THE USE OF MENTAL IMAGERY BY AESTHETIC ATHLETES PRIOR TO COMPETITION

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Abstract

This study examined the influence of state-confidence on aesthetic athletes' precompetitive imagery function use. Important individual differences effecting functional imagery use require empirical confirmation. Proposed is state-confidence as a factor influencing the functions of imagery used immediately prior to competition. Also, sport type may also be a moderator of the relationship and thus, is constrained in this study. Female aesthetic athletes from Southern Alberta (N = 180, M_{age} = 14.64, SD = 1.88) completed measures of state-confidence, imagery ability, and frequency of imagery function use. One-way ANCOVA tests revealed that athletes with high state-confidence used significantly more cognitive specific, cognitive general, motivation general-arousal, and motivational general-mastery functions of imagery than low state-confident athletes. Findings imply that applied sport psychology consultants should be more encouraging of preparation strategies with low state-confident athletes.

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List of Abbreviations

	Instrumentation
CSAI-2	Competitive State Anxiety Inventory-2
DIQ	Dance Imagery Questionnaire
MIAMS	Motivational Imagery Ability Measure for Sport
MIQ	Movement Imagery Questionnaire
MIQ-R	Movement Imagery Questionnaire Revised
SIAQ	Sport Imagery Ability Questionnaire
SIQ	Sport Imagery Questionnaire
SSCI	State Sport Confidence Inventory
VMIQ	Vividness of Movement Imagery Questionnaire

	Functions of Mental Imagery
CS	Cognitive Specific
CG	Cognitive General
MS	Motivational Specific
MG-A	Motivational General-Arousal
MG-M	Motivational General-Mastery

Chapter 1

Introduction

To demonstrate full performance potential, athletes implement several different mental tools or strategies into their training routines (cf. Hackfort, Duda, & Lidor, 2005). A common tool used by athletes is mental imagery. During mental imagery practice athletes use multiple senses to re-live a past performance or anticipate the feelings that will be associated with an upcoming event. Examples of mental imagery, therefore, may include visualizations of skills, mental walkthroughs of a given performance, or the use of cues to trigger a specific sensation.

One of the outcomes influenced by the use of mental imagery is self-confidence (Martin, Moritz, & Hall, 1999). Self-confidence is a general term referring to the beliefs an individual has about his or her ability to be successful. Several studies have examined this relationship (Callow, Hardy, & Hall, 2001; Martin et al., 1999; Mills, Munroe, & Hall, 2000), reporting that the use of different types of imagery will produce increases in one's level of self-confidence. However, it is proposed that self-confidence will influence the images used, in addition to being an outcome of imagery use.

Preliminary research has explored the role self-confidence has on the selection of various functions of imagery. These studies have determined that self-confidence does act as an individual characteristic that influences the different ways in which athletes may utilize imagery in their training and competition preparation (Abma, Fry, Li, & Relyea, 2002; Mills et al., 2000; Moritz, Hall, Martin, & Vadocz, 1996). One feature of this research has been to use multi-sport samples. Thus, the nature of this relationship (i.e., between self-confidence and mental imagery functional use) is not clearly understood for a specific sport type. It is believed that a strong relationship exists between self-confidence and imagery in dancers and other aesthetic athletes (Nordin & Cumming, 2006a) due to the artistic nature of these sports. Therefore, the objective of this study was to examine the relationship within a single population, and to determine how high and low self-confident athletes may utilize functions of mental imagery prior to competition.

Chapter 2

Literature Review

2.1 Mental Imagery

Considerable research has been put forth to understand mental imagery and how it is used by athletes (cf. Callow & Hardy, 2005; Weinberg, 2008). Mental imagery is a complex construct and a number of different terms are used to describe conceptually distinct aspects. Scientifically, researchers have defined mental imagery as "an experience that mimics real experience…"seeing" an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing" (White & Hardy, 1998, p. 389). Three aspects of mental imagery are central to this study. First, *mental imagery function* represents the performance purpose of the image content (Hall, Mack, Paivio, & Hausenblas, 1998). Secondly, the *use of mental imagery* is the purpose and frequency that mental images are employed (Fish, Hall, & Cumming, 2004; Munroe-Chandler, Hall, & Fishbourne, 2008; Munroe, Giacobbi, Hall, & Weinberg, 2000). Finally, *mental imagery ability* refers to an athlete's ability to experience both vivid and controllable mental images (Denis, 1985). In the next section, each aspect of mental imagery is explored in greater detail.

2.2 Mental Imagery Function and Mental Imagery Content

A major advancement in the study of athletes' mental imagery is the theoretical model of imagery function (Paivio, 1985). Paivio determined that mental images could serve both cognitive and motivational functions. A cognitive function of mental imagery serves to influence the mental construction of a skill or strategy, while a motivational function serves to influence an individual's emotional feelings and perceptions about his or her physical ability. It was proposed by Paivio that cognitive and motivational imagery could contain mental images that are general or specific in nature. As a result, Paivio defined four specific styles, or functions, of mental imagery. These functions include: (a) Cognitive Specific (CS), the imaging of sport specific skills; (b) Cognitive General (CG), the imaging of a performance routine or strategy; (c) Motivational Specific (MS), the imaging of goal pursuit; and (d) Motivational General (MG), the imaging of arousal control.

Sport research applying Paivio's (1985) conceptual framework revealed that the MG function should be divided into two conceptually distinct functions (Hall et al., 1998). Hall and his colleagues determined that motivational general images could serve either an arousal or mastery function. Thus, the Motivational General-Arousal (MG-A), the imaging of emotion regulation, and Motivational General-Mastery (MG-M), images of overcoming potential performance adversity, functions were established. The five functions of mental imagery, CS, CG, MS, MG-A, and MG-M, form the conceptual model underlying the Sport Imagery Questionnaire (SIQ; Hall et al., 1998). The SIQ has become the dominant instrument measuring the functional use of mental imagery in sport.

Recently, the validity of the SIQ has been questioned (Short & Short, 2005). Mental imagery content refers to the specific aspects and components that make up an image visualized by an individual. The content of the mental images will vary depending on the ultimate goal or function of the mental image. The SIQ assumes that the content of an image provides the same mental function for all athletes. For example, "I image myself giving 100%" (Item 3) is assumed to serve a MS function. However, athletes may perceive this function as MS (i.e. a goal to pursue) or MG-M (i.e. a method of overcoming performance adversity). This is viewed to be a limitation of the instrument as it restricts the ratings available for each function and it does not take into account individual differences in the intended function for the mental image. Furthermore, the SIQ does not allow athletes to determine what function a specific mental image serves for them personally. The assumption that all athletes perceive images to serve the same mental function may produce equivocal results within the research examining mental imagery function use.

2.3 Mental Imagery Ability

It is believed that athletes display varying levels of mental imagery ability (Hall & Pongrac, 1983). Mental imagery ability in sport refers to an athlete's ability to vividly experience the content of an image and to control the content of an image (Hall & Martin, 1997; Hall & Pongrac, 1983). Also in the sport context, the ability to visually (see) image and to kinesthetically (feel) sport movement images is related to sport performance (Hall & Martin, 1997). Many tools have been developed in order to provide quantitative descriptions of athlete's mental imagery ability. The two most common assessment tools include the Movement Imagery Questionnaire (MIQ; Hall & Pongrac, 1983) and the Vividness of Movement Imagery Questionnaire (VMIQ; Issac, Marks, & Russell, 1986).

Hall and Pongrac (1983) developed the MIQ to assess athletes' imagery ability for visual and kinesthetic imagery. The questionnaire consisted of 18 images; 9 visual and 9 kinesthetic. For each image, participants listened and reacted to movement instructions and were then asked to image the movement they just previously experienced. Participants rated their visual ability to create the mental images on a 7-point Likert scale, ranging from 1 (*very easy to picture*) to 7 (*very difficult to picture*). Participants rated their kinesthetic ability to create the mental images on a 7-point Likert scale, ranging from 1 (*very easy to feel*) to 7 (*very difficult to feel*). Adequate reliability and internal consistency of both visual and kinesthetic scales of the MIQ were reported by Hall, Pongrac, and Buckolz (1985). In 1997, Hall and Martin revised the original scale by removing items that subjects commonly failed to answer or items in which responses yielded redundant results or information. The MIQ-R has 8 items; 4 visual and 4 kinesthetic. Hall and Martin (1997) reported significant correlations of both the visual and the kinesthetic subscales between the MIQ and the MIQ-R, demonstrating that the MIQ-R is an acceptable tool to measure mental imagery ability.

The VMIQ (Issac et al., 1986) measures how well an individual can mentally image general motor tasks both visually and kinesthetically. Items of this scale are aggregated into six groups, including basic body movements (Items 1-4), movement with control by some unplanned risk (Items 5-8), movement with controlling an object (Items 13-16), movements that cause imbalance and recovery (Items 17-20), and movements demanding control in aerial situations (Items 21-24). The validity of the VMIQ was determined through the testing of three competitive levels of trampolinists (Issac et al., 1986). However, Roberts, Callow, Hardy, Markland, and Bringer (2008) revealed that the original instrument was not assessing differences between what an athlete may see, and what an athlete may feel when imaging. Therefore, changes to the original questionnaire included revisions of select items, as well as providing a scale next to each item to ensure accuracy of ratings of each image. Testing of the items on the VMIQ-2 confirmed the concurrent and construct validity (Roberts et al., 2008). The study also determined that high-level athletes, in comparison to less elite athletes, have greater imagery ability. The VMIQ-2 is valid, but as a newly developed tool, requires further psychometric testing.

A weakness identified in mental imagery ability assessment instruments is that only the CS function of mental imagery is tested. Accordingly, a new instrument has been developed to assess visual and kinesthetic imagery ability associated with images that serve motivational functions. This instrument is called the Motivational Imagery Ability Measure for Sport (MIAMS; Gregg & Hall, 2006). The MIAMS assesses the ability to image eight different sport-situations; four motivational general-arousal and four motivational general-mastery. To complete each scale, athletes read a scenario script and create a mental image from what they read, and then rate the mental image that they experienced on a 7-point Likert scale. For example, the first scenario has an individual imagine they are in a competition and are feeling very exhausted, but suddenly become more energized and they become more happy and alert. They would then imagine this situation in the mind, and then rate the strength of their emotional experience, as well as the ease to form the image. This study of the validity MIAMS revealed that more elite athletes scored higher on the ability to image both MG-A and MG-M functions of mental imagery (Gregg & Hall, 2006). Thus, it may be assumed that athletes at higher competitive levels have an increased ability to create vivid and controllable mental images with more emotional content than athletes at lower competitive levels.

2.3.1 Mental Imagery Ability and Functions. Based on Lang's (1977) bio-informational theory of emotional imagery, an applied model of mental imagery was developed to present the interactions between sport situation, mental imagery function, and the outcome of mental imagery use (Figure 2.1; Martin et al., 1999). It is hypothesized that sport situation (i.e., training, competing, rehabilitation) affects the function of mental imagery used, and would affect the predicted outcome as a result. That is, specific sport environments require different functional types of images. Further, the function of mental imagery affects the outcome of mental imagery. Outcomes of mental imagery include modifications to cognitions, including influencing self-confidence, as well as performance indicators (i.e., improved performance of skills and strategies, regulation of arousal and anxiety).

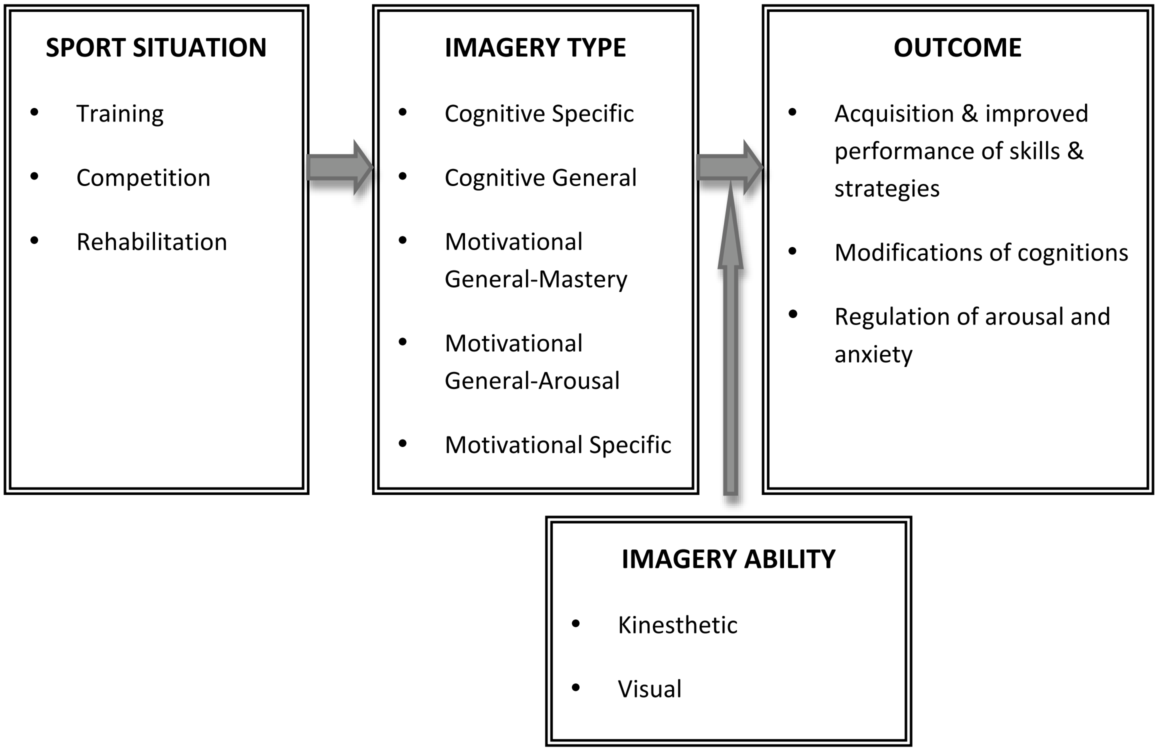
In their test of the Applied Model of Mental Imagery, Martin et al. (1999) hypothesized that MG-M mental images would be desired in all sport situations and that the use of MG-M mental images would have a positive impact on the outcomes of mental imagery use. Results found that MG-M images did increase self-confidence in three types of sport situations (i.e., training, competing, and rehabilitation). CS, CG, MS, and MG-A functions of mental imagery were used across the three sport situations, but all failed to significantly influence self-confidence. This model provides a conceptual framework to explain the relationship between situation, mental imagery type, and outcome, but fails to view the relationship in the reverse direction. The use of this applied model cannot determine the effect that self-confidence may have on imagery use.

2.4 Effect of Sport Type on Mental Imagery Use

Sport type does play an influencing role on the mental imagery used by athletes (Munroe, Hall, Simms, & Weinberg, 1998). Different types of sport require different imagery content, or may use mental imagery for various functions. The type of sport

Figure 2.1

Applied Model of Mental Imagery Use in Sport (Martin et al., 1999)



may influence the use of mental imagery in light of varying demands, constraints, and structural components of different types of sports (Munroe et al., 1998). For example, participants in research have included track and field athletes, football players, and elite roller skaters (Abma et al., 2002; Short & Short, 2005; Moritz et al., 1996, respectively). Each study reported slightly different findings. For example, Moritz et al. found high self-confident roller skaters used more MG-A and MG-M functions of mental imagery, while Abma et al. found no significant differences within track and field athletes. This research will control for sport type by selecting athletes that perform in aesthetic sports.

2.5 Self-Confidence

Self-confidence is defined as an individual's personal belief in his or her own ability to succeed within his or her sport (Vealey, 1986). Self-confidence is conceptualized as both state and trait characteristics (Vealey, 1986). In the sport context, state-confidence refers to the belief an athlete has in their ability to perform a specific task or skill successfully, whereas trait confidence refers to an athlete's overall belief in their ability to be successful within their sport. A construct conceptually similar to state confidence is self-efficacy. Self-efficacy is the belief that the individual has in his or her ability to perform an event within their sport (Bandura, 1997). An event may include a specific skill, activity, or critical moment in a competition. Both state and trait confidence along with self-efficacy can be included under the larger umbrella construct of self-confidence. For the purpose of this research, state-confidence will be used throughout to describe the pre-competitive nature of the individual confidence beliefs that were assessed.

2.5.1 Influence of Self-Confidence on Mental Imagery Ability. The relationship between self-confidence and mental imagery ability is equivocal (Abma et al., 2002; Gregg & Hall, 2006; Nordin & Cumming, 2008). One study (Abma et al.) revealed that high self-confident athletes use mental imagery more frequently than their low self-confident peers, but no significant difference in mental imagery ability was found between high and low self-confident athletes. Gregg and Hall (2006) found competitive athletes have higher imagery ability than their recreational counterparts. Finally, Nordin and Cumming (2008) determined that athletes who, during training, engage in more frequent use of mental imagery also were higher in self-confidence than those athletes who use mental imagery less frequently in their training. Thus, it remains unknown whether imagery ability is strongly correlated with various functions of imagery, of the frequency to which various functions are employed.

2.5.2 Mental Imagery Functions Influencing Self-Confidence. Self-confidence is frequently associated with MG-M function of mental imagery (Callow et al., 2001). Specifically, self-confidence is an outcome of this function of mental imagery. This makes conceptual sense as MG-M function serves to help athletes view themselves as successful when faced with challenges. However, it may be suggested that self-confidence may influence the use of MG-M, as it could be that an athlete who is confident in his or her ability may be more likely to use MG-M mental images, and thus, would strengthen self-confidence as a result (Callow et al., 2001; Martin et al., 1999).

2.5.3 Influence of Self-Confidence on Mental Imagery Use. Three studies have examined the directional relationship between self-confidence and mental imagery. Moritz and colleagues (1996) examined elite level roller skaters and the images they were experiencing. Study participants were assessed using the SIQ (Hall et al., 1998) and the State Sport Confidence Inventory (SSCI; Vealey, 1986) to assess the functions of mental images and level of confidence, respectively. Results from the study demonstrated that high self-confident athletes were utilizing more images of MG-M and MG-A functions than their less-confident peers. It is important to note that this research is limited to the competitive setting and cannot be generalized to other sport settings were mental imagery is performed (i.e. training, rehabilitation).

Second, Mills and colleagues (2000) examined the relationship between self-efficacy and mental imagery use. Examining rowers, wrestlers, and track and field athletes, the authors found individuals who had high competitive self-efficacy were more likely to use mental imagery for motivational purposes (i.e. MS, MG-A, and MG-M), than athletes with low competitive self-efficacy. However, results from this research were not statistically significant and therefore implications can only be inferred. This research produced results contradictory to those of Moritz et al. (1996), perhaps because of the difference in the artistic nature between roller-skating and the other sports.

Finally, it has been reported that track and field athletes with high self-confidence are more likely to use images that serve MG-A and MG-M mental functions, compared to their low self-confidence counterparts (Abma et al., 2002). This research provided results to show that high self-confident athletes use all five functions of mental imagery more than their low self-confident peers. Abma et al. (2002) studied athletes in practice while Moritz et al. (1996) completed research at a competition. This may provide support that athletes will use mental imagery functions MG-A and MG-M for both practice and competition. These two studies demonstrate the equivocal findings in the self-confidence-mental imagery literature, which may be explained by procedural differences such as the time of which self-confidence and imagery function questionnaires were administered.

In conclusion, it is known that the functions of imagery used by an individual will be influenced by their level of self-confidence. Level of self-confidence is an individual factor, which in addition to sport situation (Martin et al., 1999), produces different functions of imagery. Further research is needed to study the relationship not only between athletes of similar sports, but also to contribute to the understanding of the most effective training practices for individual athletes. As a common mental strategy (Weinberg, 2008), conceptually understanding the factors that influence imagery usage has potential for widespread practical application. Specifically, by examining a single sport population (aesthetic athletes), results will provide support into findings and practical applications that have not been available from generalizations from other sport types.

2.6 Sport Type, Mental Imagery Functions, and Self-Confidence

Participants of past research examining self-confidence and imagery use have included elite roller skaters, collegiate football players, and elite badminton players. The difference in the nature of each sport may be affecting the results that have determined which functions of mental imagery are used. Differences in the way each sport is played, for example team versus individual athletes or open versus closed sports, may influence the types of mental images that the athletes incorporate in their training. Hall et al. (2009) found no significant differences in imagery use for sport type (individual versus team athletes), while other studies have produced significant differences (Munroe et al., 1998). Differing findings may also be a result of few researchers exploring the relationship between self-confidence and mental imagery functions within a specific sport style. This is a research limitation, as results are not providing strong evidence that can be generalized or transferred as a result only comparing team and individual athletes. Therefore, sport type was controlled for within this study in order to examine the nature of this relationship within a single sport population (Moritz et al., 1996).

The relationship between self-confidence and mental imagery is thought to be unique in aesthetic athletes due to artistic nature of the sports in which they participate (Nordin & Cumming, 2008). Aesthetic sports include but are not limited to artistic gymnastics, cheerleading, dance, figure skating, and synchronized swimming. Athletes within these sports often have set routines, and their performances do not change drastically from competition to competition. Aesthetic sport performers do not have to react to opponents or other teams while performing. Therefore, athletes are better able to control their images, as there are no dynamic components of their environment that will influence their performance. Finally, the relationship between self-confidence and mental imagery is thought to be unique within this specific sport type because of the common use of music while performing (Nordin & Cumming, 2005). Fluid patterns of skills and routines are easily connected to mental images of movement. These reasons provide evidence for an exclusive relationship between self-confidence and imagery function use within this sport type that will be explored within this study.

The Applied Model of Mental Imagery (Martin et al., 1999) has been a grounding framework utilized while examining full time professional ballet dancers (Fish et al., 2004). Levels of confidence were measured using a modified version of the Competitive

State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990) and functions of mental imagery were determined using the SIQ. The CSAI-2 is a valid instrument to measure cognitive and somatic anxiety, as well as self-confidence. Results demonstrated that the MG-M function of mental imagery was the only function that could significantly predict self-confidence. This supports the hypothesis that the applied model of mental imagery can be used to effectively predict outcomes of mental imagery functions in elite dancers. Although dancers are only one sport within the aesthetic athlete group, this research provides a closer examination of self-confidence and mental imagery use within this specific population.

Qualitative research by Nordin and Cumming (2005) has determined various aspects of mental imagery within dancers. This study determined five reasons why dancers use mental imagery in training. Reasons for imagery use included cognitive, motivational, artistic, and healing reasons, along with the no reason (triggered imagery explanation). Dancers reported using mental imagery for motivational reasons, typically when faced with adversity. These mastery-related images were reported to have allowed the athletes to feel prepared and in control, and also served to enhance self-confidence. These results support the MG-M function of imagery proposed by Hall et al. (1998). Athletes used both execution and body-related images, or CS and CG (execution) and MG-M (body-related) functions of mental imagery. Furthermore, athletes' mental images were facilitative in nature. Findings from Nordin and Cumming (2005) suggest aesthetic athletes prefer to use CS, CG, and MG-M functions of mental imagery.

In addition to exploring the content of dancers' images, Nordin and Cumming (2005, 2008) studied the relationship between self-confidence and functional mental imagery use in dancers and aesthetic sport performers. To do so, Nordin and Cumming (2006a) developed an alternative scale to measure mental imagery use within dancers. The Dance Imagery Questionnaire (DIQ; Nordin & Cumming, 2006a) assesses mental images of a uniquely artistic nature, including "roles/characters, expression, movement quality… and metaphors" (Nordin & Cumming, 2008, p. 377). These four functions describe the functions of imagery that were believed to be unique to dancers. Additional research by Nordin and Cumming (2008) used the traditional scale (SIQ) and the new scale (DIQ) to examine mental imagery functions. The two most common functions of mental imagery for both dancers and aesthetic sport performers were CS and MG-M. Furthermore, athletes who use more mastery functions of mental imagery were more trait self-confident than those athletes who used other functions of mental imagery. The results from this work suggest that there is a relationship between the functions of mental imagery used and the self-confidence levels of dancers and aesthetic athletes.

Much like Nordin and Cumming (2005), Hanrahan and Vergeer (2000) used qualitative methods to explore mental imagery with dancers, rejecting the use of the MIQ-R or the SIQ. Dancers described their imagery experiences in structured interviews. Open-ended questions encouraged full descriptions of functions of mental imagery and did not restrict explanatory vocabulary in any way. This produced very different results from dancer to dancer. From the interview responses it was obvious that no imagery types mentioned were the exact same as the mental imagery functions determined by Hall et al. (1998). The specific movement imagery type determined by Hanrahan and Vergeer was to the CS function of mental imagery. Dancers also described mental images of this type to be motivation images, as well as images that enhance or give meaning to specific movements. Therefore, this image type has MS, MG-A, or MG-M-type attributes, and describes images of a specific movement type, or having a CS function of mental imagery. The qualitative method used in this study creates the inability to relate these findings to the mental imagery functions defined in the SIQ. Although the DIQ may an alternative instrument for measuring imagery functions within dancers (and aesthetic athletes), the use of the SIQ provides results that can be compared to those of future studies examining the relationship within sport types other than aesthetic athletes.

Hanrahan and Vergeer (2000) and Nordin and Cumming (2008) demonstrate the unique qualities of aesthetic athletes' imagery that is different from the imagery functions described by the SIQ instrument. Their work suggests that aesthetic athletes' and dancers' use imagery to visualize motor movement in the form of technique, mastery, goals, and roles/movement. The roles/characters function of imagery includes images that involve expression (e.g., prowl like a cat), the movement quality (e.g., soft knees), and metaphors (e.g., float like a cloud in a light). Nordin and Cumming (2006) found the fourth function of roles/movement images to be unique to the DIQ. Therefore, this subscale may not be applicable to all other sports, aside from aesthetic sports. For example, a hockey player will not be concerned about imaging the expression of emotion within his movements. It is not assumed that a wrestler is imaging the different characters that he or she may embody while completing a match. These images do not satisfy the preparation needs of other sports that do not require athletes to demonstrate artistic, expressive, and aesthetic execution of their skills and performances. By understanding the differences between these aesthetic sports and other sport types, it is clear to see that the structural and performance requirements of the aesthetic sports are unique.

It is known that dancers and aesthetic athletes frequently use imagery, often incorporating various functions it into their training (Nordin & Cumming, 2008). Furthering the conceptual understanding of how these athletes utilize imagery as a result of their level of self-confidence will provide insight into the most effective training practices for the athletes of these sports. Furthermore, this research will provide valuable information to a population that frequently uses increased amounts and functions of imagery (Nordin & Cumming, 2008).

2.7 Research Question and Hypotheses

To better understand athletes' use of mental imagery for effective training and performance, it is important to clarify the relationship between self-confidence and mental imagery. To this end, the purpose of the study was to determine whether self-confidence is an individual difference factor of aesthetic athletes use of different functional types of mental imagery immediately prior to competition. Past research indicates that type of sport potentially influences mental imagery function use and, thus, this factor will be controlled for. The research question guiding the proposed study is, within aesthetic sport performers, how does self-confidence influence the function of mental imagery used prior to competition? It is hypothesized that high self-confident athletes within aesthetic sports will increase the likelihood that mental images that serve CS, MG-A, and MG-M function will be used in the 24 hours prior to competition.

Chapter 3

Methodology

This chapter will outline the methodological components of the research to study this question detailing the participants, instrumentation, data collection, and planned data analysis.

3.1 Participants

A selective sampling strategy was used to examine imagery processes of aesthetic athletes (i.e. artistic gymnastics, cheerleading, dance, figure skating, synchronized swimming). Only female athletes from these sports were selected, as the number of male athletes in these sport types are limited and would not have yielded a sub-sample size sufficient for adequate for statistical power. Participants recruited for this study were between the ages of 13 and 18 years of age. This range was selected, as young female athletes at this age are understood to be of an elite status within the sports of interest (Law, Côté, & Ericsson, 2007). Although all athletes who fit the above criteria were invited to participate in the study, other inclusion criteria ensured the athletes (a) were a registered member of a local club, (b) were registered in a local competition that occurred within 3 months of initial recruitment, (c) were not currently injured, and (d) had a parent or guardian provide written consent for their participation in this study (see Appendix A).

The recruited sample included 180 participants between the ages of 11 and 19 years (M_{age} = 14.64 years, *SD* = 1.88). Athletes competed in five different aesthetic sports: artistic gymnastics (*n* = 12), cheerleading (*n* = 63), dance (*n* = 26), figure skating (*n* = 28), and synchronized swimming (*n* = 50). Variability existed in sport experience amongst the athletes, ranging from one to 15 years (*n* = 156, M_{exp} = 5.95, *SD* = 3.65) in their respective sport. One hundred twenty two athletes self-reported their highest competitive level to be at a provincial level, 41 athletes had competed at a national level, and 14 athletes had competed at an international level of competition. Three athletes did not indicate their highest competitive level. An athlete's parent or guardian was asked to complete two demographic questions to provide information on a participant's socioeconomic status. Socioeconomic status was obtained on 38% (*n* = 65) of the sample. Annual income range was $30,000 to $150,000 or more, with a median value of $120,000 - $149,999. Parents or guardians (*n* = 72) reported that the highest education obtained to be *less than a high school diploma* (*n* = 3), *a high school diploma* (*n* = 13), *some college or university* (*n* = 14), or *a college or university degree* (*n* = 42). Finally, athletes self-reported the ethnic origin to which they most strongly associate, with most self-identifying as *Canadian* (*n* = 146). Other relevant ethnic origins included *English* (*n* = 58), *German* (*n* = 19), and *Scottish* origins (*n* = 21). It is important to note for the interpretation of the ethnicity identity of the sample that the data collected is based on a possible 18 ethnicities common to the region (Statistics Canada, 2011) and included *other* and *I do not belong to an ethnic or cultural group*, and participants could self-indentify with multiple ethnic origins. Twenty-one athletes did not report any information on their ethnic origin.

3.2 Instrumentation

3.2.1 Demographic information. Consistent with imagery research (for example, Abma et al., 2002; Munroe-Chandler et al., 2008; Nordin & Cumming, 2005, 2008; Short & Short, 2005), information such as age, competitive level, years of experience, and ethnic origin were collected. This information served to provide a general demographic representation of the sample. A copy of this questionnaire appears in Appendix B.

3.2.2 Income/education form. A parent or legal guardian of each participant was invited to complete an income/education form. This form required individuals to select their annual household income from 13 different ranges, as well as the highest level of education they had obtained. A copy of this form appears in Appendix B.

3.2.3 Movement imagery ability. The Movement Imagery Questionnaire-Revised (MIQ-R) is designed to assess the ability one has to create mental images of various athletic movements (Hall & Martin, 1997). The MIQ-R instructs individuals to perform four different movements and then image themselves executing the same movement they just completed. The movements are completed twice. Movements one through four are assessed using the Visual Imagery Scale. Athletes rate how easy/difficult it is to see the image of his/herself completing each movement on a 7-point Likert scale from 1 (*very hard to see*) to 7 (*very easy to see)*. Movements five through eight are assessed using the Kinesthetic Imagery Scale. Athletes rate how easy/difficult it is to feel movements of his/herself completing the imaged task on a 7-point Likert scale from 1 (*very hard to feel)* to 7 (*very easy to feel*). The MIQ-R is a revision of the original Movement Imagery Questionnaire (MIQ; Hall & Pongrac, 1983). Adequate reliability and internal consistency of both visual and kinesthetic scales of the MIQ were reported by Hall and colleagues (1985). Hall and Martin (1997) reported significant correlations of both the visual (r = -.77, p < .001) and the kinesthetic (r = -.77, p < .001) subscales between the MIQ and the MIQ-R, demonstrating that the MIQ-R is an acceptable revised tool to measure mental imagery ability. A copy of this questionnaire appears in Appendix B.

3.2.4 State sport-confidence. The State Sport-Confidence Inventory (SSCI; Vealey, 1986) consists of 13 items that are designed to assess the belief that an athlete has in his or her ability to perform in an upcoming competition. Athletes are instructed to rate their confidence in their performance by comparing themselves to the highest self-confident athlete they know. The 13 items are rated on a 9-point Likert scale ranging from 1 (*low*) to 9 (*high*). Scoring of the scale is a sum across items producing a range of scores from 13 to 117. The SSCI has adequate psychometric properties. In a multiphase study, the SSCI demonstrated internal consistency, $r = .95$ (Vealey, 1986). A copy of this inventory appears in Appendix B.

3.2.5 Functions of mental imagery use. The Sport Imagery Questionnaire (SIQ; Hall et al., 1998; Hall, Stevens, & Paivio, 2005) consists of 30 items that assess the functions of mental imagery that athletes use. The five subscales of mental imagery are Cognitive Specific (CS; seven items), Cognitive General (CG; six items), Motivational Specific (MS; five items), Motivational General-Arousal (MG-A; six items), and Motivational General-Mastery (MG-M; six items). Items are rated using a 7-point Likert scale ranging from 1 (*rarely or never engage in this kind of imagery*) to 7 (*often engage in this kind of imagery*). Hall et al. (1998) have provided adequate support for the internal consistency of the SIQ, with Cronbach's alpha coefficients ranging from .70 to .88. Cronbach alpha coefficients (CS, $\alpha = .70$; CG, $\alpha = .64$; MS, $\alpha = .82$; MG-A, $\alpha = .82$; MG-M, $\alpha = .66$) suggest adequate internal consistency for each subscale in the current study. This questionnaire does not appear in the appendix, as copyright laws protect it.

3.3 Revisions to Instrumentation

A review of the initial data collected from 21 participants led to the conclusion that participants had difficulties following the instructions of the MIQ-R questionnaire. Instructions indicate to use scales found on the first page to rank their abilities with a numeric value on the tasks found on the second and third pages. Within the first 21 participants, five individuals had incorrectly completed the MIQ-R. Participants had either circled the two sample scales on the front page and ignored the ratings needed for each item on the other two pages, or they provided written descriptions of their imagery abilities as opposed to the numeric values present in the instructions and sample scales. These data were included in the final analysis, provided participants were not missing more than 10% of their data (Tabachnick & Fidell, 2007). Therefore, revisions to the questionnaire included adding smaller versions of the scales underneath each item for participants to circle the most appropriate value for each task, thus, eliminating confusion about the provided instructions. This revision was completed in order to make certain that future participants would not become confused with these same instructions.

3.4 Procedures

3.4.1 Recruitment. Permission was obtained from the University of Lethbridge Human Subject Research Committee prior to initiating all data collecting procedures. Following ethical approval, online research determined the local competitions that would feature athletes eligible to participate in the study. A two-stage recruitment strategy was used. In the first stage, officials (e.g. event organizers, provincial governing bodies) for each event were contacted and informed of the study. If permission was granted, contact information was collected for the clubs and/or coaches who would have athletes attending each event. These individuals were then contacted and provided with an overview of the research study, and an invitation was extended to the coach and athletes to participate in the study. Upon acceptance of the invitation, athletes' participation packages were sent to the coaches by mail to ensure that the athletes could have the first set of forms completed prior to a competition. Also, upon athlete participation agreement, the principal researcher coordinated with the coaches for the most convenient time for the athletes to complete the final questionnaire at the competition site. If permission was not granted (privacy rights prohibiting some organizations from releasing coach's contact information), athletes were directly recruited at stage two of the data collection the competition venue. At the time of recruitment, athletes were provided with the details of study procedures. All participants were informed that they would be required to complete paper and pencil questionnaires at two separate points; 24 to 48 hours prior to competition, and 1 to 3 hours prior to them competing.

3.4.2 Data collection phase I. A parent or guardian was to complete written consent and the socioeconomic information questionnaire. Athletes were to complete a written consent/assent form, demographic information (including income and education information), the Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1997), and the State Sport-Confidence Inventory (SSCI; Vealey, 1986) 24 to 48 hours prior to a competitive event. This session required approximately 20 minutes of the athletes' time to complete. Athletes were encouraged by the principal researcher to complete all items on all of the questionnaires to the best of their abilities. All completed forms (from both the parent/guardian and athlete) were placed in a provided envelope, sealed, and brought to the competition venue. Athletes were instructed to meet a trained research assistant on site at the scheduled pre-competition time to complete the second phase of the data collection.

3.4.3 Data collection phase II. The Sport Imagery Questionnaire (SIQ; Hall et al., 1998) was completed 1 to 3 hours prior to the athlete's scheduled competition time. The SIQ required five minutes to complete. Athletes were encouraged by principal researcher or a trained research assistant on site to complete all the items on the questionnaire to the best of their abilities. The principle researcher and/or a trained research assistant were present to administer the questionnaires and collect all completed forms.

3.5 Data Analysis Plan

Data were subjected to data cleaning procedures (Tabachnick & Fidell, 2007) prior to the main analyses. Data were analyzed for missing data, data normality and the presence of outliers.

Next, a Pearson *r* correlation analysis was planned to examine the strength of the relationship between imagery ability and imagery functions used. A significant relationship between imagery ability and self-confidence, identified by a Spearman rho correlation analysis, as well as between imagery ability and imagery use served as the rationale for the inclusion of imagery ability as a covariate in subsequent analyses.

To test the hypothesis that athletes with high self-confidence will use more CS, MG-A, and MG-M functions of imagery, five separate three-level one-way ANCOVA tests were planned, with mental imagery ability as the covariate that would be controlled for. Follow-up pairwise comparisons using Holm's (1979) Bonferonni corrections would be administered to examine significant differences in mental imagery use between athletes with different levels of state-confidence.

Chapter 4

Results

4.1 Data Cleaning

Data were analyzed for missing values in each visual and kinesthetic ability variables, state-sport confidence, as well as five imagery function variables. Six cases with more than 10% of their data missing were removed, leaving 174 cases remaining to be analyzed (Tabachnick & Fidell, 2007). For cases with less than 10% of data missing, missing values were replaced with mean scores at the item level for each MIQ-R subscale, as well as each SIQ subscale (Tabachnick & Fidell, 2007). If an individual only completed one item in a subscale, missing values were replaced with the series mean from the rest of the sample for that subscale variable. Following the replacement of missing values, skewness and kurtosis of all continuous variables were examined. Five variables (visual imagery ability, kinesthetic imagery ability, state-sport confidence, CG imagery, MS imagery) were slightly skewed ($z > \pm 3.29$). However, data were not transformed for the purpose of result interpretation (Tabachnick & Fidell, 2007). Five outliers within four variables (kinesthetic imagery ability, state sport-confidence, CG, MG-M) were retained. Statistical tests with and without these data points indicated no differences in the results, thus a decision was made to include the outlier values in the sample.

4.1.1. Individual differences. Levene's test for equality of equal variances were not significant for state-confidence, imagery ability, or four functions of imagery (CG imagery, $p = .039$), determining that the sample was homogenous in regards to sport type. Three separate MANOVA tests examined the individual differences in questionnaire scores as a result of demographic information. Dependent variables included state-confidence, imagery ability, and the five functions of imagery. It was determined that neither age nor experience was a significant influencing factor in any of the dependent variables. However, significant differences were present between athletes at different levels of competition. Athletes who compete at different levels of competition (provincial, national, international) use significantly different MG-M functions of imagery ($F[2, 168] = 3.57$, $p = .03$, partial eta squared = .041) and have significantly different levels of state-confidence ($F[2, 168] = 4.45$, $p = .013$, partial eta squared = .050). Follow up comparisons determined athletes who have competed at the international level use significantly more MG-M functions of imagery than athletes who have competed only at the national level ($p = .024$). Furthermore, international level athletes have significantly higher levels of state-confidence than athletes who have competed at national level competitions ($p = .020$), as well as athletes who have only competed at provincial-level competitions ($p = .011$).

4.2 State-Confidence Grouping

Athletes were classified into three confidence groups using a tertile split of the State-Sport Confident Inventory scores (cf. Moritz et al., 1996). The tertile split was used, as opposed to a median split, to produce three groups that will increase the likelihood that differences will be revealed between the two extremes (high and low). This methodological technique is similar to other studies examining self-confidence (Mortiz et al., 1996). Participants rank 13 items on a Likert scale from 1 (*low*) to 9 (*high*) state-confidence. Therefore, scores for the SSCI can range from 13 to 117. Participants with a score equal to or less than 85 were categorized as low state-confident ($n = 56$, $M =$

74.02, *SD* = 11.36); individuals with a score greater than or equal to 96 were categorized as high state-confident ($n = 56$, $M = 103.13$, $SD = 4.57$). A t-test was significant, $t(72.34) = 17.78$, $p < .001$, indicating that individuals in the high state-confident group have significantly higher state-confident mean scores than their low state-confident peers.

4.3 Correlations

Spearman rho correlations were applied to examine the strength of relationship between self-confidence and imagery ability, as well as between state-confidence and the functions of imagery. Pearson *r* correlations were applied to examine the degree of relationship between imagery ability and the five functions of imagery. Correlations can be found in Tables 4.1 and 4.2, respectively. Spearman rho and Pearson *r* correlation results indicate the presence of statistically significant relationships between the constructs of interest. Specifically, that higher imagery ability is associated with higher levels of state-confidence, as well as with high frequencies of CS, CG, and MG-M functions of imagery. Therefore, imagery ability will be considered as a covariate in examination of individual differences among athletes of different state-confidence in the use of specific imagery functions.

4.4 Analyses of Covariance

To test group state-confidence differences between athletes on use of the five functions of imagery, five separate one-way analysis of covariance (ANCOVA) tests were used. The independent variable was state-confidence, which was categorized into three levels (see section 4.2). The dependent variables were the five functions of imagery. As visual and kinesthetic ability were highly correlated with each other ($r = .602$, $p < .001$), only one was chosen as a covariate (Tabachnick & Fidell, 2007). Of the

Table 4.1

Spearman's rho Correlations between State-Confidence, Imagery Ability, and Imagery Functions

Subscale	State Sport-Confidence
Visual Imagery Ability	.297**
Kinesthetic Imagery Ability	.342**
CS	-.355**
CG	.393**
MS	.185*
MG-A	.185*
MG-M	.399**

Note. * $p < .05$. ** $p < .0$

Table 4.2

Pearson r Correlations between Imagery Ability and Imagery Functions

Subscale	1	2	3	4	5	6
1.Visual Ability	-					
2. Kin. Ability	.602**	-				
3. CS	.253**	.278**	-			
4. CG	.166*	.268**	.679**	-		
5. MS	.066	.070	.354**	.413**	-	
6. MG-A	.000	-.003	.397**	.364**	.595**	-
7. MG-M	.212**	.260**	.647**	.597**	.524**	.521**

Note. *p < .05. ** p < .01

two imagery ability variables, kinesthetic imagery ability correlated most strongly with the dependent variables and was, therefore, included as a covariate in the analysis.

ANCOVA tests were significant for the following functions of imagery: CS [$F(2, 170) = 9.34$, $p < .001$; partial $\eta^2 = .099$], CG [$F(2, 170) = 9.81$, $p < .001$; partial $\eta^2 = .103$], MG-A [$F(2, 170) = 3.37$, $p = .037$; partial $\eta^2 = .038$], and MG-M [$F(2, 170) = 13.86$, $p < .001$; partial $\eta^2 = .140$]. These results indicate that significant differences exist in the use of four imagery functions between athletes with three different confidence levels. A non-significant ANCOVA, $F(2, 170) = 2.03$, $p = .135$; partial $\eta^2 = .023$, indicated that there was no significant difference between athletes' MS imagery use according to relative differences in state-confidence. Imagery ability, as a covariate in the equation, was not significant for any of the SIQ subscales. Therefore, imagery ability did not have any significant influence on the different functions of imagery used.

Following significant ANCOVA results, Tukey's test for post hoc comparisons using the Bonferroni correction were administered to evaluate pairwise differences among the state-confident means between high and low state-confident athletes only, addressing the main goal of this study. Results determined significant differences exist between relative low and high state-confident groups in CS ($p < .001$), CG ($p < .001$), MG-A ($p = .010$), and MG-M ($p < .001$) functions of imagery, indicating that high state-confident athletes used significantly more CS, CG, MG-A, and MG-M imagery than their low state-confident peers prior to a competitive event. Descriptives of SIQ subscales for the low and high state-confident participant groups are seen in Table 4.3.

Table 4.3

Descriptives and Pairwise Comparison p values of SIQ Subscale Scores for State-Confident Groups

	Low Confident (n = 56)	High Confident (n = 56)
Imagery Function	*M* (*SD*)	*M* (*SD*)
CS**	5.16 (.83)	5.88 (.71)
CG**	4.96 (.84)	5.73 (.72)
MS	4.81 (1.31)	5.36 (1.37)
MG-A*	5.07 (.99)	5.53 (1.00)
MG-M**	5.24 (.83)	6.06 (.68)

Note. * $p < .05$. ** $p < .01$

Chapter 5

Discussion

The aim of the current study was to examine the role state-confidence played on athletes' imagery use prior to a competitive event. Theory and previous research suggests a relationship exists between state-confidence and imagery use (Mills et al., 2000; Moritz et al., 1996; Vealey, 1986), however, this relationship has not been examined in specific athletic populations, such as aesthetic athletes. It is possible that previous work with mixed-sport samples may have clouded understandings about the strength of the relationship between state-confidence and functional imagery use. Sport type is suggested as an environmental factor that could moderate the relationship between state-confidence and imagery function (Martin et al., 1999). This research is grounded in the Applied Model of Mental Imagery (Martin et al., 1999). To briefly review, it is posited that sport situations (training, competing, rehabilitation) will uniquely influence the functional use of imagery effecting, in turn, three possible outcomes (improved performance of skills and strategies, modifications of cognitions, regulation of arousal and anxiety). Images serve five functional uses: (i) Cognitive Specific (CS) images of sport specific skills, (ii) Cognitive General (CG) images of general performance routines or strategies, (iii) Motivational Specific (MS) images of goal pursuit, (iv) Motivational General-Arousal (MG-A) images of performance related emotions, and (v) Motivational General-Mastery (MG-M) images of overcoming performance adversities (Hall et al., 1998). This study looked at state-confidence as a personal factor that influences *aesthetic* athletes' functional use of imagery. Based on previous research, it was hypothesized that aesthetic athletes with high state-confidence would be more likely to use CS, MG-A, and

MG-M functions of imagery prior to competition than their low state-confident counterparts (Mills et al., 2000; Moritz et al., 1996; Nordin & Cumming, 2008). This chapter will discuss the findings of this research in light of current literature, and will acknowledge the limitations and suggest future directions for this line of study.

As expected, the main results of this study suggested that an aesthetic athlete who feels strongly about her ability to succeed is likely to imagine herself performing in qualitatively different ways compared with an athlete who does not feel as strongly about her abilities. Specifically, a high state-confident aesthetic athlete has more images of performing skills and sequences (cognitive functions; CS & CG) as well as emotions and successes (motivational functions; MG-A & MG-M) compared to a low state-confident counterpart. Finally, it has been revealed that the more confident in their ability to image and athlete is, the more likely they are to use imagery as a mental preparation strategy (Short, Tenute, & Feltz, 2005). It can further be assumed that their overall increase in confidence in their abilities to succeed (in their sport), also includes an increase in their ability to image.

Partial sections of the results of this study are congruent with those completed by Mills et al. (2000) and Moritz et al. (1996). Both studies found higher state-confident athletes to use more MG-A and MG-M functions of imagery than those athletes with low state-confidence. Thus, we can conclude that state-confidence should be regarded as a personal variable that moderates imagery function use. However, the finding that aesthetic athletes differ in their state-confidence use of CG functions of imagery for precompetitive preparation is unique. Neither, Mills et al. (2000) and Moritz et al. (1996) found differences in athletes' use of cognitive functions of imagery in relation to differences in state-confidence. Possible explanations for this contradiction in the research include (a) the moderating influence of sport type, (b) consideration of decision-making styles, and (c) measurement of imagery function use.

5.1 Imagery Function Use and Sport Type

This study advances the literature in that previous research has not examined the pre-competitive relationship within a single sport population. It is difficult to identify the true nature of the relationship between state-confidence and functional imagery use in past studies, as samples have included athletes from many different sport types. Several issues are presented when working with mixed sport samples. For example, it has been reported that sport types differ in the demands, constraints, and structural components required for a performance (Munroe et al., 1998). Because performance requirements differ among sports (i.e., a soccer performance versus a figure skating routine), the images used for performance preparation are also likely to differ (Monsma & Feltz, 2006; Nordin & Cumming, 2005). Furthermore, competitive events have aesthetic athletes performing closed routines in front of a judging panel while being compared to the performances of their opponents. The reported use of imagery to help figure skaters to mentally prepare for these events (Monsma & Feltz, 2006) may include CG images, visually running through their routines in their heads. Also, sport differences exist in the ways athletes are encouraged and instructed to use imagery. Nordin and Cumming (2006b) found that dancers perceived their coaches to be strong influences on their use of imagery, often providing them instructions to visualize or image their performances. Additionally, Overby, Hall, and Haslam (1998) reported that dance and figure skating coaches instructed athletes to use imagery more than soccer coaches did. As a result of positive external influence to utilize imagery, aesthetic athletes with higher levels of state-confidence may feel more comfortable and confident in their ability to incorporate imagery into their preparation routine. Thus, it is possible that with multi-sport samples, potential differences in imagery function use may be present in athletes from some sport types and not in others. In other words, it is possible that observed differences in functional imagery use, such as CG imagery use, is cancelled out when studied with multi-sport samples. To protect against this limitation, the current study sampled only female athletes from an aesthetic sport population.

Similar to the main finding, Nordin and Cumming (2005, 2006b, 2006c, 2008) have found a strong relationship between self-confidence (as a general characteristic) and functional imagery use existing within dancers. In a series of qualitative studies, these researchers have identified that dancers prefer to use images that serve CS, CG, and MG-M functions, and other types of images that have yet to be classified in the Hall et al. (1998) framework (Hanrahan & Vergeer, 2000; Nordin & Cumming, 2005; Overby et al., 1998). Overby and colleagues labeled these unique functions as metaphoric images. Metaphoric images are abstract visualizations that are representations of actions and sensations may not be objectively possible (Hanrahan & Vergeer, 2000; Nordin & Cumming, 2008). These may refer to images of natural or non-human representations (i.e. flow like the current of a river), images of situations that do not exist (i.e. penny between your feet), or even images that are impossible (i.e. stretch to touch opposite walls of the auditorium with your fingertips) (Nordin & Cumming, 2006a).

Taken together, it is reasonable to expect that cognitive imagery functional uses are preferred by most aesthetic athletes, in part because of the nature of the sport (i.e., executing a series of sequential movements within a choreographed routine). Thus, state-confidence individual differences in the current sample's CG imagery use may exist as a result of their artistic nature of their sports.

5.2 Imagery Function Use and Decision-Making Styles

A second explanation for the difference between the current findings and the existent research lies in decision-making styles. Baumeister and Newman (1994) outline two different styles of information processing and decision-making styles that impact how functional images are selected prior to competition. A comprehensive description of the theory is beyond the scope of this thesis, but in brief decision-making styles are labeled as (i) intuitive scientist and (ii) intuitive lawyer. The intuitive scientist decision-making style reflects a preference to gather all information cues and resources available to the individual in order to make the 'best choice' possible in preparation of an event. For example, a figure skater with an intuitive scientist decision-making style may seek out information cues about her potential success about an up-coming performance from a coach, environmental factors such as the condition of the ice and starting lineup, as well as personal reflections about her own personal skills and abilities. All of this information is used to determine an appropriate imagery preparation strategy. That is, to use CS, CG, MG-A, MG-M, or some combination of the functional uses because that would best fit the type information that was processed for potential success. In contrast, an intuitive lawyer decision-making style reflects processing select information that is judged to be relevant for an a proiri decision. Generally, the type of information that is processed for a decision is that which will prove that a specific decision is true (Baumeister & Newman, 1994). To use the figure skating example above, if the figure skater had pre-judged that her potential success in the up-coming competition was primarily based on skating a flawless routine, she would likely only intake information regarding her skills and ability from herself and her coach (and ignore any environmental and emotional cues informational cues). This may lead her to the decision to use a specific pre-competition imagery strategy that does not include greater numbers of images of either cognitive or motivational functions (in relation to the intuitive scientist decision-making style).

Extrapolating this theory to individuals who differ in state-confidence, one could predict that high state-confident aesthetic athletes chose imagery preparation strategies similar to that of intuitive scientist, whereas low state-confident aesthetic athletes chose images according to an intuitive lawyer. Consumer literature offers a finding to help conceptualize the differences in athletes' decision-making styles. Cognitive processes of individuals with increased positive affect towards a situation are different than those of individuals with negative affect (Isen, 2001). Moreover, individuals who experience increased positive affect within a given situation demonstrate more creativity and flexibility in their problem solving and decision-making styles required in that scenario. Therefore, a high state-confident athlete, likely with greater positive affect towards the current situation, is predicted to utilize many different functions of imagery to help him or her mentally prepare for a competition and to support his or her final conclusion (that he or she will be successful at this event). Furthermore, individuals with low state-confidence tend to not use all resources available to them, and will only use images to support that they will not achieve the caliber of performance necessary to be successful. Based on the selection bias and inflexibility of their decision-making process, they will likely not construct a preparation routine that incorporates increased images to serve all functions. Furthermore, they would not use any images in their preparation that may disprove their belief in their inability to succeed.

It is suggested that the differences observed between the main findings of the current research and the sport imagery literature may be explained by decision-making theory (Baumeister & Newman, 1994). Therefore, the examination of information processing and decision-making styles is an area for future study to better understand athletes' choices in specific functional imagery use.

5.3 Timing of the Measurement of Imagery Function Use

A third explanation to explain differences between results of the current study and previous literature may lie in the timing of the measurement. Previous measurement of imagery function use has typically occurred prior to a practice (e.g., Mills et al., 2000), or 24 hours prior to a competition (e.g., Moritz et al., 1996). This measurement procedure is not appropriate because sport situation (i.e., training, competition, and performance) affects the types of functional images that are used (Martin et al., 1999). In addition, research has supported the notion that athletes typically image the most just prior to competing or performing (Munroe et al., 2000). Thus, what an athlete images more than 24 hours prior to a competition is not likely to be the same as what they image immediately prior to their performance. Using a procedure that measured pre-competition imagery approximately 90 minutes prior to competition, the current findings show athletes with high state-confidence to use more CS and CG functions of imagery. It may be that cognitive functions are utilized immediately prior to a competitive event as athletes are walking through the required skills and sequences that will be executed in their performance.

5.4 Imagery Ability

A secondary finding of this study was that imagery ability was moderately related to imagery function use. In accordance with the Applied Model of Mental Imagery Use (Martin et al., 1999), this finding implies that having the skill to create vivid and controllable images affects the outcomes produced by functional imagery use. It was expected that imagery ability might also play a role in the relationship between state-confidence and the images used.

Although in the current study a significant relationship was determined between imagery ability and state-confidence, no interaction effect was statistically significant in the ANCOVA analyses. Moritz et al. (1996) reported an alternate finding, not only reporting that higher state-confident athletes use more MG-A and MG-M images, but that they had higher visual and kinesthetic abilities to create those images. The results of the current study, however, imply that individual differences in high and low state-confident aesthetic athletes' functional imagery use cannot be attributed, in part, to imagery ability.

This finding, however, may be the result of a methodological flaw in the assessment of imagery ability. Williams and Cumming have recently developed the Sport Imagery Ability Questionnaire (SIAQ; Williams & Cumming, 2011) that assesses all five functions of imagery, as opposed to the MIQ-R (Hall & Martin, 1997), which only assesses cognitive specific (CS) functions of imagery. Equivocal findings regarding the role of imagery ability may be rectified by the use of a tool that more accurately assesses ability of all functions, not just one cognitive imagery function. Therefore, future research is encouraged to test the whether or not the SIAQ is a reliable tool to replace the MIQ-R.

5.5 Strengths of the Study

This study provides insight into the role self-confidence of aesthetic athletes plays on their pre-competitive imagery use. Previous studies have proposed the need to examine difference between various types of sport (Martin et al., 1999; Munroe et al., 1998). Thus, by examining imagery use within a specific sport population, this study is contributing preliminary data to the development of a growing line of research within the literature. The current research serves to examine differences in imagery processes between different sport type classifications, not just between team and individual athletes. Furthermore, the knowledge that differences exist between athletes of various confidence levels provides practical applications to trainers, coaches, and athletes. Understanding how imagery may be used pre-competitively as a function of state-confidence may help athletes and coaches more effectively prepare for competition.

Measurement of imagery function use immediately prior to competition provided an accurate look at the types of images athletes were engaging in specifically for that event. Athletes were assessed on their imagery function use at the time that they are most likely to be using imagery (Nordin & Cumming, 2007, Munroe et al., 2000), therefore optimizing the likelihood of each athlete engaging in their pre-competitive imagery tendencies. As this study assessed *state*-confidence, it was logical to assess the imagery that was to be utilized in the pre-competitive preparation state as well. By assessing imagery use so close to competition time, accurate assessments of imagery functions used may have contributed to the strong relationship present with state-confidence.

In addition, this study collected data using an unconventional measurement strategy. This research assessed state-confidence 24 hours prior and imagery function use one to three hours prior, the reverse order to that of previous studies (Moritz et al., 1996). However, this strategy was employed to more accurately assess the images that an athlete may be utilizing as competition time approaches. The functions of imagery may differ as preparation advances and competition times near, as the significant results of this study may imply. The increased use of cognitive functions of imagery immediately prior to competition may highlight imagery usage as a primer for the body's performance in competition. Thus, the administration of the SIQ at this unconventional time period promotes accurate assessment and acts as a unique strength of the study.

Although it is expected that confidence levels may fluctuate as the concerning event approaches, the nature of the study and the design of the confidence inventory supports the administration of the SSCI 24 hours prior to the athletes' competition times. As the athlete rates her confidence in relation to that of the most confident person they know, the inventory may not be as sensitive to fluctuations in state-confidence as the competition time nears. Furthermore, by not having the athlete complete the SSCI immediately prior to competition, the athletes' state-confidence levels were not jeopardized by the comparing their abilities to other athletes at that time. Thus, the SSCI is accurately assessing imagery one to two days prior to the scheduled event time.

5.6 Limitations of the study

A major limitation of the research lies in the instrumentation used. This research used the MIQ-R to assess participants' imagery ability. It has been reported that the MIQ-R only assesses imagery ability of images that serve CS functions, thus, not accurately representing athletes' abilities of all functions of imagery (Gregg & Hall, 2006; Williams & Cumming, 2011). More accurate assessment of imagery ability, such as with The Sport Imagery Ability Questionnaire (SIAQ; Williams & Cumming, 2011), may lead to the discovery of ability as a stronger covariate than currently reported. Furthermore, the use of the SIAQ in future studies may provide insight towards the conceptual understanding about athletes' imagery abilities.

Limitations of the study are also acknowledged with use of the MIQ-R. Short and Short (2005) reported discrepancies in findings from use of two different versions of the instrument. Thus, it is plausible that this instrument does not appropriately classify the images representing specific functional types. Furthermore, dancers report to utilize functional types of imagery that is different than what is assessed by the SIQ. It is clear that the SIQ questionnaire may not be accurately measuring functional imagery types in this population. Nordin and Cumming (2006a) have developed a new tool, the Dance Imagery Questionnaire (DIQ), to validly capture the types of functional images that dancers use. Their multiphase research determined dancers' images are of techniques, role and movement qualities, mastery situations, or related to their goals. The use of the DIQ, or a modified version to accommodate all types of aesthetic athletes (not just dancers), may be a more fitted form of measurement for assessing athletes' functional imagery use.

5.7 Future Directions

Researchers should expand the findings of this study to further validate the suggestions made to modify the Applied Model of Mental Imagery proposed by Martin and colleagues (1999). First, all studies that have examined the differences in sport type have only compared athletes from team versus individual sports. Suggestions of further investigation of this area have included comparing athletes from other classification of sport types, not just team versus individual (Martin et al., 1999; Munroe et al., 1998). Various classifications of different sport types, and must be explored to determine why these relationships exist in the ways that they do. In doing so, findings can be extended to examine the differences in imagery used by athletes of various sports and sport types.

Within the study of aesthetic athletes, researchers are encouraged to use the DIQ, or modifications of it, in order to examine the frequency of the functions of imagery these unique athletes engage in. As Nordin and Cumming have demonstrated (2005, 2006b, 2008), dancers utilize different functions of imagery than the general sport population. As their functional imagery use is different, the use of the SIQ does not accurately assess the ways in which these athletes may be preparing for competition. Though the DIQ was developed for a dance population, strong similarities between dancers and the whole aesthetic sport population may warrant only minor modifications to the instrument to make it useful for all aesthetic athletes. The use of the DIQ will help to further validate the instrument, and will work to provide more accurate representations of the relationships that exist between confidence and imagery usage within this unique population.

As the MIQ-R is only designed to assess athletes' CS imagery abilities, future research is required to explore the use of new instrumentation to measure all functions of imagery ability. As previously mentioned, the SIAQ (Williams & Cumming, 2011) may be a suitable tool to replace the MIQ-R, as it provides a more complete assessment of athletes' imagery abilities. Future research will test its functionality and strength in the measurement of imagery ability.

Finally, a more conceptual understanding of athletes' decision-making processes will help to clarify how confidence levels influence the use of mental imagery. This research provided initial discussion and comparisons of state-confidence levels in relation to two distinct decision-making styles. Furthermore, future research, in addition to mental imagery, may extend the influence of decision-making styles and their applications to other areas of mental preparation. The examination of differences in attentional focus of athletes as competition approaches may provide insight into how athletes process information differently (cf. Neurocognitive Model of Mental Imagery; Murphy, Nordin, & Cumming, 2008). By examining differences within the two decision-making styles and patterns of information processing, research can aim to answer *why* athletes may choose to mentally prepare in different ways.

5.8 Implications

5.8.1 Theoretical Implications. This research supports previous studies that have highlighted how state-confidence, or more generally self-confidence, influences the functions of imagery that athletes choose to engage in (Abma et al., 2002; Mills et al., 2000; Moritz et al., 1996). The research studies together imply that self-confidence is an influencing variable within the relationship, and thus a variable influencing imagery function use in the Applied Model of Mental Imagery (Martin et al., 1999). A more detailed applied model may include self-confidence as an individual characteristic that serves a distinct influence in the selection and utilization of various functions of imagery by athletes.

In addition, it was found that aesthetic athletes as a single sport type population utilize a unique combination of imagery in their precompetitive preparations. Although this research was the first in the field to examine the relationship within a single sport type, the findings supported previously made suggestions to examine other classifications of sport type as opposed to just open versus closed athletes, or even team versus individual athletes imagery use (Munroe et al., 1998). This research also implies that the different nature of various sport type classifications influences how the athletes of those sports utilize imagery. Future research will further develop additional classifications in order to further conceptualize the differences between sport types.

5.8.2 Practical Implications. The findings of this study can provide practical applications to applied sport psychology consultants, coaches, and athletes. The main results of this research highlight the fact that athletes use of imagery differently as a function of personal state-confidence. Further, athletes with higher levels of state-confidence utilize four of five functions of imagery significantly more than athletes in the same sports who possess lower levels of state-confidence. Therefore, developmental self-confidence training tools may be instructed for low state-confident athletes to use in order to build their self-perceptions, thus facilitating the increased likelihood of their use of more functions of imagery to prepare for competitive events.

5.9 Conclusions

This research has provided results into the role state-confidence plays on athletes' imagery use. Results from this study revealed that significant differences in four of five functions of imagery were present between high and low state-confidence athletes. From these findings, it is known that both state-confidence levels and sport type may have influencing roles in the functions of imagery that athletes employ. Differences in imagery use were discussed in terms of (a) sport type variables, (b) two distinctly different decision-making styles, and (c) methodological structure and measurement tools. Furthermore, this research suggests future studies should extend the findings by examining the relationship between imagery functional use and state-confidence during competition preparation among different classifications of sport types, the use of new and potentially more accurate measurement instruments, as well as the possible mediation influence of information processing and decision-making styles.. This study has provided new research to understand the impact state-confidence has on athletic preparation, specifically mental imagery use, and suggestions for future research will aid in confirming and strengthening the knowledge of this relationship.

References

Abma, C. L., Fry, M. D., Li, Y., & Relyea, G. (2002). Differences in imagery content and imagery ability between high and low confident track and field athletes. *Journal of Applied Sport Psychology, 14,* 67-75.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman & Company.

Baumeister, R. F., & Newman, L. S. (1994). Self-regulation of cognitive inference and decision processes. *Personality and Social Psychology Bulletin, 20,* 3-19.

Callow, N., & Hardy, L. (2005). A critical analysis of applied imagery research. In D. Hackfort, J. L. Duda, & R. Lidor (Eds.), *Handbook of Research in Applied Sport and Exercise Psychology: International Perspectives* (37-58). Morgantown, WV: Fitness Information Technology.

Callow, N., Hardy, L., & Hall, C. R. (2001). The effects of a motivational general-mastery imagery intervention on the sport confidence of high level badminton players. *Research Quarterly for Exercise and Sport, 72,* 389-400.

Denis, M. (1985). Visual imagery and the use of mental practice in the development of motor skills. *Canadian Journal of Applied Sport Science, 10,* 4S-16S.

Fish, L., Hall, C. R., & Cumming, J. (2004). Investigating the use of imagery by elite ballet dancers. *Avante, 10,* 26-39.

Gregg, M., & Hall, C. R. (2006). Measurement of motivational imagery abilities in sport. *Journal of Sports Sciences, 24,* 961-971. doi:10.1080-02640410500386167

Hackfort, D., Duda, J. L., & Lidor, R. (Eds.) (2005), *Handbook of research in applied sport psychology and exercise psychology: International perspectives.* Morgantown, WV: Fitness Information Technology.

Hall, C. R., Mack, D. E., Paivio, A., & Hausenblas, H. A. (1998). Imagery use by athletes: Development of the Sport Imagery Questionnaire. *International Journal of Sport Psychology, 29* 73-89.

Hall, C. R., & Martin, K. A. (1997). Measuring movement imagery abilities: A revision of the movement imagery questionnaire. *Journal of Mental Imagery, 21,* 143-154.

Hall, C. R., Munroe-Chandler, K. J., Cumming, J., Law, B., Ramsey, R., & Murphy, L. (2009). Imagery and observational learning use and their relationship to sport confidence. *Journal of Sports Sciences, 27,* 327-337.

Hall, C. R., & Pongrac, J. (1983). *Movement imagery questionnaire.* London, Ontario:

University of Western Ontario.

Hall, C. R., Pongrac, J., & Buckolz, E. (1985). The measurement of imagery ability. *Human Movement Science, 4,* 107-118.

Hall, C. R., Stevens, D. E., & Paivio, A. (2005). *The Sport Imagery Questionnaire: Test manual.* Morgantown, WV: Fitness Information Technology.

Hanrahan, C., & Vergeer, I. (2000). Multiple uses of mental imagery by professional modern dancers. *Imagination, Cognition, and Personality, 20,* 231-255.

Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics, 6*, 65-70.

Isen, A. M. (2001). An influence of positive affect on decision making in complex situations: Theoretical issues with practical implications. *Journal of Consumer Psychology, 11, 75-85.*

Issac, A., Marks, D., Russell, E. (1986). An instrument for assessing imagery of movement: The Vividness of Movement Imagery Questionnaire (VMIQ). *Journal of Mental Imagery, 10,* 23-30.

Lang, P. J. (1977). A bio-informational theory of emotional imagery. *Psychophysiology, 16,* 495-512.

Law, M. P., Côté, J., & Ericsson, K. A., (2007). Characteristics of expert development in rhythmic gymnastics: A retrospective study. *International Journal of Sport and Exercise Psychology, 5,* 82-103.

Martens, R., Burton, D., Vealey, R. S., Bump, L. A., & Smith, D. E. (1990). Development and validation of the Competitive State Anxiety Inventory-2. In R. Martens, R. S. Vealey, & D. Burton (Eds.), *Competitive anxiety in sport* (pp. 117-190). Champaign, IL: Human Kinetics.

Martin, K. A., Moritz, S. E., & Hall, C. R. (1999). Imagery use in sport: A literature review and applied model. *The Sport Psychologist, 13,* 245-268.

Mills, K. D., Munroe, K. J., & Hall, C. R. (2000). The relationship between imagery and self-efficacy in competitive athletics. *Imagination, Cognition, and Personality, 20,* 33-39.

Monsma, E. V., & Feltz, D. L. (2006). A mental preparation guide for figure skaters: A developmental approach. In J. Dosil (Ed.), *The Sport Psychologist's Handbook: A Guide for Sport Specific Performance Enhancement,* 427-454. New York, NY: John Wiley & Sons.

Moritz, S. E., Hall, C. R., Martin, K. A., & Vadocz, E. (1996). What are confident athletes imaging?: An examination of image content. *The Sport Psychologist, 10,* 171-179.

Munroe-Chandler, K. J., Hall, C. R., & Fishbourne, G. J. (2008). Playing with confidence: The relationship between imagery use and self-confidence and self-efficacy in youth soccer players. *Journal of Sports Sciences, 26,* 1539-1541.

Munroe, L. J., Giacobbi, P. R., Hall, C. R., & Weinberg, R. (2000). The four Ws of imagery use: Where, when, why, and what. *The Sport Psychologist, 14,* 119-137.

Munroe, K. J., Hall, C. R., Simms, S., & Weinberg, R. (1998). The influence of type of sport and time of season on athletes' use of imagery. *The Sport Psychologist, 12,* 440-449.

Murphy, S., Nordin, S., & Cumming, J. (2008). In T. S. Horn (Ed.), *Advances in Sport Psychology* (3rd Ed) (pp. 297-324). Champaign, IL: Human Kinetics.

Nordin, S. M., & Cumming, J. (2008). Exploring common ground: Comparing the imagery of dancers and aesthetic sport performers. *Journal of Applied Sport Psychology, 20,* 375-391. doi:10.1080/10413200802210795

Nordin, S. M., & Cumming, J. (2006a). Measuring the content of dancers' images: Development of the Dance Imagery Questionnaire (DIQ). *Journal of Dance Medicine and Science, 10,* 85-98.

Nordin, S. M., & Cumming J. (2006b). The development of imagery in dance Part I: Qualitative findings from professional dancers. *Journal of Dance Medicine and Science, 10,* 21-27.

Nordin, S. M., & Cumming, J. (2006c). The development of imagery in dance Part II: Quantitative findings from a mixed sample of dancers. *Journal of Dance Medicine and Science, 10,* 28-34.

Nordin, S. M., & Cumming, J. (2005). Professional dancers describe their imagery: Where, when, what, why, and how. *The Sport Psychologist, 19,* 395-416.

Overby, L. Y., Hall, C., & Haslam, I. (1998). A comparison of imagery used by dance teachers, figure skating coaches, and soccer coaches. *Imagination, Cognition, and Personality, 17,* 323-337.

Paivio, A. (1985). Cognitive and motivational functions of imagery in human performance. *Canadian Journal of Applied Sport Sciences, 10,* 22-28.

Roberts, R., Callow, N., Hardy, L., Markland, D., & Bringer, J. (2008). Movement imagery ability: Development and assessment of a revised version of the vividness of movement imagery questionnaire. *Journal of Sport & Exercise Psychology, 30,* 200-221.

Short, S.E., Tenute, A., & Feltz, D. L. (2005). Imagery use in sport: Mediational effects for efficacy. *Journal of Sports Sciences, 23,* 951-960.

Short, S., & Short, M. W. (2005). Differences between high- and low-confident football players on imagery functions: A consideration of the athletes' perceptions. *Journal of Applied Sport Psychology, 17,* 197-208. doi:10.1080/10413200591010049

Statistics Canada (2011). Population by selected ethnic origins, by province and territory (2006 Census). Retrieved from: http://0www40.statcan.gc.ca.darius.uleth.ca/l01/cst01/demo26j-eng.htm

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn and Bacon.

Vealey, R. S. (1986). Conceptualization of sport-confidence and competitive orientation: Preliminary investigation and instrument development. *Journal of Sport Psychology, 8,* 221-246.

Weinberg, R. (2008). Does imagery work? Effects on performance and mental skills. *Journal of Imagery Research in Sport and Physical Activity, 3,* 1-21.

White, A., & Hardy, L. (1998). An in-depth analysis of the uses of imagery by high-level slalom canoeists and artistic gymnasts. *The Sport Psychologist, 12,* 387-403.

Williams, S. E. & Cumming, J. (2011). Measuring athlete imagery ability: The Sport Imagery Ability Questionnaire. *Journal of Sport & Exercise Psychology. 33,* 416-440.

APPENDIX A

RECRUITMENT SCRIPT
CONSENT FORM

EMAIL/PHONE SCRIPT

ATHLETE ACCESS APPROVAL

[To Whom It May Concern],

My name is Courtney Link and I am working towards a Master of Arts in Sport Psychology at the University of Lethbridge. I am writing/phoning to ask for approval to recruit athletes from your club/competition for participation in a study I am currently completing. This study will examine how self-confidence levels may influence the use of mental imagery a female aesthetic athlete may use. Understanding this relationship will help the effectiveness of personalized mental training for female athletes who compete in aesthetic sports. It is for this reason that I have selected the athletes of your club/competition, (name of club/competition), to participate in this research. Parental consent is required before athletes are eligible to complete the study.

Participants to be recruited are female athletes between the ages of 13 and 18 years of age that are currently registered to compete in a local competition within the next three (3) months. The participants of this study will be required to answer a set of general demographic questions, a questionnaire regarding self-confidence, a questionnaire regarding mental imagery ability, and finally a questionnaire regarding their use of mental imagery within their sport. The study will be require participation at initial consent, 24 hours prior to competing, and finally one to two hours prior to competition. It is estimated that 30 minutes will be required to complete the questionnaires administered 24 hours prior to competing, and only 5-10 minutes to complete the questionnaire administered one to two hours prior to competing.

The information obtained from these athletes is completely confidential and will only be accessible to my supervisor and myself. All participants in the study are volunteers and may feel free to withdraw at any time without any consequences.

This research will work towards providing insight into personalized coaching and training practices that will attend to individual differences in self-confidence and mental imagery use by the athletes.

Thank you for your time and concern regarding my study and your athletes' participation. Feel free to contact me if you have any questions or concerns, 403-332-5207, or courtney.link@uleth.ca.

I thank you in advance for considering involvement in this research.

CONSENT TO PARICIPATE IN RESEARCH

The Use of Mental Imagery by Aesthetic Athletes Prior to Competition

This consent form serves as an invitation for you to participate in research examining aesthetic athletes and their use of mental imagery in preparation for competition.

If you have any questions about this research, please feel free to contact Courtney Link 403-332-5207; courtney.link@uleth.ca, or Dr. Sharleen Hoar 403-329-2591; sharleen.hoar@uleth.ca.

PURPOSE OF THE STUDY

The purpose of this study is to examine how one's feelings about a competition affect their use of mental imagery. Understanding this relationship will allow coaches to personalize training practices for athletes who use mental imagery differently.

PROCEDURES

This research requires that you complete a series of questionnaires on two occasions. During the first testing session, approximately 24 hours prior to a competition, we will ask you to complete three questionnaires and participate in a familiarization activity in preparation for the completion of one of the questionnaires that day. This will require approximately 30 minutes of your time. The second testing session will occur one to two hours prior to a competition. In this testing session, you will complete one questionnaire, which will require 5-10 minutes of your time.

POTENTIAL RISKS AND DISCOMFORTS

There are no serious risks associated with participation in this study.

POTENTIAL BENEFITS TO PARTICIPATION AND/OR TO SOCIETY

There are no direct benefits from participating in this study. However, results regarding the relationship between the feelings athletes hold about a competition and their mental imagery use will provide valuable information for coaching and training practices for enhancing sport performance. The results will also provide understanding of how aesthetic athletes use mental imagery prior to competition.

INFORMATION ABOUT STUDY RESULTS

If you chose, you will be emailed an executive summary of the study of the results upon completion of the study.

PAYMENT FOR PARTICIPATION

Your participation is voluntary and you will not receive any payment for participation.

ANONYMITY AND CONFIDENTIALITY

All personal information obtained from this research will remain confidential. Your information will be anonymous in that your data will not be matched to your name in the analysis or communication of results. The results of this study will be communicated in group-form.

Information obtained during this study will be kept in a locked filing cabinet or a secure computer within the Sport Psychology Laboratory at the University of Lethbridge for five years. Access to this information will be granted only to the principal researcher and the researcher's supervisor. Your identity will **not** be revealed in any reports regarding this study.

PARTICIPATION AND WITHDRAWL

Participation in this study is completely voluntary and you may feel free to withdraw at any point in the study without consequences of any kind. If you chose to withdraw from the study, you will be consulted regarding what you wish to be done with your data thus far.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without any penalty. You are not waiving any legal claims, rights or remedies because of your participation in this study.

I have read the information presented in the consent letter about a study being conducted by Courtney Link at the University of Lethbridge. Questions regarding your rights as a participant in this research may be addressed to the Office of Research Services, University of Lethbridge (Phone: 403-329-2747 or Email: research.services@uleth.ca).

CONSENT

I have read the information presented in the information letter about a study being conducted by Courtney Link at the University of Lethbridge. I have had the opportunity to ask questions about my involvement in this study, and to receive any additional details I wanted to know about the study. I understand that I may withdraw from the study at any time, and I agree to give my consent to participate in this study.

______________________	______________________
Name of Participant	Signature of Participant
	______________________
	Date
______________________	______________________
Name of Parent/Guardian	Signature of Parent/Guardian
	______________________
	Date

____

Email or Mailing Address: Only if you wish to receive a copy of the results (please print clearly)

APPENDIX B

GENERAL DEMOGRAPHIC FORM
INCOME AND EDUCATION FORM
MOVEMENT IMAGERY QUESTIONNAIRE-REVISED
STATE SPORT-CONFIDENCE INVENTORY

GENERAL DEMOGRAPHIC QUESTIONS

Please complete the following questions to provide use with a better understanding of yourself.

Age: ______

Sport: __________________

Years in this Sport:________

Competitive Level: _______________________________________

How do you describe yourself in terms of your ethnic origin?

(PLEASE CHECK "✓" **ALL** THAT APPLY)

❍ Aboriginal/Native	❍ English	❍ Italian	❍ Polish
❍ Canadian	❍ French	❍ Japanese	❍ Scottish
❍ Chinese	❍ German	❍ Korean	❍ Swedish
❍ Danish	❍ Hungarian	❍ Norwegian	❍ Ukrainian
❍ Dutch	❍ Irish		

❍ Other ethnic or cultural group(s), please specify:_______________________

❍ *I do not belong to an ethnic or cultural group.*

INCOME AND EDUCATION
(To Be Completed By A Parent Or Legal Guardian)

Which of the following is your best guess of the **total income**, before taxes and deductions of **all household members** from all sources in the past year?

❍ No Income	❍ $30,000 – $39, 999	❍ $80,000 – $99, 999
❍ $5000 - $9999	❍ $40,000 – $49, 999	❍ $100,000 - $119, 999
❍ $10, 000 – $14, 999	❍ $50,000 – $59, 999	❍ $120, 000 – 149, 999
❍ $15,000 – $19, 999	❍ $60,000 – $79, 999	❍ $150, 000 or more
❍ $20,000 – $29, 999		

What is your highest level of education?

❍ Less than a high school diploma	❍ A high school diploma	❍ Some college or University	❍ A college or university degree

MOVEMENT IMAGERY QUESTIONNAIRE-REVISED

Adapted from Hall and Martin (1997)

This questionnaire concerns two ways of *mentally* performing movements which are used by some people more than others, and are more applicable to some types of movements than others. The first is attempting to form a visual image or picture of a movement in your mind. The second is attempting to feel what performing a movement is like without actually doing it. You are requested to do both of these mental tasks for a variety of movements in this questionnaire, and then rate how easy/difficult you found the tasks to be. The ratings that you give are not designed to assess the goodness or badness of the way you perform these mental tasks. They are attempts to discover the capacity individuals show for performing these tasks. There are no right or wrong ratings or some ratings that are better than others.

Each of the following statements describes a particular action or movement. Read each statement carefully and then actually perform the movement as described. Only perform the movement a single time. Return to the starting position for the movement just as if you were going to perform the action a second time. For the first set of four (1-4) questions, create as clear and vivid a visual image as possible of the movement just performed. For the second set of four (5-8) questions, attempt to feel yourself making the movement just performed without actually doing it.

After you have completed the mental task required, rate the ease/difficulty with which you were able to do the task. Take your ratings from the following scales (Questions 1-4, use the Visual Imagery Scale; Questions 5-8, use the Kinesthetic Imagery Scale). Be as accurate as possible and take as long as you feel necessary to arrive at the proper rating for each movement. You may choose the same rating for any number of movements "seen" or "felt" and it is not necessary to utilize the entire length of the scale.

Do not feel concerned about using the same numbers repeatedly if you feel they represent your true feelings. Remember, there are no right or wrong answers, so please answer as accurately as possible.

<u>Rating Scales</u>

Visual Imagery Scale

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

Kinesthetic Imagery Scale

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

Ability to SEE the Image

1. **Starting Position:** Stand with your feet and legs together and your arms at your sides.

   Action: Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.

   Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

   Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

2. **Starting Position:** Stand with your feet and legs together and your arms at your sides.

   Action: Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.

   Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

   Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

3. **Starting Position:** Extend the arm of your non-dominant hand straight out to your side so that it is parallel to the ground, palm down.

   Action: Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.

   Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

   Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

4. **Starting Position:** Stand with your feet slightly apart and your arms fully extended above your head.

   Action: Slowly bend forward at the waist and try to touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head.

   Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

   Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

Ability to FEEL the Image

5. Starting Position: Stand with your feet and legs together and your arms at your sides.

Action: Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.

Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

6. Starting Position: Stand with your feet and legs together and your arms at your sides.

Action: Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.

Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: 7 6 5 4 3 2 1
Very Easy Easy Somewhat Easy Neutral Somewhat Hard Hard Very Hard
to Feel to Feel to Feel to Feel to Feel to Feel
to Feel

7. Starting Position: Extend the arm of your non-dominant hand straight out to your side so that it is parallel to the ground, palm down.

Action: Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.

Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

8. Starting Position: Stand with your feet slightly apart and your arms fully extended above your head.

Action: Slowly bend forward at the waist and try to touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head.

Mental Task: Assume the starting position. Attempt to see yourself make the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating:

7	6	5	4	3	2	1
Very Easy to See	Easy to See	Somewhat Easy to See	Neutral to See	Somewhat Hard to See	Hard to See	Very Hard to See

STATE SPORT-CONFIDENCE INVENTORY

Think about how self-confident you feel right now about performing successfully in the upcoming competition.
Answer the questions below based on how confident you feel *right now* about competing in the upcoming contest. Compare your self-confidence to the *most self-confident* athlete you know.
Please answer as you *really* feel, not how you would like to feel. Your answers will be kept completely confidential.
How confident are you right now about competing in the upcoming contest? *(Circle number)*

1. Compare the confidence you feel right now in YOUR ABILITY TO EXECUTE THE SKILLS NECESSSARY TO BE SUCCESSFUL to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
2. Compare the confidence you feel right now in YOUR ABILITY TO MAKE CRITICAL DECISIONS DURING COMPETITION to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
3. Compare the confidence you feel right now in YOUR ABILITY TOPERFORM UNDER PRESSURE to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
4. Compare the confidence you feel right now in YOUR ABILITY TO EXECUTE SUCCESSFUL STRATEGY to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
5. Compare the confidence you feel right now in YOUR ABILITY TO CONCENTRATE WELL ENOUGH TO BE SUCCESSFUL to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
6. Compare the confidence you feel right now in YOUR ABILITY TO ADAPT TO DIFFERENT GAME SITUATIONS AND STILL BE SUCCESSFUL to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
7. Compare the confidence you feel right now in YOUR ABILITY TO ACHIEVE YOUR COMPETITIVE GOALS to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9

8. Compare the confidence you feel right now in YOUR ABILITY TO BE SUCCESSFUL to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
9. Compare the confidence you feel right now in YOUR ABILITY TO THINK AND RESPOND SUCCESSFULLY DURING COMPETITION to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
10. Compare the confidence you feel right now in YOUR ABILITY TO MEET THE CHALLENGE OF COMPETITION to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
11. Compare the confidence you feel right now in YOUR ABILITY TO BE SUCCESSFUL BASED ON YOUR PREPARATION OF THIS EVENT to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
12. Compare the confidence you feel right now in YOUR ABILITY TO PERFORM CONSISTENTLY ENOUGH TO BE SUCCESSFUL to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9
13. Compare the confidence you feel right now in YOUR ABILITY TO BOUNCE BACK FROM PERFORMING POORLY AND BE SUCCESSFUL to the most confident athlete you know.	Low Medium High 1 2 3 4 5 6 7 8 9