusively in appearance, therefore suggesting other influences in exercise behaviors. Furthermore, the study is a generalization of exercises, encompassing aerobic exercise class participants, weight lifters, and runners. A more exerciser specific study is needed because imagery use within each activity may differ. For example, weight lifting is an anaerobic exercise and is a discrete task, compared to running which is an aerobic exercise and is more continuous, therefore potentially requiring different functions of imagery use. Just as Munroe et al. (1998) found that imagery use differs from sport to sport.
general exercisers and aerobic exercise class participants may use imagery differently than weight lifters.

Based on previous research (Gammage et al., 2000; Hausenblas et al., 1999; Rodgers et al., 2001) there is a strong rationale to continue the study of exercise imagery because it may aid in our understanding of the acquisition and maintenance of physical activity behavior. Moreover, exercise imagery may be a useful intervention tool to increase exercise behavior by increasing people's motivation and self-efficacy to engage in regular exercise (Giacobbi et al., in press). Also, Hall (1995) suggested that an exercise imagery intervention program, designed to change how people addicted to exercise imagine their participation and the outcomes they hope to achieve while exercising, could prove to be beneficial. Trying to reduce the amount of imagery people are using may also have beneficial effects on addicted exercisers (Hall, 1995). Therefore, the purpose of the present study was to examine the uses of imagery with dependent and non-dependent weight lifters. Previous research (Gammage et al., 2000; Hausenblas et al., 1999; Rodgers et al., 2001) has found that all participants use appearance imagery the most and energy imagery the least. Moreover, Rodgers and colleagues (2001) have found that imagery accounted for approximately 20% of the variance in exercise dependence, with energy and technique imagery showing statistically significant and meaningful predictive relations. Based on these findings, three hypotheses were made. First, all participants (dependent and non-dependent) will use appearance imagery the most, followed by technique and energy imagery. However, dependent weight lifters will use more energy and technique imagery than their non-dependent counterparts and appearance imagery will be used the same between the two groups. Finally, technique and energy imagery will be the biggest predictors of dependence to weight lift and appearance imagery will not predict weight lifting dependence.
METHODOLOGY

Participants

The study sample of participants included 422 male recreational weight lifters (Mean age = 25.91, SD = 7.55), with a wide range of weight lifting experience (Mean years = 6.23, SD = 5.84). Seven of these participants had completed in bodybuilding competitions, so therefore removed from any further analyses. Recreational weight lifters are defined as weight lifters who do not lift weights for the purpose of competing in bodybuilding competitions. The participants varied in both frequency (Mean = 4.19 day per week, SD = 1.24) and duration (Mean = 0.36 hours per week, SD = 2.87) of weight lifting. The recruitment of the participants took place in specifically targeted gyms and fitness facilities within the Southwestern Ontario region. Since the studies that have involved the BDS (Hurst et al., 2000; Smith et al. 1998) have examined mostly male participants, only male participants were used in the present study thereby allowing for a comparison. Additionally, the present study is a preliminary investigation of the use of imagery among dependent and non-dependent weight lifters, thus controlling as many factors as possible is beneficial. Most importantly, there are few studies examining exercise imagery among males. The majority of the studies (Gammage et al., 2000; Hausenblas et al., 1999; Rodgers et al., 2001) that have been conducted either examined females and males together or just females alone. Therefore, it was deemed valuable to investigate only males in the exercise realm, specifically weight lifting.

Measures

Weight Lifting Imagery Questionnaire (WLIQ; adapted from Gammage et al., 2000). The WLIQ is a 9-item measure on which participants rate their imagery use on a 9-point scale anchored by 1 (never) and 9 (always). The questionnaire is comprised of three subscales: appearance imagery focuses on the attainment of a fit-looking body (e.g., “I imagine a more
'defined-me' from lifting weights''); energy imagery relates to getting psyched up or feeling energized from exercising (e.g., "To get me energized, I imagine lifting weights"); and technique imagery relates to performing the skill and techniques correctly with good form (e.g., "When I think about lifting weights, I imagine my form and body position") (See Appendix C). Each subscale contains three items. The appearance and energy subscales are thought to serve a motivational function, while the technique subscale is thought to serve a cognitive function (Gammage et al., 2000; Hausenblas et al., 1999). The questionnaire is modelled after the Exercise Imagery Questionnaire (EIQ: Gammage et al., 2000; Hausenblas et al., 1999), also comprised of three subscales: appearance, energy, and technique. The researcher reworded the EIQ and had two other expert researchers in the field examine the wording of the 9-items on the WLIQ to verify that it was specific to weight lifters. The questionnaire was then read and completed by three individuals who were frequent weight lifters to establish content validity. The Cronbach's alphas were found to be acceptable for the WLIQ subscales, ranging from .79-.84.

**Bodybuilding Dependency Scale (BDS: Smith et al., 1998).** The BDS is a 9-item measure on which participants rated their dependency to weight lift on a 7-point Likert scale with 1 representing "Strongly Disagree" and 7 representing "Strongly Agree." The scale is comprised of three subscales: Mastery items reflect the need to exert control over training schedules (e.g., "I often weight train when I have a cold or flu."); Training Dependency items measure the need to engage in weight lifting (e.g., "I feel guilty if I miss a weight training workout."); and Social Dependency items focus on the need to be in the weight lifting environment (e.g., "Bodybuilding has totally changed my lifestyle.") (See Appendix D). The Cronbach's alpha for each subscale showed satisfactory internal consistency (Mastery $\alpha = 0.72$, Training Dependence $\alpha = 0.73$, and Social Dependence $\alpha = 0.62$). These Cronbach's alphas are consistent with previous research.
that has also found satisfactory internal consistent alpha values ranging from .78-.75 (Smith et al., 1998).

**Demographic Data.** Relevant demographic information was also obtained, such as age, years lifting weights, and frequency and duration of weight lifting within a week. Moreover, information on whether the participant has ever competed within a bodybuilding competition was collected. The competitive bodybuilders were eliminated from the study in order to only examine recreational weight lifters.

**Experimental Procedure**

Fitness facility operators in the Southwestern Ontario region were contacted to obtain consent for the use of their facilities for participant recruitment. A recruitment letter including the purpose and methodology of the study was provided to the operators (See Appendix E). When consent was received from the operators, the lead researcher spent one 8-hour day at each facility to collect data. All male club members who entered the facility to work out during the time the researcher was present were asked to participate in the study. Facility personnel were also there to assist in the recruitment of the participants by making the participants aware of the questionnaires. Participants were able to freely decline to participate in the study. The participants consented to the study by agreeing to fill out the questionnaires. Those who agreed to participate were asked to complete the two questionnaires (WLIQ, BDS) and demographic questions as well as a letter of information (See Appendix F) before or after his workout. The participants filled out the questionnaires at a table beside the researcher's station. Once the questionnaires were completed, the participants placed them in a sealed box. For added incentive, participants had an opportunity to win a draw for workout straps and weight lifting gloves upon completion of the questionnaires.
Pilot Study

A pilot study was completed prior to the actual experimental trial to assess participant comprehension of the experimental procedure and the guidelines for conducting the research. The pilot study was conducted in one exercise facility in the London and Middlesex area. Prior to collecting the data, the facility manager gave consent for the pilot test to be administered within the facility. The data collected for the pilot study was not included in the actual experiment. Male participants (N = 31) were approached before or after their workouts. Participants were given a letter of information and then asked to complete demographic data, the WLIQ and BDS. Upon completion, the participants placed the questionnaires into a sealed box. The purpose of the pilot study was to have the researcher become familiarized with the experimental procedure and analysis needed to conduct the actual experiment. The pilot study data were analyzed for possible trends and possible identification of problems or concerns with the questionnaires. It was important to ensure that both questionnaires were easily understood and could be fully completed.

Design

A between subjects multivariate analysis design was used to assess imagery use and weight lifting dependence. The dependent variables were the three subscales of the WLIQ, appearance, energy, and technique. The independent variables were participants’ dependency or non-dependency to weight lift. The three subscales of the BDS were collapsed into an overall dependency score and then a tertile split was conducted. The dependency scores were divided into thirds. The bottom third of the scores (BDS = 12-29) consisted of the non-dependent weight lifters (n = 147). The top third of the scores (BDS = 39-60) consisted of the dependent weight lifters (n = 153). The BDS scores between 30 to 38 were considered neither dependent nor non-dependent weight lifters, so therefore were excluded from any further analyses. A t-test was
conducted to determine that the dependent and non-dependent weight lifters differed statistically in dependency scores. The two groups were statistically different, \( t(299) = 41.18, p = .000 \).

Moreover, four other between subject designs were conducted to examine the demographic data. The independent variables were age, experience, the frequency and the duration of weight lifting. The dependent variables were the three subscales of the WLIQ: appearance, energy, and technique.

In order to determine which subscales of the WLIQ predicted dependency to weight lift, a forward regression analysis was conducted. In the forward regression analysis the dependency scores of weight lifters was the dependent variable and the appearance, energy, and technique imagery subscales were the independent variables.
RESULTS

Descriptives

Descriptive statistics were calculated for the entire sample (combination) as well as for the dependent and non-dependent weight lifters (see Table 1 for summary). The dependent and non-dependent group consisted of a total of 300 participants. The age of the participants ranged from 18 to 62 years. The total number of years lifting weights varied from 1 to 45 years. The frequency of lifting weight was 4.18 days per week. The duration of lifting weights was 6.35 hours per week.

When comparing dependent ($n = 153$) and non-dependent weight lifters ($n = 147$), there were no differences in mean age (dependent = 26.63 years; non-dependent = 26.10 years). Dependent weight lifters had more years lifting weights than non-dependent weight lifters ($t(297) = 2.31, p = .02$). In terms of frequency, dependent weight lifters lift weights more days per week than non-dependent weight lifters ($t(294) = 8.30, p = .00$). Lastly, in terms of duration, dependent weight lifters lift more hours per week than their non-dependent counterparts ($t(294) = 8.35, p = .00$). See Table 1 for a summary.

Hypothesis 1. It was hypothesized that all participants, regardless of dependency, would use appearance imagery the most, followed by technique and energy imagery. To examine this hypothesis, mean scores were calculated for each imagery subscale. The mean scores for dependent weight lifters for the WLIQ subscales were: appearance (mean = 7.3, $SD = 1.5$), energy (mean = 4.4, $SD = 2$), and technique (mean = 6.9, $SD = 1.7$). The non-dependent weight lifters scores consisted of appearance (mean = 5.6, $SD = 1.8$), energy (mean = 4.9, $SD = 2.1$), and technique (mean = 2.4, $SD = 1.5$) (See Table 2). It was found that regardless of dependency to weight lift (being dependent or non-dependent), appearance imagery was used the most followed by technique and energy imagery, thus supporting the first hypothesis.
Table 1

Participant Demographic Information

<table>
<thead>
<tr>
<th>Topic</th>
<th>Combination (N = 300)</th>
<th>Dependent (n = 153)</th>
<th>Non-dependent (n = 147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>M = 26.37, SD = 7.79</td>
<td>M = 26.63, SD = 7.01</td>
<td>M = 26.10, SD = 8.53</td>
</tr>
<tr>
<td>Yrs. lifting weights</td>
<td>M = 6.75, SD = 6.32</td>
<td>M = 7.57*, SD = 5.93</td>
<td>M = 5.89, SD = 6.61</td>
</tr>
<tr>
<td>No. workouts week (frequency)</td>
<td>M = 4.18, SD = 1.28</td>
<td>M = 4.72*, SD = .97</td>
<td>M = 3.60, SD = 1.32</td>
</tr>
<tr>
<td>No. of hours week (duration)</td>
<td>M = 6.35, SD = 2.90</td>
<td>M = 7.59*, SD = 2.63</td>
<td>M = 5.05, SD = 2.59</td>
</tr>
</tbody>
</table>

Note. * Denotes p < .05 between dependent and non-dependent weight lifters.
Table 2

*WLIQ Mean Scores for Dependent and Non-dependent Weight Lifters*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Dependent</th>
<th>Non-dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>M = 7.32</td>
<td>M = 5.60</td>
</tr>
<tr>
<td></td>
<td>SD = 1.53</td>
<td>SD = 1.82</td>
</tr>
<tr>
<td>Technique</td>
<td>M = 6.87</td>
<td>M = 4.93</td>
</tr>
<tr>
<td></td>
<td>SD = 1.67</td>
<td>SD = 2.14</td>
</tr>
<tr>
<td>Energy</td>
<td>M = 4.39</td>
<td>M = 2.42</td>
</tr>
<tr>
<td></td>
<td>SD = 2.00</td>
<td>SD = 1.50</td>
</tr>
</tbody>
</table>
Hypothesis 2. A MANOVA was used to investigate the second hypothesis that dependent weight lifters would use more energy and technique imagery than their non-dependent counterparts and that appearance imagery would be used the same amount by the two groups. A significant multivariate effect emerged. Pillai's Trace $F(3, 295) = 43.50, p < .000$. Post hoc univariate analyses revealed that the dependent weight lifters significantly differed from the non-dependent weight lifters on all three subscales of the WLIQ: appearance, $F(1, 297) = 78.03, p < .000$, technique, $F(1, 297) = 57.78, p < .000$, and energy, $F(1, 297) = 94.44, p < .000$. This partially supports the second hypothesis in that dependent weight lifters will use significantly more energy and technique imagery than non-dependent weight lifters (See Table 3).

Hypothesis 3. In order to investigate which weight lifting imagery subscale best predicted weight lifting dependence, a forward regression analysis was conducted. It was found that the only predictor of weight lifting dependence was appearance imagery, accounting for 60% of the variance, which does not support the third hypothesis that energy and technique imagery will be the biggest predictors of weight lifting dependence (see Table 4).
<table>
<thead>
<tr>
<th>WLIQ Subscale</th>
<th>df</th>
<th>df error</th>
<th>mean square error</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>1</td>
<td>29^*</td>
<td>2.82</td>
<td>78.63</td>
<td>.000</td>
</tr>
<tr>
<td>Technique</td>
<td>1</td>
<td>29^*</td>
<td>3.13</td>
<td>94.44</td>
<td>.000</td>
</tr>
<tr>
<td>Energy</td>
<td>1</td>
<td>29^*</td>
<td>3.70</td>
<td>75.78</td>
<td>.000</td>
</tr>
</tbody>
</table>
Table 4

Summary of Regression Analysis

<table>
<thead>
<tr>
<th>Description</th>
<th>Vars. in model</th>
<th>$R^2$</th>
<th>$R$</th>
<th>$df_s$</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent appearance</td>
<td></td>
<td>.06</td>
<td>11.30</td>
<td>1.151</td>
<td>.001</td>
<td>.26</td>
<td>3.36</td>
<td>.001</td>
</tr>
</tbody>
</table>

Note. Vars. = variables.
DISCUSSION

The comparison of demographic data between dependent and non-dependent weight lifters yielded several findings. The frequency of time spent in days lifting weights and the number of hours lifting weights were found to be significantly different between dependent and non-dependent weight lifters. Upon examination of the means for both frequency items, dependent weight lifters spent more time engaged in weight lifting. This supports the notion that individuals who spend exceedingly large amounts of time weight training tend to be dependent upon weight lifting (Fussell, 1991; Klein, 1993). Furthermore, time spent exercising is one of seven criteria suggested by Hausenblas and Symons-Downs (2002) which classifies an exerciser as dependent. Therefore, it is not surprising that dependent and non-dependent weight lifters significantly differ in their frequency to weight lift.

Similarly, experience, that is years lifting weights, was found to be significantly different between dependent and non-dependent weight lifters, which support previous research. Hurst and colleagues (2000) found that experienced bodybuilders need the social atmosphere that the gym offers and become dependent to the actual activity of lifting weights. Although Hurst and colleagues (2000) examined bodybuilders, it can be postulated that dependent weight lifters can experience the same needs from lifting weights, such as the social atmosphere and become dependent to the actual activity of weight lifting.

Moreover, this relationship between experience and commitment to exercise has also been supported in previous exercise literature. Yair (1992) examined the commitment levels of runners of varying experience and found that professional runners had a stronger commitment to running in comparison to semi-professional and amateur runners. Additionally, semi-professional runners displayed stronger commitment levels than amateur runners. In spite of the fact that experience and level of competition may not be synonymous, it can be presumed that
the higher the level of competition in which the individual is competing, the more experience the individual has with the activity.

Furst and Germone (1993) found that experienced runners and exercisers were more addicted to the activity than the less experienced person. However, the authors did find that after 15 years of experience with an activity, lower mean scores were found. Furst and Germone (1993) suggested that although exercise may still be important to the individual, family or career responsibilities may become more important. In the present study, however, the average years lifting weights for the dependent weight lifters was approximately 7 years, therefore supporting previous researchers' claims that more experienced exercisers were more addicted dependent to the activity than less experienced exercisers.

The purpose of this study was to examine the use of imagery among dependent and non-dependent weight lifters. It was found that regardless of dependency, weight lifters used appearance imagery the most and energy imagery the least, thus supporting the first hypothesis and previous exercise imagery research (Gammage et al., 2000; Hausenblas et al., 1999; Rodgers et al., 2001). It seems that the majority of general exercisers use imagery mostly for appearance purposes. This coincides with the current trend within Western culture that promotes a standard of beauty and success, which focuses on physical attractiveness and being muscular especially for men (Philips & Drummond, 2001; Tucker, 1982). With these current trends, people may be motivated to exercise to obtain these ideals of what an attractive male or female should look like. As stated by Gammage and colleagues (2000), individuals may participate in exercise primarily for appearance outcomes and may use appearance imagery as motivation to engage in exercise.

Results also revealed that dependent weight lifters used all three types of imagery significantly more than non-dependent weight lifters. One plausible explanation for these findings may stem from the amount of time dependent weight lifters spend in the gym compared
to non-dependent weight lifters. As previously mentioned, dependent weight lifters spend significantly more time, in terms of the number of hours per week and number of workouts per week, weight lifting than non-dependent weight lifters. These may be the reasons dependent weight lifters imagine appearance, technique, and energy imagery more than non-dependent weight lifters. In essence, the more familiar the weight lifter is to lifting weights the more imagery that will take place.

Support for this explanation comes from sport imagery research. Salmon et al. (1994) examined imagery use with national, provincial, and recreational level soccer players. They found that all three groups of players used imagery. The more elite players reported more imagery use than the non-elite players regardless of the function of imagery used. The greater commitment elite athletes make to the sport was the reason why elite athletes use imagery more than non-elite athletes (Salmon et al., 1994). Although skill level and experience may not be synonymous, it can be assumed that, in general, the more experienced an individual is at an activity the greater the skill level will be. Therefore, the greater the skill levels of athletes and exercisers, the more frequent the use of imagery (Hall, 2001).

Finally, a forward regression analysis was conducted to examine which imagery function(s) predict weight lifting dependency. The findings from the forward regression did not support the third hypothesis that technique and energy imagery would be the biggest predictors of dependence to weight lift. However, the findings did indicate that appearance imagery was the biggest predictor of weight lifting dependence, thus refuting previous exercise imagery research. Rodgers and colleagues (2001), in their study with dependent exercisers, suggested that appearance is a benefit of exercise but is not the primary motive for exercise dependence. Contrary to their finding, the present findings suggest that for male weight lifters, appearance is the prime motive for weight lifting dependence. This result may be founded in the concept of
body image. In Western culture, the mesomorphic body type for males, which is muscular in nature, is the most preferred and socially desired body type (Davis, Elliot, Dionne, & Mitchell, 1991; Tucker, 1982). Research has shown that individuals tend to view the mesomorphic male compared to an ectomorphic or endomorphic male, as possessing more favourable skills and personality traits, and to be more physically adept and athletically capable (Berscheid & Walster, 1972; Lerner & Jovanovic, 1971; Spillman & Everington, 1989; Wells & Siegal, 1961).

Therefore, a male weight lifter may be motivated to achieve this body type and as a result may use more appearance imagery to help attain his goals, thus potentially becoming dependent to weight lift.

Moreover, body dissatisfaction is one of the precipitating factors of muscle dysmorphia, which is a specific subtype of Body Dysmorphic Disorder (BDD: Pope, Katz, & Hudson, 1993). Individuals who have muscle dysmorphia view themselves as too thin and want to gain muscle mass and strength even though they may be large and muscular (Pope et al., 1993). Muscle dysmorphics are consumed by weight lifting and other activities associated with gaining muscle mass and also becoming lean with no body fat (Pope et al., 1993). Lantz et al. (2001) developed a conceptual model of muscle dysmorphia. Within this model, two of the behavioral characteristics of muscle dysmorphia are body size, symmetry and exercise dependence. The authors suggest that the behavioral characteristics are cyclical in nature. For example, individuals with a distorted image of being small will manipulate behaviors such as increasing their weight lifting activity. As a result, their bodies will have gained muscle size and or shape reinforcing the need to engage in the behaviors. This perpetuates the cycle in that weight lifting may improve one's appearance thereby reinforcing the need to weight lift.

Giacobbi et al. (in press) found that appearance imagery was used more by female college student exercisers, thus suggesting that appearance imagery may have important
implications for sustaining exercise behavior. Although the present study examined only male
participants, the finding that appearance imagery was used the most by dependent weight lifters
lends some support to Giacobbi and colleagues’ (in press) study. Dependent weight lifters may
use appearance imagery to sustain their weight lifting behavior. Furthermore, Giacobbi et al. (in
press) stated that there may be links between appearance related imagery and body
dissatisfaction. This may lead individuals to engage in pathological behaviors, such as becoming
dependent to weight lift.

Furthermore, media, more specifically advertising, may play an important role in the
perception of one’s body image. This may be the result of marketing campaigns that specifically
target males and promote muscularity and leanness (Davis, Brewer, & Weinstein, 1993).
Advertising has been found to have an effect on an individual’s attitudes, beliefs, behaviors, and
values (Lavine, Sweeney, & Wagner, 1999). Advertisements depicting the current ideals of body
type will have an effect on an individual’s perceptions of appearance and will influence one’s
attitudes, beliefs, behaviors, and values of appearance. These advertisements may affect some
individuals so much that they may go to extreme measures, such as becoming dependent to
exercise, to obtain the physiques of those printed in the media.

Limitations

There are several limitations with the present study that should be noted. First, as with all
studies, there may be some potential response biases. The participants may answer the questions
less honestly since the researcher was nearby when the participants were filling out the
questionnaires (Thomas & Nelson, 2001). Nevertheless, this is a chance that a researcher takes
when conducting a questionnaire-based study. Second, since there are no normative values for
the BDS, a tertile split was conducted to determine dependency and non-dependency to weight
lift. A tertile split may have potential problems in that the entire sample may have relatively high
or relatively low overall dependency scores. As the tertile split indicated, 13 of the total present sample was dependent which may be questionable especially when generalized to all male weight lifters. Furthermore from a theoretical perspective, the BDS does not tap into many of the dependency criteria as suggested by Hausenblas and Symons-Downs (2002). Therefore, the results are specific to the present sample. Third, only male weight lifters were used in this study thereby limiting the generalizability of the results to one gender and one activity. Fourth, the question 'Have you ever competed in bodybuilding competitions?' should have read 'Have you ever competed or are preparing to compete in a bodybuilding competition?' The reason for the change is that people who are preparing to compete may already behave as a person who has competed previously. As a result, this may have skewed the results. Lastly, an additional demographic question regarding the purpose of lifting weights is needed. Participants may have different motives for lifting weights. In professions such as firefighting or policing, strength and stamina are a necessity and therefore may be the primary motivator for lifting weights.

Conclusions

The purpose of this study was to examine the use of imagery among dependent and non-dependent weight lifters. Although previous research (Gammage et al., 2000; Hausenblas et al. 1999; Rodgers et al., 2001) has examined imagery use with a variety of exercisers, there have not been any specific studies investigating specifically males or weight lifting.

The present study produced several key findings. The most surprising finding was that appearance imagery was the biggest predictor of weight lifting dependence. The evidence found in the present study partially supports Hall’s (1995) proposal that imagery may be an important predictor of exercise dependence. By recognizing what male dependent weight lifters imagine, it will help practitioners develop intervention programs to help attenuate dependence to weight lifting (i.e., reducing the use of appearance imagery). Furthermore, the findings may also help
males who have trouble adhering to a weight lifting program. Since it was found that dependent male weight lifters use all functions of imagery more than non-dependent male weight lifters, an intervention program incorporating the various functions of imagery may help individuals who are new exercisers or less dependent to weight lifting adhere to a weight lifting program.

Hurst and colleagues (2000) suggested that future research should examine recreational weight lifters and competitive bodybuilders. The present study did examine the imagery used by recreational weight lifters. However, future research should investigate competitive bodybuilder’s use of imagery. Furthermore, since weight lifting is only one facet of exercise, it would be interesting to investigate the other realms of exercise dependence and imagery use independently, such as running or aerobics. Running and aerobics are more continuous exercises while weight lifting is more discrete. This would allow for comparisons to be made with various aspects of exercising.

Moreover, future research should examine the effect imagery may have on Lantz and colleagues’ (2001) model of muscle dysmorphia. Hurst and colleagues (2000) stated that exercise dependence, bodybuilding dependence and muscle dysmorphia have yet to be clearly defined. By examining the imagery use of individuals with muscle dysmorphia and dependent weight lifters, a comparison may be made between these two groups. Since muscle dysmorphics see themselves as thin and small, it could be postulated that the content of images between dependent weight lifters and muscle dysmorphics would differ.

As stated previously, only recreational male weight lifters were examined in this study. Smith and Hale (in submission) found that there were no gender differences in the BDS scores when comparing male and female bodybuilders. However, in a previous exercise imagery study, Gammage and colleagues (2000) found that female exercisers used more appearance imagery
than male exercisers. Due to the equivocal results, further investigation involving male and female weight lifters or bodybuilders and their use of imagery is warranted.

The present study has revealed several interesting findings regarding imagery use among male dependent and non-dependent weight lifters. Although, there have been general exercise dependency and imagery studies, it was the intent of this study to explore and investigate research examining recreational male dependent and non-dependent weight lifters. In conclusion, these results indicate that male weight lifters use imagery for various reasons including motivational and cognitive purposes. The results further show that the biggest predictor of dependency to weight lift is appearance based imagery, thus suggesting weight lifters may have different motives to weight lift than the general exerciser.
REFERENCES


Hardy, L., & Callow, N. (1999). Efficacy of external and internal visual imagery perspectives for the enhancement to performance on tasks in which form is important. *Journal of Sport and Exercise Psychology, 21*, 95-112.


Appendix A

A Conceptual Framework of Regular Exerciser’s Use of Mental Imagery

(Giacobbi et al., in press).
Exercise Imagery

In Exercise Environment
N=8

In and Out of Exercise Environment
N=2

Prior to Workout
N=3

During Workout
N=5

Prior to Specific Exercise
N=1

During the Day
N=4

Exercise Technique
N=9

Aerobics Routines
N=3

Exercise Context
N=4

Appearance Images
N=8

Competitive Outcomes
N=4

Visualize stages of a run
Seeing others pass by in road
Preparation for a race
Exercise environment

Appearance
Being toned
Imagine your body
Losing weight
Imagining a bigger bicep
Imagine oneself looking good
Gradual firming and toning
Visualize oneself in past

Doing well in a race
Winning or finishing a race
Getting a better time in race

Weight lifting technique
Biggest strides during workout
Practice (via imagery) posture in the car
Perfecting technique
Think about timing of movements to music
Planting foot correctly
Appendix B

Action-Language-Imagination (ALI) Model (Annett, 1994)
Human Actions

Perceptual Processes

Motor Processes

Actions

Verbal Instructions

Perceptual Processes

Motor Processes

Speech
Appendix C

The Weight Lifting Imagery Questionnaire (adapted from Gammage et al., 2000)
Weight Lifting Imagery Questionnaire

Age: ____________ yrs. Years lifting weights: ______________ yrs
Have you competed in weight lifting competitions before: YES or NO
If yes, what was the highest level: AMATEUR or PROFESSIONAL
The number of weight lifting workouts per week: ____________
The number of hours in a week you lift weights: ____________

The following questions deal with imagery and weight lifting participation. Imagery involves ‘mentally’ seeing yourself lifting the weight. The image in your mind should approximate the actual physical activity as closely as possible. Imagery may include sensations like hearing music and feeling yourself move through the exercises. Imagery can also be associated with emotions (e.g., getting psyched up or energized), staying focused (e.g., concentrating on the required movements and not being distracted), or setting exercise plans goals (e.g., imaging achieving a desired size), etc.

USING THE SCALE BELOW. PLEASE INDICATE WHICH MOST APPLIES TO YOU:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tr>
<td>Never</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Always</td>
</tr>
</tbody>
</table>

1. To keep me going during the day, I imagine lifting weights.
2. I imagine a more symmetrical me from lifting weights.
3. To take my mind off work, I imagine lifting weights.
4. When I think about lifting weights, I imagine perfecting my technique (e.g., speed, breathing, flexing).
5. When I think about lifting weights, I imagine my form and body position.
6. To get me energized, I imagine lifting weights.
7. I imagine a more “defined-me” from lifting weights.
8. I imagine a “bigger-me” from lifting weights.
9. When I think about lifting weights, I imagine doing the required movements (e.g., chest: flat, incline and decline press).

CIRCLE ONE OF THE FOLLOWING:

When you imagine yourself lifting weights do you:

See yourself as if you are watching yourself on television (external imagery)

OR

See yourself as if you are actually performing the movement (internal imagery)

OR

BOTH (external and internal imagery)
Appendix D

The Bodybuilding Dependency Scale (Smith et al., 1998).
The Bodybuilding Dependency Scale

USING THE SCALE BELOW, PLEASE INDICATE WHICH MOST APPLIES TO YOU. THERE ARE NO WRONG OR RIGHT ANSWERS BUT PLEASE BE HONEST WITH YOUR ANSWERS.

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

1. I often weight train when I have a cold or flu. 
2. I often continue to weight train when I am injured. 
3. I will not miss a scheduled weight training workout, even if I do not feel like training.
4. I feel guilty if I miss a weight training workout.
5. If I miss a weight training workout, I feel as though my muscle mass has shrunk.
6. My family and/or friends have complained about the amount of time I spend in weight training.
7. Weight training has totally changed my lifestyle.
8. I plan my other daily activities around my weight training.
9. In the event of a conflict of interest between my weight training and my job, my training would always come first.

Thank you for your participation!

If you would like to enter the draw for the various prizes (such as straps and weight lifting gloves), please leave your name and phone number below. tear along the dotted line and drop it off in the box provided:

Name: ________________________________

Phone #: ________________________________
Appendix E

Recruitment Letter to Facility Managers
To Whom It May Concern:

I am writing this letter to ask for your cooperation in conducting my Master’s thesis research. I am searching for local fitness facility operators who would be willing to offer their gyms as sites for my study. The research will examine imagery use and body building dependency in weight lifters. Enclosed you will find a letter for your review, containing the rationale for the study and the methods used in collecting my data.

If you agree to participate in the study, the necessary resources (a sealed box and questionnaires) will be dropped off at your facility and placed at the front desk. The participants will be able to fill out the questionnaires on their own time. Once the questionnaires are completed, the respondents can place them in the sealed box or send them by mail. I would then pick up the questionnaires bi-weekly. I would need approximately one month to collect data.

If you are willing to participate or have any questions or concerns about the study, please contact my advisor, Dr. Krista Munroe, at the number below or myself.

Thank you for your time and consideration.

Sincerely,

Arvin Kim,
Masters of Human Kinetics student,
Faculty of Human Kinetics
University of Windsor
(519) 253-3000 ext. 2451
arvinkim@hotmail.com

Krista Munroe, PhD
Faculty of Human Kinetics
University of Windsor
(519) 253-3000 ext. 2446
kmunroe@uwindsor.ca
Appendix F

Letter of Information
LETTER OF INFORMATION

I would like to take this time to introduce myself and explain the study that is being conducted. My name is Arvin Kim and I am a Master's student in the Faculty of Human Kinetics at the University of Windsor. My advisor is Dr. Krista Munroe. As a requirement to complete my Master's degree, I am required to complete a research study. I have chosen to focus my research on the area of Sport and Exercise Psychology. I am investigating the use of imagery by weight lifters.

The questionnaires will target the use of imagery among weight lifters and their dependency on weight lifting. The research is designed to increase the knowledge of imagery by weight lifters. To this end, the completion of this booklet is very important, but by no means a requirement.

You will be asked to complete the booklet consisting of two questionnaires with 9 questions each. You will also be asked to fill out some relevant demographic information necessary to complete the research. There are no potential risks within the study. The booklet will take approximately 5-15 minutes to complete. As a participant, if you would like to be informed on the proper use of imagery with regards to the improvement of your performance in the gym, please contact Arvin Kim at the number below.

Participation is completely voluntary and no compensation of payment will be made available. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time without penalty. The questionnaires are only for the use of the researcher. All results from both questionnaires are completely anonymous. The information that you will provide may be used in subsequent research and will also be treated with strict confidentiality.

If you have any questions, please feel free to contact the researcher at any time. If you agree to participate in this study, please complete the booklet comprised of two questionnaires and place it in the box located at the front desk. If you have any questions regarding your rights as a research subject, contact the Ethics Review Board at the address below.

Thank you.

Arvin Kim
Masters of Human Kinetics student
Faculty of Human Kinetics
University of Windsor
(519) 253-3000 ext. 2451
arvinkim@hotmail.com

Krista Munroe, PhD
Faculty of Human Kinetics
University of Windsor
(519) 253-3000 ext. 2446
kmunroe@uwindsor.ca

Research Ethics Co-ordinator
University of Windsor
Windsor, Ontario
N9B 3P4
(519) 253-3000 ext. 3916
ethics@uwindsor.ca

Please contact Arvin Kim via e-mail or by phone if you would like to know the results of the study. Please allow several months for analysis of the data.
VITA AUCTORIS

NAME: Arvin Jin Kim

PLACE OF BIRTH: London, Ontario

YEAR OF BIRTH: 1978


University of Windsor, Windsor, Ontario 2001-2003 M.H.K.