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Examining the Relationships between Imagery, Sport Motivation, and Athletic Identity in Curling

Nicole Westlund

The University of Western Ontario

Supervisor

Dr. Craig Hall

The University of Western Ontario

Graduate Program in Kinesiology

A thesis submitted in partial fulfillment of the requirements for the degree in Master of Arts

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EXAMINING THE RELATIONSHIPS BETWEEN IMAGERY, SPORT
MOTIVATION, AND ATHLETIC IDENTITY IN CURLING

(Spine title: Imagery, Sport Motivation, and Athletic Identity in Curling)

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by

Nicole K. Westlund

Graduate Program in Kinesiology

A thesis submitted in partial fulfillment
of the requirements for the degree of
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The School of Graduate and Postdoctoral Studies
The University of Western Ontario
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THE UNIVERSITY OF WESTERN ONTARIO
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CERTIFICATE OF EXAMINATION

Supervisor

Dr. Craig Hall

Supervisory Committee

Dr. Bert Carron

Dr. Harry Prapavessis

Examiners

Dr. Harry Prapavessis

Dr. Alan Salmoni

Dr. Jan Polgar

The thesis by

Nicole Kim Westlund

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ABSTRACT

Imagery use, motivation, and athletic identity all have been investigated in sport; however, a study examining the relationships among these three constructs has yet to be conducted. The participants ($N = 213$) were club and competitive curlers ($M_{\text{age}} = 49.0$; $SD = 15.39$). Results showed that athletic identity was significantly correlated with all five imagery functions and six behavioural regulations ($p < .01$) except for external regulation and amotivation. Multiple regression analyses predicting imagery use from both the behavioural regulations and athletic identity were conducted for each imagery function in club and competitive curlers. Athletic identity, identified regulation, and integrated regulation emerged as significant predictors of imagery use ($p < .05$). These findings suggest that there is a link between imagery use, motivation, and athletic identity. Researchers and sport psychologists can use these findings to develop more effective psychological skills training programs to improve the performance of curlers.

Keywords: imagery, motivation, athletic identity, sport, curling

CO-AUTHORSHIP

I would like to acknowledge my co-author on this research project. I would like to acknowledge my supervisor Dr. Craig Hall.

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TABLE OF CONTENTS

CERTIFICATE OF EXAMINATION	ii
ABSTRACT	iii
CO-AUTHORSHIP	iv
ACKNOWLEDGEMENT	v
LIST OF TABLES	vi
LIST OF APPENDICES.....	vii
INTRODUCTION	1
Imagery in Sport.....	4
Self-Determination Theory	14
Athletic Identity.....	26
Purpose of the Present Study.....	38
METHOD	39
Participants	39
Measures.....	40
Procedure.....	42
RESULTS	43
Descriptive Statistics	44
Bivariate Correlations	48
Multiple Regression	51
DISCUSSION	54
Descriptive Findings	55
Correlational Findings.....	56
Athletic Identity as a Predictor of Imagery Use.....	59

Identified Regulation as Predictor of Imagery Use	61
Integrated Regulation as Predictor of Imagery Use	63
Intrinsic Motivation and Amotivation as Predictors of Imagery Use	66
Strengths, Limitations and Future Directions	68
Implications and Conclusions	71
REFERENCES	74
APPENDICES	86
CURRICULUM VITAE.....	95

LIST OF TABLES

Table	Description	Page
1	Means and frequencies of demographic information for club and competitive curlers	46
2	Means and standard deviations of subscale scores for club and competitive curlers	47
3	Bivariate correlations between demographic variables and subscale scores for club and competitive curlers	49
4	Bivariate correlations between subscale scores in club and competitive curlers	50
5	Predictors of imagery use by function in club curlers	52
6	Predictors of imagery use by function in competitive curlers	53

LIST OF APPENDICES

Appendix	Description	Page
A	Glossary	86
B	Letter of Information	87
C	Online Questionnaire	88
D	Ethics Approval Notice	94

Examining the Relationships between Imagery, Sport Motivation, and Athletic Identity in Curling

Researchers and practitioners in sport psychology are well aware of the benefits of mental training on performance. In fact, both athletes and coaches recognize that 40% to 90% of their success can be attributed to mental training (Krane & Williams, 2010). At the elite level, the difference between standing on the podium and finishing in the top ten is marginal, and more often than not due to differences in athletes' mental training (Jones, Hanton, & Connaughton, 2002). For years, researchers have been trying to pinpoint what it takes for athletes to succeed at a high level and how to develop these qualities. Characteristics such as determination, self-belief, focus, and coping skills have been found to be requirements for mentally trained athletes (Connaughton, Wadey, Hanton, & Jones, 2008). A variety of mental tools can be used to develop these characteristics in athletes, one of which is imagery, which is the focus of the present investigation.

Imagery is considered to be one of the most popular techniques in psychological skills training programs (Short et al., 2002). It involves the mental stimulation of performing physical skills, and has been associated with changes in cognition, affect, and behaviour (Martin, Moritz, & Hall, 1999). A definition that is commonly used to describe imagery is one by White and Hardy (1998), who stated that imagery could be defined as "an experience that mimics real experience. We can be aware of "seeing" an image, feeling movements as an image, or experiencing the real thing ... It differs from dreams in that we are awake and conscious when we form an image" (p. 389). Frequent imagery use is known to increase an athlete's imagery ability, which may subsequently

increase their performance (Gregg, Hall, & Nederhof, 2005). While imagery and its use in sport has been widely studied by researchers since the 1960s (e.g., Clark, 1960; Start & Richardson, 1964), much of the research conducted over the past decade has derived from Paivio's (1985) framework, which was the first to conceptualize how imagery operates in different areas of sport performance.

According to Paivio, athletes use imagery for both cognitive and motivational functions, operating at either a general or specific level. Hall, Mack, Paivio, and Hausenblas (1998) later expanded this framework into five different imagery functions: cognitive specific (CS; rehearsal of specific skills), cognitive general (CG; rehearsal of specific strategies), motivational specific (MS; goal-oriented responses), motivational general-arousal (MG-A; regulation of arousal and stress), and motivational general-mastery (MG-M; increasing mental toughness, focus and self-confidence). This expansion into five different imagery functions led to the development of the Sport Imagery Questionnaire (SIQ; Hall et al., 1998), which has become the most prevalent tool in measuring the frequency of imagery use in athlete populations. Paivio's framework and the SIQ have revolutionized imagery research (Short, Ross-Stewart, & Monsma, 2006), and served as the driving force for imagery interventions. Elite athletes are motivated to use imagery because they are very aware of its benefits.

The topic of motivation has been a dominant issue in psychology research as it is considered to be at the centre of social, biological, and cognitive regulation (Ryan & Deci, 2000). In simplest terms, motivation can be described as the "why" of behaviour (McClelland, 1985); the reasons for which individuals engage in particular activities (Vallerand & Losier, 1999). According to Aristotelian views, humans are assumed to

strive naturally toward psychological growth and integration (Ryan & Deci, 2002). They do so by continuously seeking new challenges, perspectives, and assimilating cultural behaviours and norms through social experiences and interactions in their environments. Self-Determination Theory (SDT) offers a framework by which researchers can organize these human behaviours based on the notion that individuals will always strive to actualize their human potentials (Ryan & Deci, 2002). According to SDT, humans are motivated to act, or behave passively based largely upon the social environment in which they develop and function (Ryan & Deci, 2000). These social experiences can be either facilitative or debilitating towards the psychological growth of individuals (Ryan & Deci, 2002). In its original form, SDT consists of what is termed organismic (i.e., psychological growth) and dialectical (facilitative or debilitating social environments) frameworks to explain human motivation in terms of personality development.

The focus of motivation research has typically revolved around two types of motivation, intrinsic motivation (IM) and extrinsic motivation (EM; Vallerand & Ratelle, 2002). IM describes behaviours in which individuals engage in out of personal interest and enjoyment (Ryan & Deci, 2002). EM describes behaviours in which individuals engage in response to tangible rewards or the values of others (Ryan & Deci, 2002). A third type of motivation known as amotivation refers to the lack of intention or motivation to act (Deci & Ryan, 2000). It is thought that IM, EM, and amotivation exist along a continuum ranging from least self-determined to most self-determined, depending on the extent to which a behaviour is internalized and integrated into the self (Ryan & Deci, 2002).

In sport, another concept involving the internalization of behaviours into the self is athletic identity. It is defined as the degree to which athletes identify themselves with a particular athletic role (Brewer, Van Raalte, & Linder, 1993). Athletic identity is a multidimensional construct that consists of cognitive, social, and affective components (Lamont-Mills & Christensen, 2006). Markus (1977) discussed it as a *self-schema*, which consists of cognitive generalizations made about the self, compiled from past social experiences and behaviours that are organized in such a way to quickly process new information into categories. These generalizations are thought to be a reciprocal relationship between one's perceptions and their behaviours, which can also be influenced by the environment and significant others (Shavelson, Hubner, & Shanton, 1976). Markus argued that once a certain self-schema was created (e.g., an athletic identity), individuals would become resistant to information that contradicted their self-schema. A strong athletic identity has interesting implications in the realm of sport, especially when examined in a competitive sport setting. In the present study, the presence of an athletic identity was examined in the sport of curling, to see if it was related to different types of sport motivation, as well as different functions of imagery use. Each of these three constructs will now be considered in more detail. For a glossary of the constructs and their abbreviations used throughout the thesis (i.e., the various imagery functions, behavioural regulations, and athletic identity), please refer to Appendix A.

Imagery in Sport

Over the past four decades, many theorists have attempted to explain imagery's powerful effects on behaviour in sport. A popular theory used to describe how imagery

operates is Lang's (1977; 1979) bioinformational theory. According to Lang, the use of mental imagery to produce overt, emotional responses is an innate ability in humans. Characteristics of different mental images are stored in the brain's long-term memory and organized as a mental schema. When athletes engage in mental imagery practice, stimulus characteristics regarding the content of those images are activated. This causes the activation of specific response characteristics (e.g., physiological activity and the resulting behaviours). Unwanted response characteristics associated with a particular image such as anxiety or lack of focus can be modified through imagery practice in order to improve performance (Vealey & Greenleaf, 2010). When developing imagery scripts based on Lang's theory, it is believed that scripts containing many response characteristics will produce images that are more vivid than scripts containing many stimulus characteristics (Paivio, 1985). Ahsen's (1984) Triple Code (ISM) Model added a third element to the bioinformational theory's stimulus and response characteristics – the meaning of the image to each individual. According to Ahsen, imagery consists of three parts: the image (I), the somatic response (S), and meaning (M). Ahsen believed that because all individuals carry their own unique sets of experiences with them, they would always interpret imagery instructions differently than others. This belief is evident in other areas of psychology as well. For example, in the development of his social cognitive theory, Bandura (1986) postulated that any changes due to imagery depends on a combination of unique personal, behavioural, and environmental factors that affect an individual's interpretation of imagery.

As discussed above, Paivio (1985) and Hall et al. (1998) proposed a framework for how imagery functions in sport. Martin and colleagues (1999) using this framework

put forth the Applied Model of Imagery Use in Sport. They identified four key constructs that must be considered when examining imagery use in sport. The model consists of three causal stages (sport situation → imagery function → desired outcome) with a moderating variable between imagery function and desired outcome (i.e., imagery ability). The model suggests that for imagery to be most beneficial, the function employed should match the desired outcome (i.e., improve skills and strategies, modify cognitions, regulate arousal and anxiety). For example, if athletes want to improve a specific skill, CS imagery should be used. If they need to improve their confidence, MG-M imagery should be employed. The model was summarized nicely by Short and colleagues (2006) in that the model's predictions are essentially "what you see is what you get" (e.g., the imagery of skills would likely improve skill execution). As well, Martin and colleagues recognized in their model that imagery is used differently in each of the two sport situations (i.e., training and competition). In training, the cognitive functions of imagery tend to play a larger role, and in competition, the motivational functions are emphasized. Imagery ability was included as a moderator given that research has shown that greater ability may lead to greater performance gains (e.g., Goss, Hall, Buckolz, & Fishburne, 1986).

Imagery Use by Athletes

In their qualitative examination of the four Ws of imagery use – where, when, why, and what – Munroe, Giacobbi, Hall, and Weinberg (2000) added insightful information regarding imagery use by athletes. With respect to 'where', athletes reported using imagery extensively in both training and competition, and they described doing so before, during and after each – the 'when'. In terms of 'what' they imaged (i.e., the

content of images), they described various characteristics such as the frequency with which they use imagery. It is employed most often just before competition and during practice. It is important to note that some researchers believe athletes should physically rehearse a new skill first before attempting to practice it using imagery (Smith, 1987). This is to ensure that they understand the proper techniques required and get an internal sense of how they are supposed to perform that skill. Without this understanding, athletes may visualize incorrect techniques, causing them to physically perform that skill using the incorrect techniques, which would have little or no effect on improving their performance. Other research has found that athletes can also benefit from using imagery immediately after a successful performance, allowing them to re-experience the positive aspects of their performance, increasing their feelings of confidence and competence for their next performance (MacIntyre & Moran, 2007; Orlick, 1980).

Munroe et al. (2000) found that the duration of athletes' imagery sessions varied greatly. Researchers have suggested that it is important for imagery sessions to be kept short (approximately five to ten minutes in length) in order to maintain an optimal level of concentration for the entire duration of the session (Munroe et al., 2000; Smith, 1987). Research also has found that it may take at least eight weeks of imagery practice before athletes notice a significant increase in their performance (Bennett & Pravitz, 1982; Smith, 1987). Thus, athletes must be cautioned not to expect immediate effects, or else they may quickly become discouraged.

Munroe and colleagues (2000) also found that images can be positive, such as imagining accurate execution of skills or successful outcomes, or negative, such as imagining incorrect execution of skills or failure. Athletes in this study were found to use

positive imagery more often during practice and pre-competition and negative imagery during competition (Munroe et al., 2000). Successful athletes typically use more positive imagery (i.e., seeing themselves winning and receiving awards) than negative imagery (i.e., losing), providing evidence that imagery is used by those athletes as a form of motivation (Hall, Rodgers, & Barr, 1990). As would be expected, athletes perform better when using positive imagery (e.g., imagining success) than negative imagery (Martin et al., 1999). A study looking at the effects of negative suppressive imagery on golf putting performance found golfers in the group using negative suppressive imagery before every putt (i.e., trying not to think about hitting the ball past the hole) had the poorest putting performances. Golfers in the positive imagery group (i.e., imaging hitting the ball into the hole) had the better performances (Beilock, Afremow, Rabe, & Carr, 2001).

Furthermore, athletes report using two perspectives when engaging in imagery practice (Munroe et al., 2000). An internal imagery perspective involves athletes envisioning themselves performing a skill from their own perspective, as if they were actually performing that skill in real time. An external imagery perspective involves athletes seeing themselves perform a skill from outside their body, as if they were another person (i.e., a spectator) watching them perform (Vealey & Greenleaf, 2010). Recent research by Callow and Roberts (2010) found that athletes tend to have a preference for either the internal or external imagery perspective.

In addition to the two perspectives previously described, there are also four different modalities of imagery used by athletes: visual, kinesthetic, auditory, and olfactory (Munroe et al., 2000). Visual and kinesthetic imagery have been the focus of most research, with athletes typically using visual imagery most often (Hall et al., 1990).

However, in their sample of British athletes, Callow and Roberts (2010) found that both visual and kinesthetic imagery tend to be used concurrently. Most of the sport research considering visual and kinesthetic imagery has focused on athletes' imagery abilities. Gregg, Hall, McGowen, and Hall (2011) found that both visual and kinesthetic imagery ability predicted CS imagery use in a large sample of mostly recreational and club athletes from 45 different sports. Increased visual and kinesthetic imagery abilities have also been reported in high-confident athletes (e.g., Moritz, Hall, Martin, & Vadocz, 1996). In fact, Vadocz, Hall, and Moritz (1997) were able to classify medalists and non-medalists based on the presence of self-confidence and high kinesthetic imagery ability. While most research on imagery ability has focused on the visual or kinesthetic modalities, it has been argued that the use of all four imagery modalities yields the most accurate and detailed images (Vealey & Greenleaf, 2010).

Finally, Munroe et al. (2000) found that athletes reported using imagery for the five functions outlined by Hall et al. (1998). These functions represent 'why' athletes use imagery and have been the subject of most imagery investigations. They will be considered next.

Research on the Five Functions of Imagery

As initially noted in Paivio's (1985) framework, athletes use imagery for both cognitive and motivational functions. Imagery use by athletes as measured by the SIQ has been examined in many sports, resulting in a general trend that CS and MG-M imagery are used most often (e.g., Hall et al., 1998; Hallman & Munroe-Chandler, 2009; Watt, Spittle, Jaakkola, & Morris, 2008) and MS imagery is used the least often (e.g., Hallman & Munroe-Chandler, 2009; Munroe, Hall, Simms, & Weinberg, 1998). Overall

findings have also suggested that athletes who compete at higher levels tend to use imagery more frequently (e.g., Hall et al., 2009; Watt et al., 2008). Imagery practice has been found to improve imagery ability (Gregg et al., 2005). Similarly, athletes who use imagery more often tend to find imagery more effective and easier (Nordin & Cumming, 2008), and have higher imagery abilities (Vadocz et al., 1997). In addition, athletes competing at more elite levels have been found to use imagery more deliberately (Nordin, Cumming, Vincent, & McGrory, 2006). There have been mixed reports regarding whether gender differences exist when considering the frequency and perceived effectiveness of imagery use. Hall (2001) reported only minor gender differences in imagery use, while Weinberg, Butt, Knight, Burke, and Jackson (2003) found that males used imagery more than females and perceived it as being more effective. This is not to say that there are gender differences in the ability to engage in imagery, as this has not been widely reported in the literature (e.g., Morris, Spittle, & Watt, 2005).

When examining the use of imagery by varsity athletes from 10 different sports across the course of a competitive season, Munroe and colleagues (1998) found that changes in imagery use varied according to sport. Most sports showed an increase in MS and CG imagery use across the competitive season, and CS imagery use was found to increase for field hockey, soccer, wrestling, rugby, and fencing. Finally, only rugby, soccer, and wrestling showed significant increases in all three of these motivational functions across the competitive season, although all athletes reported using MG-M and MG-A the most at both time periods measured. Similar results have been found in a sample of Finnish synchronized skaters from three different competitive levels (Arvinen-

Barrow, Weigand, Hemmings, & Walley, 2008); skaters in all levels used more CG, MS, and MG-M imagery during the competitive season compared to the pre-season.

Athletes in individual sports perceive imagery as being more effective when compared to athletes in team sports (Weinberg et al., 2003). This finding was attributed to the lack of control perceived by athletes in team sports, whereas individual sport athletes tend to know exactly what they need to do in an upcoming competition.

Arvinen-Barrow, Weigand, Thomas, Hemmings, and Walley (2007) found that athletes in open skilled sports (e.g., martial arts and rugby) used significantly more MG-A imagery than athletes in closed skill sports (e.g., figure skating and golf), likely due to the differences in arousal imagery needed in the different sports. One study has examined differences in imagery use within different positions on a sports team. Looking at competitive male ice hockey players, Hallman and Munroe-Chandler (2009) found that goaltenders used significantly more CS and MG-M imagery than their teammates who played defense or forward. In addition, the goaltenders reported having more vivid and clear images from using both internal and external perspectives, when compared to forwards. Thus, the functions of imagery used depend highly on the individual demands required by different sports (White & Hardy, 1998). Furthermore, athletes may use the same image for different functions (Short, Monsma, & Short, 2004), and some functions may be used for one or more purpose (Callow & Hardy, 2001). For example, CG imagery has been used for strategy learning and development, as well as to help athletes stay focused, which falls under the MG-M function (Nordin & Cumming, 2008). These differences are important for practitioners to keep in mind when working with athletes who are looking to use imagery to achieve a particular outcome.

Imagery Interventions

Employing imagery interventions is the best way to determine effectiveness of the various imagery functions in sport. Hall (2001) pointed out that a majority of studies conducted on imagery have focused on CS imagery, with results being generally supportive of the notion that CS imagery practice can positively influence both skill learning and performance (e.g., Driskell, Copper, & Moran, 1994; Morris et al., 2005). In contrast, there has been a limited amount of research concerning CG imagery. Researchers have only begun to conduct imagery interventions on CG imagery, likely because of the difficulties associated with measuring strategy performance (Westlund, Pope, & Tobin, in press). Imagery interventions conducted using CG imagery have been met with mixed results; Guillot, Nadrowska, and Collet (2009) found their intervention to be effective, but Munroe-Chandler, Hall, Fishburne, and Shannon (2005) failed to find a significant effect on performance following their CG imagery intervention.

With respect to motivational imagery studies, an intervention conducted by Callow, Hardy, and Hall (2001) using elite junior badminton players found some support for the effect of MG-M imagery on confidence. Three out of the four athletes involved in the intervention showed increases in their level of confidence from baseline to post-intervention. Munroe-Chandler, Hall, and Fishburne (2008) found that MG-M imagery was a significant predictor of self-confidence and self-efficacy in youth soccer players playing at both recreational and competitive levels. In addition, an imagery intervention conducted with undergraduate students found that MG-M imagery could improve individual students' collective efficacy scores when performing a team-based task (Shearer, Mellalieu, Thomson, & Shearer, 2007). Finally, Shearer, Thomson, Mellalieu,

and Shearer (2007) found that MG-M imagery predicted collective efficacy in a sample of elite athletes from various team sports. However, the same relationship was not obtained for non-elite athletes.

Martin and Hall (1995) were one of the first researchers to conduct an intervention that revealed the presence of a relationship between imagery use and sport motivation. Participants were divided into one of three experimental conditions: a performance + outcome imagery group, a performance imagery group, and a control group. Results showed that participants in the performance imagery group developed stronger self-evaluative cognitions (i.e., standards against which participants compared their performance), set higher goals for themselves, and had more realistic expectations of their performances compared to participants in the control group. In addition, they found that the use of performance imagery caused participants to become more motivated to practice outside of the lab. Since this study was conducted before the publication of the SIQ, there is no way of determining which functions of imagery the participants were actually using. However, the results still offered support for Paivio's (1985) framework of imagery use, showing that imagery could be used to enhance motivation. Given the relatively large number of studies that have demonstrated the link between imagery and motivation, it is of interest to the present study to explore a prominent theoretical framework to explain different types of motivation and how they can affect athletic performance.

Self-Determination Theory

Since its origination, SDT has grown to include five mini-theories that explain its original assumptions. The first mini-theory, called the Cognitive Evaluative Theory, describes how social contexts influence an individual's IM (Ryan & Deci, 2002). This mini-theory focuses mainly on how IM can be undermined by tangible rewards and controlling environments (Ryan & Deci, 2002). The second mini-theory is known as the Organismic Integration Theory and explains the different aspects of EM. It is within this mini-theory that the well-known self-determination continuum exists. It is this continuum that is relevant to the present study.

At the least self-determined side of the continuum lies amotivation. Individuals who are amotivated are known to 'go through the motions' of a behaviour without any intention to act (Ryan & Deci, 2002). Next on the continuum is EM, which consists of four different subtypes; external regulation, introjected regulation, identified regulation, and integrated regulation, again ranging from least to most self-determined. External regulation refers to behaviours that are engaged in to avoid punishment or gain external rewards. Introjected regulation is considered to be somewhat internalized, but not part of an integrated self. Behaviours engaged in through introjected regulation are performed in order to boost one's ego or feelings of self-worth, as well as decrease feelings of shame or guilt. The next form of EM is identified regulation, by which individuals engage in behaviours because they are personally valued. It is possible, however, for identified regulations to be compartmentalized, in that they may be separate from other values held by that individual and not be representative of their overall values. The final form of EM is integrated regulation, which is the most self-determined extrinsic regulation.

Behaviours motivated by integrated regulation are considered to be part of the self-concept. They are typically associated with more positive experiences, but are still engaged in for an external outcome and not necessarily reflective of one's interests.

External regulation and introjected regulation are considered to be controlled regulations in that they are motivated by external rewards (e.g., money), praise from others, the avoidance of punishment, or to avoid negative feelings of guilt or shame (Ryan & Deci, 2002). On the other hand, the identified and integrated regulations are considered to be autonomous regulations, and while still governed by external reasons, individuals with these types of motivation engage in certain behaviours because they are personally valued, or in the case of integrated regulation, because they fit with the individual's self-concept. The final form of human motivation along this continuum (and most self-determined) is IM. It occurs when an individual engages in a particular behaviour for the instinctive pleasure and interest in an activity. Research by Ryan and Connell (1989) has determined that the self-determination continuum exists in a quasi-simplex pattern such that regulations directly adjacent to each other typically show the strongest inter-correlations with each other, while regulations further apart from each other show weaker inter-correlations. In terms of the self-determination continuum and the basic psychological needs (discussed below), SDT suggests that the internalization of a behaviour is largely affected by the need for autonomy (Ryan & Deci, 2002). In order to fully internalize a behaviour, individuals are required to transform that behaviour into a personal value and integrate that value into their sense of self (Ryan & Deci, 2002).

The final three mini-theories are the Causality Orientations Theory, Goal Contents Theory, and Basic Needs Theory. The Causality Orientations Theory predicts

human behaviour based on individual differences affecting how one chooses particular social environments based on autonomy, controlled, and impersonal orientations (Ryan & Deci, 2002). If an individual is more autonomy-oriented, they will choose behaviours based on personal values and interests, reflecting IM and integrated regulation.

Individuals who are controlled-oriented choose behaviours that are directed by social factors, reflecting introjected regulation or external regulation. Lastly, individual with an impersonal orientation engage in more amotivated behaviours and tend to act without intention (Ryan & Deci, 2002). The Goal Contents Theory discusses goals in terms of their intrinsic (i.e., personal growth, affiliation, and community) or extrinsic (i.e., fame, wealth, and popularity) nature. The pursuit of intrinsic or extrinsic goals is proposed to lead to either positive or negative outcomes, respectively, on one's psychological well-being (Ryan & Deci, 2002).

The final mini-theory, called the Basic Needs Theory is one of the central aspects of SDT; it revolves around three basic psychological needs, seen universally across all cultures and at all stages of development. Consideration of the psychological needs is critical in order to acquire a thorough understanding of human motivation (Deci & Ryan, 2000). The three basic psychological needs are competence, relatedness, and autonomy (Ryan, & Deci, 2002). Competence refers to optimizing and maintaining one's capabilities in a certain activity and feeling confidence when engaging in those activities (Ryan & Deci). Relatedness is the psychological feeling associated with being connected with other people and having a sense of belongingness with others and within one's community (Ryan, 1995). Autonomy refers to the feeling one gets when they perceive themselves as choosing their behaviours (Deci & Ryan, 1985). These needs are not

learned over time, but instead are innate aspects of human motivation, as humans will engage in certain behaviours both consciously and unconsciously in order to fulfill them (Deci & Ryan, 2002).

Many researchers and theorists have aimed to explicate the different types of human motivation based on SDT and its mini-theories. One prominent model that emerged within the past 15 years is Vallerand's (1997) Hierarchical Model of Intrinsic and Extrinsic Motivation. It was based on the notion both IM and EM had been a major focus of motivation research, even before SDT was developed. Vallerand proposed five postulates to explain the complexity of motivation based on the facts that IM, EM, and amotivation can be differentiated based on each of their abilities to: explain a large range of behaviours, embody vital parts of the human experience, and produce a range of consequences at various levels of generality. Postulate one states that a complete analysis of motivation must include IM, EM, and amotivation. Based on various confirmatory factor analyses, Vallerand's model expanded upon the original premises of SDT by dividing IM into three subtypes: IM to know, IM to accomplish, and IM to experience, generating a multidimensional construct, similar to EM. IM to know refers to the motivation to explore, learn, and understand new things. IM to accomplish refers to the motivation to accomplish a task, or exceed one's abilities or expectations. Lastly, IM to experience refers to the motivation to experience stimulating sensations.

Postulate two states that IM, EM, and amotivation exist at three levels of generality (Vallerand, 1997). The global level consists of an individual's general motivational orientation. This is the most stable level and describes that individuals will generally act intrinsically, extrinsically, or be amotivated towards their environment.

Becoming more specific, the contextual level consists of different motivational orientations towards different contexts of one's life (e.g., education, family, sports). The most specific level, known as the situational or state level of motivation, refers to how an individual will act in a given situation at a specific time. This is thought to be the most unstable because it consists of immediate responses to one's environment. Researchers typically calculate what is known as the Self-Determination Index to determine an individual's motivational orientation at a given level (Vallerand & Ratelle, 2002).

Postulates three and four discuss the relationships between the three levels of generality. In postulate three, motivation is thought to be affected by both social factors, existing at one of the three levels of generality and mediated by the fulfillment of one's basic psychological needs, as well as top down effects from the next highest level (i.e., global → contextual → situational; Vallerand, 1997). In other words, global levels of motivation are thought to have greater effects on contextual levels, and contextual levels are thought to have greater effects on situational levels of motivation. Postulate four concerns the opposite effect, where there exists a bottom up relationship between the levels of generality (i.e., situational → contextual → global). In this case, situational levels of motivation are thought to have a greater effect on contextual levels, and contextual levels are thought to have a greater effect on global levels of motivation.

Postulate five discusses the consequential effects that different types of motivation have on cognitive, affective, and behavioural consequences. It reinforces the SDT continuum in that consequences are less positive as individuals become less self-determined (e.g., behaviours regulated by controlled EM or amotivation) and more positive as individuals become more self-determined (Deci & Ryan, 1985).

Consequences will also transpire at the same level of generality at which they occur (e.g., global motivation results in global consequences).

Sport Motivation

In sport, motivation has been widely cited as a fundamental aspect of both achievement and performance (Duda & Treasure, 2001). Much of the research conducted on motivation in sport has focussed on either participation motivation or achievement motivation, although there has been an increase in focus on participation motivation (Frederick-Recascino, 2002). This is almost entirely due to the fact that sport requires a significant amount of discipline, in addition to focus, energy, and exertion, all of which cause or *motivate* athletes to engage in behaviours associated with sport (Ryan & Deci, 2007). SDT is commonly used to examine motivation in sport due its inclusion of the basic psychological needs as predictors of sport participation, focusing specifically on the needs for competence and autonomy, and SDT's autonomy continuum. Vallerand, Deci, and Ryan (1987) suggested that athletes might be motivated to participate in sport for one of two reasons. Athletes may participate in sport for enjoyment or fun (i.e., IM) or to obtain tangible benefits, such as material or social rewards, or to avoid punishment (i.e., EM). Many studies have linked more internalized motivations (i.e., IM, integrated regulation, and identified regulation) with more positive outcomes, including frequency of participation (Alexandris, Tsorbatzoudis, & Grouios, 2002; Hodge, Allen, & Smellie, 2008), long-term sport performance (Gillet, Berjot, & Gobanc  e, 2009), positive affect (Assor, Vansteenkiste, & Kaplan, 2009), well-being (Assor et al., 2009; Chatzisarantis & Hagger, 2007b), adaptive perfectionism in the form of increased effort and coping skills (Mouratidis & Michou, 2011), and sportpersonship orientations (Chantal, Robin, Vernat,

& Bernache-Assollant, 2005; Donahue et al., 2006). Other studies examining less self-determined motivations (i.e., introjected regulation, external regulation, and amotivation) have found links with negative outcomes such as burnout (Lonsdale, Hodge, & Rose, 2009), concern over mistakes and ineffective coping (Mouratidis & Michou, 2011), and negative affect (Mouratidis, Lens, & Vansteenkiste, 2010). There are mixed results as to whether gender differences exist in self-determined motivation (e.g., Mouratidis & Michou, 2011; Pelletier, Fortier, Vallerand, & Brière, 2001). One study did find that females exhibited lower levels of IM, identified regulation, and introjected regulation compared to males, in addition to showing a maladaptive emotional pattern consisting of fewer reports of well-being (Mouratidis et al., 2010).

In an analysis of SDT and the Hierarchical Model of Intrinsic and Extrinsic Motivation, Vallerand and Losier (1999) proposed a motivational sequence to help explain the antecedents and consequences of IM and EM in sport: Social Factors → Psychological Mediators (i.e., autonomy, competence, relatedness) → Motivation (i.e., IM, EM, amotivation) → Consequences. In terms of social factors, Vallerand and Losier suggested that the experience of success or failure had the ability to affect whether or not individuals fulfilled their basic psychological needs, which of course affects the degree of self-determined motivation, and finally certain cognitive, affective, or behavioural consequences. For example, the experience of failure would cause athletes to feel incompetent, leading to lowered levels of self-determined motivation. As seen in the literature, failing to fulfill one's psychological needs has the ability to undermine an individual's IM, which in turn is well known to lead to negative psychological consequences (Ryan & Deci, 2007). A second social factor discussed as being part of the

model is that of competitiveness. It has been found in the literature that similar to failure, competitiveness can undermine some athletes' IM. The final social factor discussed was the influence of coaches' behaviours. Being the most important interpersonal relationship in sport, it is no surprise that having a controlling coach or an autonomy supportive coach can have significant effects on an athlete's degree of self-determined motivation.

Looking at how different types of self-determined motivation affect cognitive, affective, and behavioural outcomes was the focus of Bhatnagar and Karageorghis' (2008) study. Using a group of track athletes from various clubs in the London, United Kingdom area, the authors found amotivation to emerge as a strong negative predictor of concentration (cognitive), satisfaction (affective), and persistence (behavioural). Surprisingly, neither IM nor EM was found to predict any of the motivational outcomes. This is in contrast to what would be expected according to the SDT (e.g., Deci & Ryan, 1985; Vallerand, 1997). This may be due to the nature of the sport examined. Track and field is unique compared to other sports in that a team consists of different types of athletes competing in vastly different events (e.g., sprinters, jumpers, throwers). This may result in competition between the different events for funding, use of training facilities, or media attention, all of which could lead to the athletes experiencing less self-determined forms of motivation (Bhatnagar & Karageorghis). As well, it is important to note that data for this study were collected during the peak of the athletes' competitive season. Thus it is likely that any IM was undermined by external competition pressures (e.g., Fortier, Vallerand, Brière, & Provencher, 1995; Ryan & Deci, 2002).

An examination of the Hierarchical Model of Intrinsic and Extrinsic Motivation was undertaken using dyadic sports (e.g., badminton, synchronized swimming, and figure skating), where athletes compete in pairs (Gaudreau & Fecteau, 2010). This was a unique approach as research focussing on self-determination in sport is typically conducted at the individual level (Gaudreau & Fecteau). The results found support for the relationship between self-determined motivation and positive outcomes. More specifically, this relationship was stronger when an individual with high levels of self-determined motivation was paired with another individual with similarly high levels of self-determined motivation toward sport. A moderating effect for relationship quality was noted, as well as a marginally significant effect for cohesion as a moderator, suggesting the need for future research using dyads.

Sport Motivation in Recreational Athletes

Shifting the focus slightly, the frequency of recreational sport participation was examined in a sample of Greek adults. Alexandris and colleagues (2002) found evidence of a positive relationship between self-determined motivation and levels of sport participation. Participants were divided into groups based on whether they participated daily, weekly, monthly, or less than monthly. Those who participated in recreational sports on a daily basis showed higher levels of IM and EM and lower levels of amotivation compared to all other groups, while those who participated on a weekly basis showed greater levels of IM and decreased levels of amotivation compared to those who participated monthly and less than once a month. When looking at perceived constraints on motivation type, the authors found that the following intrapersonal dimensions, lack of knowledge, lack of interest, individual/psychological, and lack of time, were significant

predictors of amotivation. Amotivation subsequently predicted decreased levels of participation. This falls in line with predictions made by SDT as well as the characteristics of amotivation.

When comparing the effects of participation in recreational and competitive sport, one study found that recreational athletes emphasized intrinsic life aspirations more than extrinsic life aspirations such as placing more value on forging meaningful relationships, focusing on personal development, and health (Chatzisarantis & Hagger, 2007b). This finding may be due to the fact that recreational sports are not as focused on winning and/or the attainment of external rewards as competitive sports. By focussing on intrinsic life aspirations, the recreational athletes in this study reported experiencing increased levels of hedonic enjoyment and eudemonia (i.e., having a sense of purpose in life). The authors contended that placing a lesser value on intrinsic life aspirations and a focus on extrinsic aspirations works to undermine eudemonia and hedonic enjoyment. They argued that their findings revealed both that beneficial effects of recreational sport participation on psychological well-being exist, as well as why these effects occur.

Sport Motivation in Competitive Athletes

Again considering competitive sports, one study focused exclusively on an adolescent sample of elite sport athletes to investigate if adolescents could distinguish between two hypothesized types of introjected motivation, introjected approach and introjected avoidance (Assor et al., 2009). This specific group of student athletes was chosen because they were deemed to have strong athletic identities due to heavy investment in their sports. Overall findings suggested that the adolescent athletes could in fact differentiate between both types of introjected motivation. In addition, it was

found that introjected avoidance motivation was associated with negative outcomes (e.g., negative affect and depressive feelings). This was especially evident in girls, as introjected avoidance motivation was negatively related to maladaptive indicators, suggesting that female athletes may be at risk of experiencing greater competitive pressure, which causes them to be more sensitive to the consequences of failure. Introjected approach motivation was not significantly related to any of the measured outcome variables. Following the self-determination continuum, it was found that introjected avoidance was more positively associated with external regulation than was introjected approach motivation. In addition, introjected avoidance motivation was seen as being more controlling and less autonomous than introjected approach motivation. Both findings provide evidence for a potentially more refined autonomy continuum, as introjected approach motivation is seen as more autonomous than introjected avoidance. However, it is still less optimal than identified regulation for self-determined motivation.

Differences in self-determined motivation have been found when examining the relationship between competitive athletes who dropout from sport and those who are persistent and continue with their sport in future seasons. Dropping out was significantly related to less self-determined motivation in a sample of adolescent female handball players (Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002), and a sample of adolescent competitive swimmers (Pelletier et al., 2001). These athletes had significantly higher levels of amotivation and lower levels of IM (as found in both studies), as well as higher levels of external regulation and lower levels of identified regulation in the Pelletier et al. study. In addition, decreased fulfillment of the three basic psychological needs (i.e., competence, autonomy, and relatedness) was found by Sarrazin and colleagues in the

handball players who dropped out. An analysis of drop-outs' perceived coach motivational climate was found to be significantly less task-involved and significantly more ego-involved, prompting the creation of the following model: Coach's behaviour towards female handball → Perceptions of competence, autonomy, and relatedness → Level of self-determined motivation → Intentions to dropout. Furthermore, Sarrazin and colleagues found that the effect of motivation on behaviour was fully mediated by behavioural intentions. Motivation was found to account for 62% of the variance in behavioural intentions, while behavioural intentions accounted for 31% of the variance in actual behaviour. The authors posited that the disconnect observed between the three variables may have been due to the fact that dropout may not have been fully controlled by the athletes (e.g., a serious injury), or because the study was prospective in nature and measured behavioural intentions 21 months in advance.

Pelletier and colleagues (2001) on the other hand, examined coaches' behaviour in terms of autonomy support and control. They found that athletes who persisted and remained in swimming perceived their coaches to be significantly more autonomy supportive and less controlling, which were related to higher levels of IM, identified regulation and introjected regulation. Dropout athletes who perceived their coaches as controlling exhibited higher levels of introjected regulation, external regulation, and amotivation. Pelletier and colleagues continued their examination of athlete persistence in sport over 10 and 22 months. They found that high levels of IM and identified regulation predicted athlete persistence at both 10 and 22 months and that amotivation was a strong negative predictor of persistence at those time periods. Interestingly, introjected regulation was found to be a positive predictor of persistence at 10 months but

not at 22 months, and external regulation was found to be a negative predictor of persistence at 22 months but not at 10 months. In trying to explain the findings associated with introjected and external regulation, the authors suggested that while introjected regulation can positively motivate behaviour, its effects are only sustainable over a shorter period of time, thus resulting in a behaviour that is less stable, less persistent, and less well performed.

To summarize, research has found that long-term sport participation is more likely if athletes' motivation is more self-determined or autonomous (Chatzisarantis & Hagger, 2007a). In other words, athletes continue to participate in their sport because it is personally rewarding and/or has become integrated into their sense of self. Explanations for why this occurs can be understood when one considers the athletic identity and how it motivates and maintains behaviour in sport.

Athletic Identity

The notion that in order to achieve optimal performance, athletes need to focus the majority of their efforts towards their sport has become a societal norm (Danish, 1983). A high level of concentration on the athletic role and status is essential in order to remain focused on sport-related goals, as noted in a study conducted with 10 former Olympic athletes (Stephan & Brewer, 2007). This causes athletes to develop a strong athletic identity, which in turn influences how they perceive any sport-related event (e.g., financial support, an injury) that affects their ability to function as an athlete (Brewer et al. 1993). This sport-based evaluation can have either positive and negative effects on athletes' functioning and well-being (Hale, James, & Stambulova, 1999).

Quantitative research on athletic identity has found it to be greater in males (Brewer et al., 1993; Fraser, Fogarty, & Albion, 2009; Phoenix, Faulkner, & Sparkes, 2005; Wiechman & Williams, 1997), athletes at higher competitive levels (Lamont-Mills & Christensen, 2006; Wiechman & Williams, 1997), athletes who spend more time participating in their sport (Tasiemski, Kennedy, Gardner, & Blaikley, 2004), and athletes who feel obligated to participate in their sport (Gapin & Petruzzello, 2011). Mixed results have been found in regards to the relationship between athletic identity and age. Houle, Brewer, and Kluck (2010) found athletic identity to increase between the ages of 10 and 15 in a sample of female gymnasts. However, athletic identity was found to decrease with age in a sample of male varsity football players (Brewer et al., 1993) and a sample of elite Australian athletes (Fraser et al., 2009). With respect to ethnicity, one study found significant differences across ethnic groups in a sample of high school athletes; Mexican-Americans had the highest levels of athletic identity, followed next by Caucasians, with African-Americans reporting having the lowest levels of athletic identity (Wiechman & Williams, 1997). Interestingly, a significantly larger proportion of the African-American athletes reported having expectations to play professional sports than Mexicans and Caucasians. Wiechman and Williams discussed this finding as being alarming and suggested that there may be a disconnect in minority groups in that they see sports as their only way to achieve success in life, and thus hold unrealistic expectations regarding the likelihood of achieving a professional sports career.

Focusing on athletic identity in women, a qualitative study conducted by Meyer (1990) discovered some issues which female collegiate athletes face being student-athletes. Participants reported feeling like their sport ruled their lives and that practices

took up too much of their time. Many of them felt like they had more fun playing sports in high school than they were having in university. In addition, the women experienced a variety of academic pressures and a lack of social recognition for being student-athletes. On the plus side, these participants did not encounter the same types of issues with roommates as the majority of their friends consisted of fellow athletes. The women in this study also expressed feelings of gratitude for not being a male athlete due to the increased amount of pressure placed on males by their coaches to perform consistently at their best in order to secure scholarships and be drafted – something that is not as prevalent for female athletes. These findings highlight the fact that women typically receive less recognition for sport, as well as less funding than men receive, which may help explain why women tend to have weaker athletic identities compared to men.

Further examining the gender differences between men and women, a study by Mignano, Brewer, Winter, and Van Raalte (2006) revealed that student-athletes at a women's college had higher athletic identities than women at a coeducational college (i.e., attended by both men and women). The authors thought that this was due to differences in the way resources are distributed at each type of college. Naturally, female athletes would be the recipients of all athletic funding at the women's college, while funding would be shared or perhaps reduced at coeducational colleges, where the focus would be on male athletes and developing them for careers in professional sport.

Effects of a Strong Athletic Identity

Participation in sport can have a positive or negative influence on one's social development (Danish, 1983). This also is evident with the construct of athletic identity, as "sport can be a place where one begins to know oneself" (Danish, p. 237). Individuals

with a strong athletic identity are thought to be more likely to participate in sport (Brewer et al., 1993). As well, a stronger athletic identity is required for athletes to be successful at an elite level because they are required to sacrifice activities (e.g., their social lives) to focus solely on their sport (Danish, 1983; Gould, Dieffenbach, & Moffett, 2002). Horton and Mack (2000) found that a strong athletic identity could provide athletes with both psychological and physical benefits (e.g., increased body image and self-confidence, as well as lowered anxiety levels). It also has been suggested that participation in competitive sport teaches athletes life skills, such as good sportsmanship attitudes (Danish, 1983). In these ways, it has been deemed an adaptive developmental process in striving for success in athletic domains (Steinfeldt & Steinfeldt, 2010).

Qualitative studies have been conducted to gain a more in-depth understanding of the effects of developing a strong athletic identity, especially in elite athletes. One such study was conducted by Stephan and Brewer (2007) with 10 former Olympians from various individual sports and found that the maintenance of athletic identity could be achieved through one of two ways, through social factors and through personal factors. Types of social factors that were highlighted by the athletes included socio-professional flexibility, influences of their coach, contact with peers and teammates, and social recognition. If the athletes held a job outside of their sport, they reported receiving benefits in terms of flexibility in their work schedule, usually in exchange for promotional use of their image within the company. Their coaches and any sport staff were always directly involved in their training and ensured that the athletes were not distracted from any external factors that may affect their focus towards their sport. Since the athletes spent such a significant amount of time training, they tended to associate

primarily with other athletes; however, they were sure to mention that they always had to keep those relations at a distance in order to maintain their superiority over other athletes. Finally, the athletes spoke of constantly seeing themselves portrayed in the media as Olympic athletes, which they found tremendously flattering.

In terms of personal factors, two were acknowledged; identification with the elite sport lifestyle and the bodily dimension of elite sport (Stephan & Brewer, 2007). The athletes' lives were so highly organized around training, travelling, and competition that these behaviours quickly became integrated into their self-concept. As well, they were continually reminded of their self-identification as elite athletes through their muscular, toned, athletic bodies. They served as living proof that they were not simply the average person as they are able to make their bodies do things that the majority of people simply cannot do. Stephan and Brewer argued that it is easy to see how all these social and personal influences would serve to strengthen the Olympians' athletic identities. They were constantly being treated as elite athletes at work and in the media, and their lifestyles and physical appearances were those of an elite athlete. Sport had become so integrated into the identities of these athletes that eventually, their entire existence was solely through sport. This also came at the expense of any other identities they may hold in other domains. For example, when the athletes were able to be at work, they reported always being recognized as athletes and not for their contributions as an employee of the company. The results in this study are similar to findings by Assor, Roth, and Deci (2004), who concluded that adolescent athletes in elite sport settings learn to base their self-worth and identities on others' regard. Assor and colleagues (2009) suggested that this could be avoided if athletes are taught to focus their self-worth and identities on the

personal value of their sport instead of how other people see them because of their participation in elite sport.

Research by Adler and Adler (1989) focused on a strong athletic identity as becoming what they called the “glorified self.” This is cultivated in athletes who have developed a public persona in response to increased media attention, making them a celebrity. While the glorified self seems to be exciting at first, the authors noted many consequences for athletes who conform to such an identity. Athletes who develop a glorified self do so at the expense of their future selves and the multidimensionality of their present selves; both are restricted. Adler and Adler discussed the possibility of athletes becoming so focused on their glorified selves that they forget about anything that does not relate to that self (e.g., commitments to school, family, or friends). Thus, their ego ends up becoming so inflated that they end up with feelings of fragmentation, as they can no longer integrate their former and current selves.

While research has established that a strong athletic identity is required for athletes to be successful at elite levels, the ensuing benefits only seem to occur when the identity is present in moderation (Gaudreau, Amiot, & Vallerand, 2009). Accordingly, elite athletes may experience several negative outcomes as a consequence of having too strong of an athletic identity. Negative aspects of having a strong athletic identity are for the most part associated with various developmental transitions. Transitions are defined by Pearson and Petitpas (1990) as physical, psychological, or social changes that affect an athletes’ normal development. These transitions can include difficulties associated with athlete burnout, not being selected for a team, retirement, or an injury, any of which

could lead to athletic career changes and termination (Gustafsson, Hassmén, Kenttä, & Johansson, 2008; Pearson & Petitpas, 1990; Phoenix et al., 2005).

Over-engagement in sports has caused some athletes to jeopardize their physical health (Brewer et al., 1993), as well as limit their psychosocial maturity (Danish, 1983). Since these athletes place such a high value on their identity as an athlete, they tend to use this to fulfill their self-worth, which causes them to experience negative emotions if they encounter adverse outcomes in their sports, regardless of competitive level (Lamont-Mills & Christensen, 2006). Burnout has been highlighted as a potential consequence of athletics being one's sole source for obtaining their identity and self-worth. Gustafsson and colleagues (2008) found that athletes will be compelled to train harder and for longer because of increased pressure they put on themselves to uphold their identity as a full-time elite athlete. Athletes in their study reported feelings of helplessness in that if they did quit (due to feelings of burnout), they felt that they would have nothing else to "lift themselves up." In addition to these factors, Gustafsson and colleagues found that a unidimensional athletic identity, inflexible sport organizations, high ego goals, strivings for self-esteem, and feelings of being trapped all contributed to burnout in their sample of elite athletes because these factors caused the athletes to feel like they could not quit their sport. Feelings of burnout were found to be worse in athletes who experienced success at a younger age, since they developed their performance-based self-esteem so early in life.

A study conducted on the effects of de-selection in elite level youth football found that athletes who were told they were not going to play professionally experienced overwhelming effects on their athletic identities (Brown & Potrac, 2009). They reported experiencing feelings of shock, anger, anxiety, humiliation, and despair. These feelings

were the result of all the time and effort that the athletes had put into football in order to achieve their goal of playing professionally, as well as having to deal with the loss of fan admiration and their status as a football player. A study involving female athletes found that changes in athletic identity occurred as quickly as two weeks post-team selection (Grove, Fish, & Eklund, 2004). Gaudreau and colleagues (2009) proposed that athletes who did not get selected for a team may experience non-self-determined motivation, a lowered athletic identity, as well as a failure to satisfy their basic psychological needs (i.e., autonomy, competence, and relatedness; Deci & Ryan, 2002).

Retirement can elicit negative feelings as it may be viewed as giving up, especially when an athlete places a high value on their sport (Danish, 1983). Phoenix and colleagues (2005) suggested that athletes with a high sense of self-worth might have a negative view towards ageing despite it being a natural developmental process, because it causes their previously athletic bodies to become frail, unattractive, and unable to do things that they had previously been able to do. This causes athletes to equate their ageing bodies with their younger, able selves, which could lead to an identity crisis. Similarly, Brewer and colleagues (1993) suggested that if an athlete experiences a career-ending injury, they are at a higher risk of experiencing emotional disturbances if they have a strong athletic identity. This is more likely to happen when the athlete does not possess other sources of self-worth or self-identification outside of their sport, and use sport as their sole source of self-worth (Phoenix et al., 2005).

Retiring due to a career-ending injury makes it more difficult than retiring by choice, as athletes experience an overwhelming sense of vagueness about their future (Webb, Nasco, Riley, & Headrick, 1998). This can be explained by the unexpected

nature of injuries in that athletes cannot predict when they will occur and thus cannot prepare themselves psychologically for retirement (i.e., dissolve their athletic identity and develop a new identity). Athletes who feel like they have little control over their lives are more likely to report decreased levels of life satisfaction, have more difficulties when faced with retirement, and thus experience greater feelings of uncertainty about their futures (Webb et al.). Athletes also tend to experience lower levels of dispositional self-esteem due to the decline of their public athletic identity associated with retirement; since they have focused everything into their one identity, they have no other identities to turn to as an alternative source to fulfil their self-esteem.

Another potential issue with having a strong athletic identity is that it could inhibit athletes from engaging in devaluing, a psychological disengagement strategy commonly used to maintain one's self-esteem in the face of a negative sport outcome (Caudroit, Stephan, Brewer, & Le Scanff, 2010). Caudroit and colleagues found that this lack of devaluing coupled with high levels of obsessive passion and a strong athletic identity could be maladaptive over time and thus put athletes at a greater risk of experiencing major emotional or behavioural problems. Emotional disturbances such as feelings of disorientation, failure, loss, and uncertainty, could be the result of a strong, unidimensional athletic identity, leaving athletes without any alternate roles, activities, or interests to engage in (Brown & Potrac, 2009).

A related outcome of having such a strong athletic identity is a decreased level of career maturity, in that athletes experience delays in their non-sport career development (Murphy, Petitpas, & Brewer, 1996). These authors noted that this may be especially problematic in males who postpone career planning due to expectations of playing

professional sports, and because they view career planning as a conflict to their central life goal. Higher levels of athletic identity were associated with greater gender role conflict between work, family, or school (Steinfeldt & Steinfeldt, 2010). Taken further, these authors found that athletic identity and gender role conflict predicted decreased levels of help-seeking behaviour. This was found more in freshman compared to seniors, as gender role conflict decreased the longer the athletes played for the team. These findings were later replicated in a study examining conformity to masculine norms in a sample of college football players (Steinfeldt & Steinfeldt, 2012). A greater sense of athletic identity was found to be related to increased conformity to traditional masculine norms, as significant differences were found on seven out of the nine subscales on the Conformity to Masculine Norms Inventory-46 (Parent & Moradi, 2009). The related subscales included winning, risk-taking, violence, power over women, self-reliance, primacy of work, and heterosexual self-preservation. It was concluded that this relationships was indicative of the process by which the college football players strived to meet societal beliefs of being a man.

When compared to the general population, athletes are thought to experience unique developmental issues due to the nature of elite sport (i.e., being centered on physical performance and excellence; Pearson & Petitpas, 1990). As well, Samuel and Tenenbaum (2011) recently found that athletes with strong athletic identities perceive any transitions (i.e., both positive and negative) as more significant and emotionally severe. Pearson and Petitpas highlighted three factors that increase an athlete's vulnerability of experiencing adverse effects of a transition. First, athletes are required to have a narrowed focus in order to train and become good enough to compete at an elite level in

their sport, which provides them with a sense of accomplishment. Second, athletes are faced with a need to develop a personal identity, which they do in a way that is homogenous with their own needs and skills. Finally, athletes do not explore or develop their identities outside of sport because their lives revolve around it. All of these factors lead to what Petitpas (1978) described as identity foreclosure, which occurs when athletes accept a socially determined identity without exploring other available options. In Canada, it is thought that identity foreclosure may be unique to varsity athletes in high-profile athletic programs such as men's football (Miller & Kerr, 2003). Other research has found the effects of identity foreclosure to differ across genders, such that the effects of identity foreclosure in men include the setting of unrealistic goals (e.g., pinning all their hopes on playing professionally), while women experience increased social pressure to confirm to a certain identity (Petitpas).

Evidence of identity foreclosure was found in a qualitative study examining collegiate students' perceptions of autonomy, where Kimball (2007) aimed to determine why student-athletes choose to stay on their collegiate sports team when it involved an autonomy-limiting environment. Through her interviews, Kimball came up with three autonomy-related themes. The first theme related to the athletes' personal autonomy, or the development of their identities as they gained more experience as a student-athlete, allowing them to feel more in control of their lives and more prepared for the commitments involved. The second theme referred to the athletes' relational autonomy. Many athletes referred to being highly influenced by their relationships with teammates and coaches when making decisions for themselves. This was even evident in athletes who had developed strong autonomous identities. The final theme that was uncovered

related to the athletes' lack of autonomy in some situations (i.e., having signed a contract and being forced to remain on the team for a certain period of time). In this case, athletes were able to change their thinking regarding their contractual obligations and see their commitment to collegiate sport as a way to prepare them for their futures, thus bringing the behaviours into closer congruence with their identities. Kimball's overall findings suggest that collegiate athletes preserve their need for autonomy by accepting and integrating the controlled lifestyle associated with being a student-athlete as part of their identity, as well as reframing any behaviours that are not inherently autonomous by changing them into behaviours that are part of their identities.

Researchers continually stress the need for counsellors and psychologists to work with athletes to prevent the difficulties associated with strong athletic identities before they occur (Pearson & Petitpas, 1990). Teachers can help athletes separate their sense of identity from being focused solely on sport (Gould et al., 2002). Athletes should be encouraged to explore all available career options, in addition to their athletic aspirations (Petitpas, 1978), and apply the skills they learned through sport to other life domains (Gaudreau et al., 2009). This way, athletes have a back-up plan for when their athletic career ends, and it would help to avoid identity foreclosure (Petitpas, 1978). Considering all the above findings, a strong athletic identity can be positive, especially since it seems to be a requirement in order for athletes to be successful at an elite level. However, the most favourable outcomes in terms of an athletes' long-term well-being occur when their athletic identity is kept in moderation.

Purpose of the Present Study

While motivational imagery has been a research focus in sport, there is a lack of research examining the link between imagery use and the behavioural regulations proposed in SDT for sport participation. The only studies of this nature have been conducted using exercisers (e.g., Wilson, Rodgers, Hall, & Gammage, 2003). One limitation of Wilson and colleagues' study is that they did not test for causal relationships between the different regulations and the functions of imagery. Despite this, the authors concluded that SDT could be a suitable theoretical framework to determine the motivational foundations underpinning cognitions such as imagery.

Furthermore, because athletic identity describes one's sense of self in relation to sport, it closely resembles integrated regulation in SDT. Therefore, an examination of the nature of the relationship between athletic identity and integrated regulation seems to be warranted. The only relevant studies that are somewhat related to this issue are one that examined the link between identity and autonomy (as mentioned above, Kimball, 2007), and another citing a moderate relationship between sport identity and both introjected and identified/intrinsic motivation (Lau, Fox, & Cheung, 2004), however this study was conducted using a sample of schoolchildren.

Therefore, the purpose of the present study was to examine the relationships among the three constructs in question, namely, imagery use, motivation, and athletic identity. These relationships were examined in the sport of curling. Two hypotheses were developed for this study. The first hypothesis was that athletic identity would be positively related to integrated regulation. The second hypothesis was that the use of imagery would be predicted by athletic identity and the more autonomous regulations

(i.e., integrated regulation and identified regulation). More specifically, it was expected that the motivational functions of imagery use (i.e., MS, MG-A, and MG-M imagery) would show a stronger positive relationship than the cognitive functions of imagery use (i.e., CS and CG imagery) with both the autonomous regulations, as well as athletic identity should hypothesis one prove to be correct.

Method

Participants

Participants consisted of 213 club and competitive curlers who were recruited from various curling clubs across Ontario. Inclusion criteria required all participants to be over the age of 18 as well as curl regularly as part of a structured curling league or competitively. The difference between the two levels is that club curlers only play once or twice a week against other curlers of similar skill levels. On the other hand, competitive curlers enter playdowns during which they playoff against other teams in their regions to advance to the provincial, national, and world championships, as long as they continue to be successful. Competitive curlers also compete in various events on the Ontario and/or World Curling Tours against other competitive curling teams in order to win money and points that rank them for elite-level events, such as the Canada Cup or Olympic Curling Trials. The sample was analyzed based on participants' competitive level, resulting in two groups; club curlers ($n = 141$) and competitive curlers ($n = 72$). The mean age of the club curlers was 53.75 ($SD = 11.80$) with a mean of 23.10 years of experience ($SD = 14.33$). The mean age of the competitive curlers was 39.76 ($SD = 17.36$) with a mean of 23.43 years of experience ($SD = 11.22$).

Measures

Curling Demographic Questionnaire. The curling demographic questionnaire was developed for the purposes of this study. It aimed to collect information regarding participants' age, gender, curling experience (i.e., how long they have participated in the sport of curling, and the level at which they compete), as well as information regarding any off-ice training they may participate in.

Sport Imagery Questionnaire (SIQ). This questionnaire was developed by Hall and colleagues (1998) to examine how often athletes use each of the five functions of imagery (i.e., CS, CG, MS, MG-A, and MG-M). The SIQ consists of 30 questions that ask participants to rate their responses from 1 (*rarely*) to 7 (*often*). Some of the items were modified to reflect their use in curling. An example of a modified MG-A imagery item was "I imagine the emotions I feel while doing my sport" that was modified to "I imagine the emotions I feel while curling." Adequate internal reliabilities for the SIQ have been reported, alpha coefficients ranging from .70 to .88, and tests of construct validity have produced favorable results (Hall, Stevens, & Paivio, 2005). In the present study, acceptable alpha coefficients were found, ranging from .83 to .89.

Behavioral Regulation in Sport Questionnaire (BRSQ). Participants' motivation to participate in curling was measured using the BRSQ. This questionnaire was recently developed by Lonsdale, Hodge, and Rose (2008) to assess the behavioural regulations in sport based on the SDT continuum (Ryan & Deci, 2000). It was developed as a replacement for the Sport Motivation Scale (Pelletier, Fortier, Vallerand, Tuson, & Blais, 1995). The BRSQ asks participants to rate the degree to which they agree with 36 statements related to why they participate in sport and was modified for use in the present

study by including the item stem, “I participate in curling...” The items make up nine subscales, including amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, intrinsic motivation-general (IM-general), IM to know, IM to stimulate, and IM to accomplish. Based on different conceptualizations, the construct of intrinsic motivation can be represented by the unidimensional IM-general factor (as described by Deci & Ryan, 1985), or it could be broken down into a multidimensional construct consisting of three factors; IM to know, to stimulate, and to accomplish (as described in a model proposed by Vallerand, 1997). As recommended by Lonsdale et al. (2008), the theoretical positions and implications of using the various IM subscales were carefully considered before deciding to employ the IM-general subscale only as the purpose of the present study did not involve testing specific hypotheses regarding the separate characteristics of the multidimensional IM constructs. Therefore, the IM-general subscale was chosen because it fit the purpose of exploring the general motives of athletes involved in recreational and competitive curling. Responses are rated on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (*very true*). The BRSQ possesses acceptable test-retest reliability ($r > .70$) as well as factorial validity (Lonsdale et al., 2008). Alpha coefficients in the present study ranged between .45 and .83, with the amotivation and external regulation subscales showing the weakest internal reliabilities.

Athletic Identity Measurement Scale (AIMS). This questionnaire was originally developed by Brewer and colleagues (1993) to assess athletic identity. A subsequent confirmatory factor analysis found that three of the original 10 items did not load on to the unidimensional construct of athletic identity and were dropped (Brewer & Cornelius, 2001). This 7-item version was used in the present study. An example of an

item from the AIMS is “I consider myself an athlete.” Responses range from 1 (*strongly disagree*) to 7 (*strongly agree*). Brewer & Cornelius found the 7-item AIMS to have acceptable internal consistency ($\alpha > .81$) and be highly correlated with the original 10-item version. In its original development, Brewer and colleagues found the test-retest reliability to be .89 as well as support for both convergent and discriminant validity. An alpha coefficient of .78 was obtained for the present study.

Procedure

Approval to conduct the present study was obtained from the Research Ethics Board at Western University. In order to recruit participants, convenience sampling was used by contacting the directors of curling clubs in Southwestern Ontario and Northwestern Ontario. They were provided with information about the study and a link to a secure website where the online questionnaire was located. The directors were asked to pass the study information and link on to their membership, asking them to participate. The letter also made use of snowball sampling, encouraging participants to pass the link on to other curlers who they thought might be interested in participating.

Once participants logged on to the secure website, they were presented with a letter of information that included contact information if individuals had any concerns regarding the study or wished to be sent the results. Participants were also informed that their consent to participate was indicated by them opting to continue with the study by completing the questionnaires. After reading the letter of information, participants were then directed to a new page where they began to fill out the four questionnaires, which took approximately 20 minutes to complete. No personal information (e.g., names or e-mail addresses) was collected, thus allowing all participants to remain anonymous.

Participants were able to withdraw from the study at any time without penalty by simply closing their browser. Once participants completed all four questionnaires, they were directed to a page that thanked them for their participation and reminded them of the contact information for the investigators if they required it.

Results

All data analyses were conducted with groups depending on whether participants indicated being a club curler or a competitive curler. Participants were excluded from any analyses if they indicated being a recreational curler (i.e., those who curl sporadically over the course of a season). A missing value analysis revealed that missing data were present in less than five percent of the cases for each item, and thus was determined to be missing completely at random (Tabachnick & Fidell, 2007). Mean value substitution using the series mean of each item was chosen to fill in the missing values since it is the most conservative of available methods (Tabachnick & Fidell). The resulting sample size was 152 club curlers and 73 competitive curlers for a total of 225 participants. Subscale scores for the SIQ and BRSQ were calculated by summing up relevant items and dividing by the number of items on each subscale (e.g., adding up the CS items and dividing by seven yielded a CS subscale score). A single subscale score for the AIMS was calculating by adding together all the items.

The normality of the data was assessed by examining skewness, kurtosis, and multivariate outliers on the subscale scores. Only one item, external regulation, was found to have a skewness value greater than +2.00 in the competitive curler group. Kurtosis was determined by dividing the kurtosis statistic by the standard error of kurtosis. The majority of the variables had scores below three, thus indicating an

acceptable range for normality (Tabachnick & Fidell, 2007). These findings fall in line with results from the initial validations of the SIQ (Hall et al., 1998) and BRSQ (Lonsdale et al., 2008), as both sets of authors indicated that most of the subscales were univariately normally distributed (i.e., skewness < 2; kurtosis < 7).

Only multivariate outliers were checked because the main analysis was a multiple regression, which is thought to be highly robust to deviations in normality (Howell, 2010). Mahalanobis distances at $p < .001$ were used, with a critical value for chi-square at seven degrees of freedom (equal to the number of independent variables) of 24.322. Subscale scores with Mahalanobis distances greater than this critical value were deemed multivariate outliers. In the club curlers group, 11 multivariate outliers were identified and removed. For competitive curlers, one multivariate outlier was found and removed. This left the final sample size at 141 club curlers and 72 competitive curlers. Removal of these outliers improved the normality of both groups.

Descriptive Statistics

Means and standard deviations of both groups were calculated for demographic variables and subscale scores from the SIQ, BRSQ, and AIMS. Differences between the two groups were determined by conducting independent t -tests. If Levene's Test for Equality of Variances was significant, it was assumed that the variances between the two groups were not equal and the appropriate t -score and p -value were used (Howell, 2010). Table 1 shows the many differences that exist between club and competitive curlers for the demographic variables. The average age of competitive curlers was significantly lower than the average age of club curlers ($p < .01$). No significant differences were found between groups on average number of years curled, however competitive curlers

were found to spend significantly more days practicing outside of regularly scheduled games ($p < .01$). The proportion of males to females was greater for club curlers, with twice as many males as females. Conversely, there was an equal distribution of males and females in the competitive curler group. When looking at the number of participants who engage in off-ice training, significantly more of these participants were competitive curlers. Specific information also can be found in Table 1 regarding the types of off-ice training engaged in by both groups. Cardiovascular and strength training were the most prevalent, followed by flexibility and endurance training. Speed training was cited the least. Finally, demographic information regarding the highest level of competition reached was collected from competitive curlers only. The majority of participants indicated competing at the provincial or national levels, while a smaller number of participants reported competed at the zone, regional, and international levels. One participant reported competing at the Olympics.

Table 2 presents the means and standard deviations of subscale scores from the SIQ, BRSQ, and AIMS for both groups. Club curlers and competitive curlers showed moderate to high scores on the SIQ subscales and AIMS. Moderate scores were obtained on the self-determined subscales on the BRSQ, while lower scores were obtained on the controlling regulations. Significant differences were present on all imagery subscales, integrated regulation, identified regulation, and athletic identity ($p < .01$), where competitive curlers scored significantly higher than club curlers. Trends for significant differences between the groups were seen on the less self-determined regulations, introjected regulation, external regulation, and amotivation ($p < .10$). For these subscales, competitive curlers scored lower than club curlers.

Table 1

Means and Frequencies of Demographic Information for Club and Competitive Curlers

	Club Curlers (<i>n</i> = 141)		Competitive Curlers (<i>n</i> = 72)		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Age	53.75	11.80	39.76	17.36	6.15	.000
Years Curled	23.10	14.33	23.43	11.22	-0.19	.853
Days/Practice	0.38	0.75	2.26	1.49	-10.07	.000
	<i>n</i>	%	<i>N</i>	%		
Male	94	66.7	37	51.4		
Female	47	33.3	35	48.6		
Highest Level:						
Zones			5	6.9		
Regionals			6	8.3		
Provincials			36	50.0		
Nationals			21	29.2		
International			3	4.2		
Olympics			1	1.4		
Off-Ice Training	49	34.8	59	81.9		
Cardiovascular	44	31.2	56	77.8		
Strength	40	28.4	48	66.7		
Flexibility	22	15.6	30	41.7		
Speed	4	2.8	7	9.7		
Endurance	13	9.2	32	44.4		

Note: *M* = mean; *SD* = standard deviation; *t* = *t*-score; *p* = *p*-value; *n* = sample size; % = percentage.

Table 2

Means and Standard Deviations of Subscale Scores for Club and Competitive Curlers

Subscale Score	Club Curlers (<i>n</i> = 141)		Competitive Curlers (<i>n</i> = 72)		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
CS	4.33	1.30	5.02	1.16	-3.80	.000
CG	4.22	1.41	4.85	1.21	-3.26	.001
MS	3.05	1.50	4.25	1.65	-5.33	.000
MG-A	3.51	1.29	4.38	1.34	-4.58	.000
MG-M	4.57	1.39	5.25	1.42	-3.38	.001
Intrinsic	6.60	0.53	6.68	0.50	-0.98	.329
Integrated	4.40	1.44	5.45	1.23	-5.27	.000
Identified	4.72	1.20	5.60	1.02	-5.27	.000
Introjected	1.50	0.73	1.75	1.00	-1.84	.069
External	1.32	0.50	1.47	0.60	-1.84	.067
Amotivation	1.35	0.58	1.51	0.64	-1.89	.061
Identity	25.35	6.71	34.66	7.26	-9.31	.000

Note: *M* = mean; *SD* = standard deviation; *t* = *t*-score; *p* = *p*-value; CS = cognitive specific; CG = cognitive general; MS = motivational specific; MG-A = motivational general-arousal; MG-M = motivational general-mastery; Identity = Athletic Identity.

Bivariate Correlations

Bivariate correlations were conducted between demographic information and the subscales scores for club and competitive curlers (see Table 3). Competitive curlers showed a greater number of significant correlations between age and the various subscale scores ($p < .05$). These were all in the negative direction and of moderate magnitude. This implies that younger athletes scored significantly higher on imagery use, three of the behavioural regulations, and athletic identity. Athletic identity showed a significant positive correlation with years curled in both groups ($p < .01$). However, years curled was only found to be significantly related to imagery use and behavioural regulations in club curlers ($p < .05$), with these correlations being of low to moderate magnitude. In regards to the highest level of competition reached, reported by the competitive curlers only, one imagery subscale and two behavioural regulation subscales showed low but significant correlations ($p < .05$). Finally, when looking at the number of days spent practicing outside of games, all but four subscales showed significant positive correlations in club curlers, while only three subscales showed significant positive correlations in competitive curlers ($p < .05$).

Table 4 shows the bivariate correlations between the various subscales. In both club and competitive curlers, significant positive correlations were found between the different imagery functions and integrated regulation, identified regulation, and athletic identity ($p < .05$). The majority of these correlations are of moderate magnitude, with competitive curlers showing slightly stronger correlations between the imagery functions and both integrated regulation and athletic identity. Club curlers showed slightly stronger correlations between the imagery functions and identified regulation, as well as between

Table 3

Bivariate Correlations between Demographic Variables and Subscale Scores for Club and Competitive Curlers

Subscale Score	Age	Years Curled	Highest Level	Practice
Club Curlers ($n = 141$)				
CS	.01	.10		.19*
CG	-.02	.19*		.27**
MS	-.08	.09		.18*
MG-A	.10	.18*		.23**
MG-M	.13	.21*		.25**
Intrinsic Motivation	.09	.12		.16
Integrated Regulation	.04	.38**		.25**
Identified Regulation	.17	.25**		.24**
Introjected Regulation	-.18*	.00		.08
External Regulation	.01	.03		-.03
Amotivation	.03	.13		-.02
Athletic Identity	.10	.37**		.21**
Competitive Curlers ($n = 72$)				
CS	-.23	.03	.21	.18
CG	-.34**	-.02	.11	.16
MS	-.40**	-.13	.26*	.24*
MG-A	-.35**	-.05	.15	.16
MG-M	-.21	.06	.09	.10
Intrinsic Motivation	.13	.06	-.24*	.02
Integrated Regulation	-.33**	-.10	.16	.25*
Identified Regulation	-.10	.07	-.13	-.10
Introjected Regulation	-.41**	-.23	.09	.10
External Regulation	-.23*	-.08	.13	.06
Amotivation	-.22	-.08	.24*	-.03
Athletic Identity	-.48**	-.30**	.22	.31**

Note: * $p < .05$; ** $p < .01$; CS = Cognitive Specific; CG = Cognitive General; MS = Motivational Specific; MG-A = Motivational General-Arousal; MG-M = Motivational General-Mastery.

Table 4

Bivariate Correlations between Subscale Scores in Club and Competitive Curlers

	IM	INT.	ID.	INTJ.	EXT.	AM	Identity
Club Curlers (<i>n</i> = 141)							
CS	.21*	.31**	.37**	.05	-.04	.09	.35**
CG	.16	.40**	.44**	.03	.00	.09	.41**
MS	.06	.31**	.31**	.16	.07	.18*	.42**
MG-A	.05	.39**	.44**	.14	.06	.23**	.46**
MG-M	.25**	.38**	.42**	.11	.01	.11	.41**
Identity	.15	.65**	.59**	.20*	.08	.19*	---
Competitive Curlers (<i>n</i> = 72)							
CS	.06	.41**	.25*	.08	.00	.04	.45**
CG	.14	.43**	.42**	.24*	.12	-.01	.50**
MS	.09	.54**	.32**	.33**	.16	.21	.52**
MG-A	.05	.46**	.27*	.30**	.17	.28*	.54**
MG-M	.09	.40**	.37**	.12	.01	.05	.37**
Identity	.24*	.49**	.24*	.29*	.16	-.09	---

Note: * $p < .05$; ** $p < .01$; CS = Cognitive Specific; CG = Cognitive General; MS = Motivational Specific; MG-A = Motivational General-Arousal; MG-M = Motivational General-Mastery; Comp = Competitive; IM = Intrinsic; INT. = Integrated; ID. = Identified; INTJ. = Introjected; EXT = External; AM = Amotivation.

athletic identity and integrated regulation. Both intrinsic motivation and amotivation showed a greater number of significant positive correlations with the imagery functions in the club curler group ($p < .05$). For the competitive curlers, a greater number of significant positive correlations were found between introjected regulation and the various imagery functions ($p < .05$).

Multiple Regression

A standard multiple regression analysis was conducted for each group to determine which of the subscales (i.e., the various behavioural regulations and athletic identity) predicted each of the five functions of imagery use. A standard multiple regression was used because there had been no prior research examining these constructs together (Tabachnick & Fidell, 2007). Collinearity statistics were used to check for multicollinearity among the independent variables as it can be a problem when including both integrated regulation and identified regulation as measures of motivation (e.g., Mouratidis et al., 2010). Multicollinearity did not seem to be a problem in the present sample. Table 5 shows the predictors of each of the five imagery functions in club curlers. Athletic identity emerged as a significant predictor of all functions of imagery use ($p < .05$), except for CS imagery, which had a p -value of exactly .05, suggesting a trend toward significance. Identified regulation emerged as a significant predictor of four imagery functions, excluding MS imagery ($p < .05$). Interestingly, although not significant, both intrinsic motivation and amotivation emerged as predictors of MG-M imagery and MG-A imagery, respectively ($p < .10$).

Lastly, predictors of the different imagery functions in competitive curlers can be found in Table 6. It can be seen again that athletic identity emerged as a significant

Table 5

Predictors of Imagery Use by Function in Club Curlers

Club Curlers ($n = 141$)	<i>B</i>	<i>SE(B)</i>	<i>beta</i>	<i>t</i>	<i>p</i>
CS ($R^2 = .19$, $F(7, 133) = 4.34$, $p < .01$)					
Identified Regulation	.29	.14	.26	2.10	.037
Athletic Identity	.04	.02	.21	1.98	.050
CG ($R^2 = .24$, $F(7, 133) = 5.91$, $p < .01$)					
Identified Regulation	.33	.14	.28	2.30	.023
Athletic Identity	.05	.02	.22	2.17	.032
MS ($R^2 = .20$, $F(7, 133) = 4.67$, $p < .01$)					
Athletic Identity	.08	.02	.35	3.31	.001
MG-A ($R^2 = .28$, $F(7, 133) = 7.32$, $p < .01$)					
Identified Regulation	.29	.13	.26	2.20	.030
Amotivation	.42	.23	.19	1.84	.068
Athletic Identity	.05	.02	.28	2.78	.006
MG-M ($R^2 = .24$, $F(7, 133) = 6.00$, $p < .01$)					
Intrinsic Motivation	.39	.22	.15	1.76	.081
Identified Regulation	.27	.14	.23	1.91	.058
Athletic Identity	.05	.02	.26	2.50	.014

Note: *B* = regression coefficient; *SE(B)* = standard error of the regression coefficient; *t* = *t*-score; *p* = *p*-value.

Table 6

Predictors of Imagery Use by Function in Competitive Curlers

Competitive Curlers ($n = 72$)	<i>B</i>	<i>SE(B)</i>	<i>beta</i>	<i>t</i>	<i>p</i>
CS ($R^2 = .30$, $F(7, 64) = 3.89$, $p < .01$)					
Integrated Regulation	.27	.13	.29	2.02	.047
Athletic Identity	.06	.02	.39	3.14	.003
CG ($R^2 = .37$, $F(7, 64) = 5.29$, $p < .01$)					
Identified Regulation	.35	.14	.30	2.58	.012
Athletic Identity	.06	.02	.35	2.96	.004
MS ($R^2 = .45$, $F(7, 64) = 7.56$, $p < .01$)					
Integrated Regulation	.44	.17	.33	2.60	.012
Athletic Identity	.08	.03	.34	3.19	.002
MG-A ($R^2 = .46$, $F(7, 64) = 7.65$, $p < .01$)					
Integrated Regulation	.24	.14	.22	1.73	.089
Amotivation	.66	.23	.31	2.81	.007
Athletic Identity	.09	.02	.46	4.15	.000
MG-M ($R^2 = .26$, $F(7, 64) = 3.27$, $p < .01$)					
Identified Regulation	.34	.17	.25	1.97	.053
Athletic Identity	.05	.03	.26	2.01	.048

Note: *B* = regression coefficient; *SE(B)* = standard error of the regression coefficient; *t* = *t*-score; *p* = *p*-value.

predictor of all five functions of imagery use ($p < .05$). Identified regulation emerged as a significant predictor of CG imagery ($p < .05$), and showed a trend toward predicting MG-M imagery ($p < .10$). Amotivation also emerged as a significant predictor of MG-A imagery ($p < .01$). Unique to the competitive curlers, integrated regulation emerged as a significant predictor of CG imagery and MS imagery ($p < .05$), as well as showed a trend towards predicting MG-A imagery use ($p < .10$). These results, showing slight differences between the two group in regards to predictors of imagery use, provide further support in differentiating characteristics unique to club and competitive curlers.

Discussion

The purpose of this study was to examine the relationships between imagery use, sport motivation, and athletic identity in curling. As predicted by hypothesis one, athletic identity was found to have a moderate positive correlation with integrated regulation in both club and competitive curlers. This pattern was stronger in club curlers, which was surprising given that competitive athletes typically have stronger athletic identities and thus would be expected to show more internalized behaviours regarding their sport (e.g., Lamont-Mills & Christensen, 2006). Athletic identity was also found to have a low to moderate positive correlation with identified regulation, with the magnitude being higher in club curlers. This is similar to findings reported by Lau and colleagues (2004), who found a moderate correlation of .39 between sport identity and identified regulation; however, their study was conducted using a sample of schoolchildren.

The second hypothesis was partially supported as the use of the various imagery functions was positively predicted by athletic identity and the autonomous regulations (i.e., identified regulation and integrated regulation). There was not, however, a clear

indication of a stronger positive relationship among the motivational functions of imagery use (i.e., MS, MG-A, MG-M imagery) and both athletic identity and the autonomous regulations when compared to the cognitive functions of imagery use (i.e., CS and CG imagery). Athletic identity emerged as a predictor of all five imagery functions in both club and competitive curlers; however, identified regulation emerged more often in club curlers while integrated regulation emerged more often in competitive curlers. Other variables (i.e., intrinsic motivation and amotivation) also emerged as significant predictors of certain imagery functions or showed trends of doing so. Explanations for each of these relationships are provided in the sections to follow.

Descriptive Findings

Competitive curlers scored higher than club curlers on all imagery and motivation variables, as well as athletic identity. These differences were significant for all imagery functions, the autonomous regulations (i.e., integrated regulation and identified regulation), and athletic identity. Trends toward significance were found for both the controlled regulations (i.e., introjected regulation and external regulation) and amotivation. Taken together, these findings are similar to those found in other studies investigating imagery (e.g., Hall et al., 2009; Nordin et al., 2006; Watt et al., 2008) and athletic identity (e.g., Lamont-Mills & Christensen, 2006). They differ, however, from research in the sport motivation literature, which suggests that recreational athletes should be expected to show greater levels of intrinsic motivation relative to competitive athletes (e.g., Chatzisarantis & Hagger, 2007b). This may be caused by sport-specific differences in the nature of curling compared to other sports that typically have been examined, however further research is needed to confirm whether this is the case.

In both curling groups, MG-M imagery was found to be used by athletes the most, followed in order by CS imagery, CG imagery, and MG-A imagery. MS imagery was reported as being used the least by both groups. Similar frequencies of imagery function use have been reported in various other sports, regardless of competitive level (e.g., Arvinen-Barrow et al., 2007; Hall et al., 1998; Munroe et al., 1998; Watt et al., 2008). When looking at the BRSQ subscales, the highest mean scores were found for intrinsic motivation followed by identified regulation and then integrated regulation in both club curlers and competitive curlers. External regulation showed the lowest mean scores, followed closely by amotivation and then introjected regulation. This pattern is similar to means reported by Lonsdale and colleagues (2008) in the development of the BRSQ. Finally, club curlers were found to have a moderate mean athletic identity score, while competitive curlers had a relatively high mean athletic identity score. These mean scores fall in line with studies conducted on athletic identity using adolescents (Houle et al., 2010), high school athletes (Wiechman & Williams, 1997), and varsity football players (Steinfeldt & Steinfeldt, 2012). Studies conducted with adult samples used the multidimensional version of the AIMS (e.g., Lamont-Mills & Christensen, 2006) and thus cannot be compared with mean scores obtained in the present study.

Correlational Findings

When looking at the correlational patterns among the variables, it was found that all five functions of imagery showed moderate positive correlations with integrated regulation, identified regulation, and athletic identity in club and competitive curlers. However, the magnitude of the correlations for identified regulation was generally higher in club curlers, while the magnitude for integrated regulation was higher in competitive

curlers. The magnitude of the correlations between athletic identity and the five imagery functions was higher in competitive curlers for all functions except for MG-M imagery. In addition, various functions of imagery also showed moderate correlations with intrinsic motivation and amotivation in club curlers, and with introjected regulation and amotivation in competitive curlers. External regulation was not significantly related to any imagery functions in either group. Although no studies have examined correlations between these constructs in athletes, Wilson and colleagues' (2003) examination of behavioural regulations and exercise imagery yielded similar results in regards to external regulation, introjected regulation, identified regulation, and intrinsic motivation. The findings of the present study add to Wilson and colleagues' findings by showing that meaningful associations between imagery use and behavioural regulations can be found in domains where individuals are required to be physically active.

An interesting pattern emerged when looking at correlations between the imagery functions and the demographic variables. Age was found to have a moderate negative correlation with three functions of imagery, CG, MS, and MG-A imagery in competitive curlers but not club curlers. Similar results were found in a sample of golfers (Gregg & Hall, 2006). Furthermore, three imagery functions (i.e., CG, MG-A, and MG-M imagery) showed low but significant positive correlations with years curled, and all five imagery functions showed significant positive correlations with days of practice in club curlers but not competitive curlers, except for MS imagery, which showed a small positive correlation with days of practice in competitive curlers. Parker and Lovell (2009) found significant moderate correlations between practice volume and all imagery functions except for CG imagery in a sample of athletes from a youth sports academy.

Furthermore, Parker and Lovell found significant differences for the use of MG-M imagery, MG-A imagery, and MS imagery by athletes who practice more compared to athletes who do not. Thus, the present findings were surprising, as competitive curlers would be expected to practice more in addition to using imagery more often; however club curlers were the ones to show this association.

A similar pattern emerged when looking at the correlations between the various behavioural regulations, athletic identity and the demographic variables. Age again showed a greater number of associations in competitive curlers, correlating negatively with integrated regulation, introjected regulation, external regulation, and athletic identity. This corresponds with research in the athletic identity literature (e.g., Brewer et al., 1993; Fraser et al., 2009). Age has not been formally examined in relation to the behavioural regulations in sport, however one study that examined physical activity frequency did not find age differences in regards to identified regulation and external regulation, but did report lower levels of intrinsic motivation and introjected regulation in middle-age adults when compared to young adults (Brunet & Sabiston, 2011). These findings provide some support for the negative correlation found for introjected regulation in club and competitive curlers, as well as the lack of significant correlations regarding identified regulation in both groups, and external regulation in club curlers.

Club curlers showed a greater number of associations with years curled and number of days practicing. Significant positive correlations were found between both variables and integrated regulation, identified regulation, and athletic identity. Similar results regarding self-reported involvement in sport and athletic identity have been found in a sample of recreational athletes who had experienced spinal cord injury (Tasiemski &

Brewer, 2011), as well as female wheelchair athletes (Spencer-Cavaliere & Peers, 2011). A negative correlation was found between athletic identity and years curled in competitive curlers, as well as positive correlations between days practicing and both integrated regulation and athletic identity in that group. Miller and Kerr (2003) found evidence of a negative association between athletic identity and time in their examination of eight intercollegiate student athletes, suggesting that athletes tend to diversify their involvement in activities as they mature. This may include the experience of significant life events such as marriage or having children, however this relationship has not been formally examined to date. Unique to competitive curlers, significant positive correlations were also found between highest level of competition and both MS imagery and amotivation, and a significant negative correlation was found between level of competition and intrinsic motivation. This would be expected, as highly competitive athletes would exhibit lower levels of intrinsic motivation as they strive to achieve their competitive goals (e.g., Chatzisarantis & Hagger, 2007b; Munroe et al., 2000; Ryan & Deci, 2007). The findings concerning age and years of experience suggest that competitive athletes learn and use imagery functions at a younger age, however in club curlers, this skill is not used until the curler has gained many years of experience. Perhaps without the coaching associated with competitive sports, it takes longer for club curlers to recognize the utility of such a skill in helping to improve their performance.

Athletic Identity as a Predictor of Imagery Use

Athletic identity was the only construct that predicted all five functions of imagery use in both groups, with the exception of CS imagery in club curlers for which there was a trend to do so. In competitive curlers, athletic identity was the best predictor

of each imagery function compared to all other significant predictors, suggesting that athletic identity contributes more to the overall prediction of imagery use (Tabachnick & Fidell, 2007). When comparing the standardized regression coefficients to club curlers, they were higher in magnitude for all imagery functions except for MG-M imagery, where the same magnitude was noted. In addition, R^2 values for predicting each imagery function were higher in competitive curlers than club curlers, again suggesting that athletic identity and behavioural regulations predicted more variance in imagery use in competitive curlers compared to club curlers. Looking at competitive curlers only, athletic identity was the strongest predictor of MG-A imagery, followed by CS imagery, CG imagery, MS imagery, and finally MG-M imagery. A slightly different pattern was seen in club curlers, where athletic identity was the strongest predictor of MS imagery, followed by MG-A imagery, MG-M imagery, CG imagery, and then CS imagery.

It makes sense that athletic identity was a stronger predictor of imagery use in the competitive curlers compared to club curlers because athletic identity is known to be higher in more elite athletes compared to recreational athletes (e.g., Lamont-Mills & Christensen, 2006). This could be related to the competitive athletes' higher level of commitment to training and their increased focus on sports goals (Horton & Mack, 2000), for which the discipline is provided by a strong athletic identity (Danish, 1983). As well, Kress and Statler (2007) found that elite Olympic athletes were better equipped to deal with pain, which they accepted as part of their sport and their identity. Taken together, these findings can help explain the higher levels of reported imagery use by competitive curlers.

Given that the majority of research on athletic identity has focussed on competitive athletes, it is more difficult to explain the findings regarding club curlers. In fact, only one study has examined the differences between elite and recreational athletes (e.g., Lamont-Mills & Christensen, 2006). The fact that club curlers showed lower levels of athletic identity and less use of imagery compared to competitive curlers may be explained by the fact that recreational athletes do not necessarily have to see themselves as athletes in order to obtain positive psychological benefits (e.g., improve their self-worth) from sport participation. Also, they are not as committed to their sport and thus would be less inclined to use imagery for its cognitive and motivational benefits. Considering the other predictors of the five imagery functions may also help provide an explanation for the nature of imagery use in this group, especially since the autonomous behavioural regulations (i.e., integrated regulation and identified regulation) were found to be highly related to athletic identity.

Identified Regulation as a Predictor of Imagery Use

Out of the six behavioural regulations examined, identified regulation emerged most often as a predictor of imagery use in both club and competitive curlers. Identified regulation significantly predicted three of the five imagery functions in club curlers (i.e., CS, CG, and MG-A imagery), while it only significantly predicted CG imagery in competitive curlers. A trend toward significance for the prediction of MG-M imagery was found in both groups. For club curlers, CG imagery use was most strongly predicted by identified regulation, followed by both CS imagery and MG-A imagery. MG-M imagery use was predicted the weakest. For competitive curlers, CG imagery use was

significantly predicted by identified regulation, while a trend was seen for the prediction of MG-M imagery use.

Identified regulation consists of actions that are valued and performed through a sense of choice as the behaviours are seen as personally important (Ryan & Deci, 2002). Through identified regulation, athletes are able to fulfill their need for autonomy, because they view the behaviours as being self-chosen, and their need for relatedness, because they are engaging in behaviours put forth toward them by others (e.g., coaches, teammates, etc.) that also fall in line with their self-concepts (Koestner & Losier, 2002). Identified regulation has been suggested to be the best predictor of positive outcomes as it can keep individuals oriented toward their goals and foster pride in their accomplishments (Koestner & Losier). While it is likely for recreational athletes to be intrinsically motivated, Alexandris and colleagues (2002) recently argued that it might make sense to see forms of extrinsic motivation also emerging as predictors of leisure-time physical activity for these athletes. Individuals who engage in recreational sports are known to do so to improve their overall health and fitness, which have the potential to become identified (Iso-Ahola, 1999). This may explain why imagery use by club curlers was predicted more often by identified regulation than in competitive curlers.

It is interesting that both cognitive functions of imagery were predicted by identified regulation in club curlers while only one cognitive imagery function was predicted in competitive curlers. Munroe and colleagues (2000) found that strategies are usually developed over the course of a season, resulting in an increase in CG imagery use. In the present study, data were collected after the end of the competitive season, which could explain why it emerged as a predictor in both groups. In addition, MG-A

imagery emerged as being significantly predicted by identified regulation in club curlers but not competitive curlers. Looking at the items that comprise the MG-A subscale, they refer to experiencing feelings of stress, anxiety, and excitement (Hall et al., 1998). Strachan and Munroe-Chandler (2006) found that MG-A imagery emerged as a significant predictor of confidence in the younger of two age cohorts examined in a sample of elite youth baton twirlers. They suspected that the younger, less experienced group used more MG-A in order to regulate their arousal levels in the outcome-oriented competitive environment. It is possible that the same mechanism was present in the current sample of club curlers; however, future research is required to confirm this proposition.

Integrated Regulation as a Predictor of Imagery Use

It is also of interest to note that integrated regulation predicted imagery use in competitive curlers but not club curlers. Integrated regulation emerged as a significant predictor of CS imagery and MS imagery, and showed a trend toward predicting MG-A imagery use. Integrated regulation consists of behaviours that are completely assimilated with one's personal goals and values that make up the self. They are considered to be the most internalized of all extrinsically motivated behaviours (Pelletier & Sarrazin, 2007), and can be similar to behaviours engaged in through intrinsic motivation (Ryan & Deci, 2002). Similar to intrinsic motivation, integrated motivation is characterized by feelings of autonomy and a lack of conflict when engaging in behaviours associated with the self.

To integrate a particular behaviour, individuals must understand its meaning and combine it to match up with their other values and goals, and because individuals are doing this on their own terms, the integration of behaviours in this way is seen as

autonomous (Ryan & Deci, 2000). This definition seems to be very similar to that of a strong athletic identity, which occurs when athletes endorse certain sport-related behaviours because they are seen as congruent with their self-endorsed values and behaviours (e.g., Brewer et al., 1993). The emergence of integrated regulation as a predictor could suggest that imagery use in competitive curlers is more indicative of the athletes' true internal values compared to club curlers, for which behaviours are only seen as personally important and thus exist through identified regulation.

Given the similar natures of integrated regulation and identified regulation, they can be perceived as being very similar or even mistaken as the same construct. In fact, few studies have included integrated regulation in their designs and/or analyses because of high correlations obtained between integrated regulation and identified regulation (e.g., Mouratidis et al., 2010), or because these studies have used measures of behavioural regulations that have failed to include integrated regulation (Pelletier & Sarrazin, 2007), such as the Sport Motivation Scale (SMS; Pelletier et al., 1995). However, these practices deviate from the originally developed SDT continuum (Pelletier & Sarrazin, 2007). The difference between the two constructs is that identified regulation consists of an individual consciously viewing behaviours as being personally important, while integrated regulation consists of identified regulations being fully incorporated into one's self-concept (Ryan & Deci, 2000). This may be the key to explain why identified regulation emerged more often as a predictor of imagery use in club curlers, while integrated regulation emerged only as a predictor of imagery use in competitive curlers. The present results certainly demonstrate the value in assessing both integrated and identified regulation.

Due to the increased effort and dedication required by competitive athletes to be successful in their sport, they are forced to assimilate these demanding behaviours into their self-concepts in order to motivate themselves to engage in the long periods of repetitive hard work (e.g., physical practice and training, mental training) that exist in between the short-lived moments of flow of intrinsic engagement enjoyed during competitions (Ryan & Deci, 2007). It is only when behaviours are autonomously motivated that they can persist for longer periods of time (Ryan & Deci, 2007). This has been confirmed by positive relationships found between autonomous regulations and both task perseverance and psychological well-being (e.g., Gagné, Ryan, & Bargmann, 2003).

Persistence, task perseverance, and coping strategies, all adaptive outcomes produced by the internalization of behaviours, have been found to be important determinants of both athletic development and performance, and can protect athletes from overtraining and burnout (Treasure, Lemyre, Kuckza, & Standage, 2007). Athletes who are unable to internalize training behaviours tend to resort to more externally regulated motivations, which can lead to maladaptive training responses such as overtraining or burnout (Lemyre, Treasure, & Roberts, 2006), which can only be sustained for short periods of time (Ryan & Deci, 2007). It is for all the above reasons that some authors consider integrated regulation to be the “gold standard in elite-level sport” (Treasure et al., 2007, p. 156).

That integrated regulation predicted MS imagery and CS imagery use suggests that competitive curlers are motivated by achieving their goals as well as improving their sport specific skills, because they see these behaviours as being part of their self-concept. This can be partially explained by Martin and Hall (1995), who were one of the few

researchers to examine the relationship between imagery and motivation. Through their imagery intervention, they found support for Paivio's (1985) hypothesis that imagery could be used to enhance motivation. More specifically, Martin and Hall found that participants who used imagery held expectations that were more realistic and set higher goals for themselves. In the present study, corresponding results were obtained as integrated regulation emerged as the sole predictor of MS imagery, which consists of goal- and success-related images (Hall et al., 1998). No research to date has explicitly examined the relationship between CS imagery and motivation. However, CS imagery has been found to be used the most frequently (e.g., Hall et al., 1998; Hallman & Munroe-Chandler, 2009) and more often by elite-level athletes compared to recreational athletes (e.g., Arvinen-Barrow et al., 2007; Watt et al., 2008). Thus, it would make sense for CS imagery use to be significantly predicted by behaviours regulated by the self.

Intrinsic Motivation and Amotivation as Predictors of Imagery Use

Intrinsic motivation showed a trend toward being a significant predictor of MG-M imagery use in club curlers. This finding suggests that club curlers are motivated by intrinsic reasons (i.e., for fun or enjoyment) to use imagery relating to increasing mastery experiences. This is supported in the literature as recreational athletes are expected to place a greater value on intrinsic aspirations, which causes them to experience more hedonic enjoyment and eudemonia, both of which contribute to a greater psychological well-being (Chatzisarantis & Hagger, 2007b). Thus, club curlers may be using imagery to improve feelings of mastery in relation to curling, which is motivated by their enjoyment of the sport. However, future research is needed to confirm whether this association actually exists.

The final behavioural regulation to be discussed is amotivation. Amotivation was found to significantly predict MG-A imagery use in competitive curlers and showed a trend towards predicting MG-A imagery use in club curlers. The fact that amotivation was found to predict MG-A imagery use in competitive athletes was somewhat unexpected. These results are in contrast to those published by Bhatnagar and Karageorghis (2008), who found that amotivation negatively predicted cognitive, affective, and behavioural outcomes in a sample of track and field athletes. However their data were collected during the middle of the athletes' competitive season when athletes may be experiencing more stress and anxiety, while in the present study, data were collected after the competitive season ended. A key finding discussed by Bhatnagar and Karageorghis was that amotivation predicted a greater percentage of affective outcomes compared to cognitive and behavioural outcomes, leading them to discuss the notion of getting athletes to utilize mood- and emotion-regulation strategies to decrease the negative effects of amotivation. This may be what is happening in the present study with competitive curlers using MG-A imagery to handle feelings of amotivation.

As mentioned earlier, it is well known that sport consists of long periods of hard work and practice, which may not be inherently interesting (Ryan & Deci, 2007). Thus, there may be certain situations in which athletes find it hard to motivate themselves to go to practice (e.g., early in the morning or after a long day of work). In these situations, athletes may use MG-A imagery to regulate potentially negative feelings associated with their lack of motivation. This proposition is partially supported by a recent study conducted by Parker and Lovell (2011), in which they found that MG-A imagery use was predicted by both positive and negative affect. They suggested that MG-A imagery was

used to regulate any arousal and stress that athletes may feel in between competitions, and restoring their arousal to optimal levels. An alternate explanation may be related to the avoidance of burnout. It was mentioned earlier that athletes who are unable to internalize training behaviours are more likely to experience maladaptive training responses, such as overtraining or burnout because they resort to more externally regulated motivations as opposed to identifying or integrating the behaviours into their self-concepts (Lemyre et al., 2006). Researchers have also supported the positive link between amotivation and burnout (e.g., Lonsdale et al., 2009). Thus, it is possible that competitive athletes, who would be more susceptible to experiencing burnout, are making use of MG-A imagery as a way to deal with the negative feelings associated with burnout. However, this relationship has yet to be examined in the literature.

Strengths, Limitations and Future Directions

As a whole, the present study contains many strengths in its contribution to the sport psychology literature. First, the present study provides descriptive information regarding the characteristics of athletic identity in a population that is less frequently examined (i.e., older adults) in the current athletic identity literature. Many published studies focus on athletic identity in younger populations such as adolescent- and varsity-level athletes (e.g., Houle et al., 2010; Lau et al., 2004). Second, the present study provides a unique comparative examination of imagery use, sport motivation, and athletic identity across two competitive levels. Only a small number of studies have conducted similar investigations across competitive levels focussing on either imagery, sport motivation, or athletic identity (e.g., Lamont-Mills & Christensen, 2006; Munroe-Chandler et al., 2008). Finally, the present study examines a sport that has not yet been

examined in the sport psychology literature, to the author's knowledge. Given the unique characteristics of the sport of curling compared to other commonly examined sports (e.g., soccer, basketball, gymnastics, skating, etc.), the present study provides new insight into how imagery, sport motivation, and athletic identity play a role in improving the performance of recreational and competitive curlers.

Despite its strengths, there are a few limitations regarding the present study that are important to note. First are the limitations of using self-report questionnaires and employing a cross-sectional design and analyses. Since the data were collected in the spring, a few months after the curling season ended, participants were required to use retrospective self-report regarding their imagery use, motivation, and athletic identity during the previous curling season. This can create problems in regards to the accuracy of participants' self-report (Morris et al., 2005). Studies that are cross-sectional in nature tend to lack generalizability and the extent to which causal inferences from the data can be made (Chatzisarantis & Hagger, 2007a). It is also important to note that although the multiple regression analyses revealed significant relationships among the constructs in question, causation cannot be inferred (Tabachnick & Fidell, 2007). While athletic identity and behavioural regulations both emerged as significant predictors of imagery use in the present study, this relationship may be reciprocal in nature, such that an individual's imagery use may also be affecting their levels of self-determined motivation and/or athletic identity. In the future, longitudinal studies that span an entire curling season should be conducted to examine this reciprocal relationship; detecting how self-determined motivation and athletic identity operate and affect imagery use, as well as how imagery use affects self-determined motivation and athletic identity at different

points of the season. Interventions could also be conducted by manipulating a specific independent variable (i.e., imagery use, self-determined motivation, or athletic identity) to see how it affects various dependent variables (e.g., imagery use, self-determined motivation, athletic identity). Furthermore, other methodological analyses (e.g., structural equation modeling) could be used to further examine exactly how the relationships function and to determine whether a causal relationship actually exists between the three constructs.

A second limitation is related to participants' inability to elaborate on their responses. Including open-ended questions may have provided an enhanced understanding of why athletes were motivated to use the various functions of imagery. This would have been beneficial, for example, in understanding why amotivation predicted MG-A imagery use in competitive curlers. A third limitation is related to the use of the BRSQ and AIMS. The BRSQ is a relatively new measure that has only been used by a handful of researchers. As well, the authors of the BRSQ cautioned that it was designed for use with competitive athletes only (Lonsdale et al., 2008). As the current sample consisted on both competitive and non-competitive athletes, the results should be approached with caution when looking at those related to the club curlers. As well, the BRSQ is one of a few measures to include separate subscales for both integrated regulation and identified regulation. While this can be viewed as a strength of the study, there have been problems regarding the assessment of these two regulations as they can be closely related and sometimes lead to problems with multicollinearity. Some studies have even chosen to leave out integrated regulation as it was found to correlate highly with identified regulation (e.g., Mouratidis et al., 2010). As mentioned earlier, the AIMS

was originally developed as a 10-item measure of the unidimensional athletic identity construct (Brewer et al., 1993) and was later changed to include only seven of the original 10 items (Brewer & Cornelius, 2001). Brewer and Cornelius also suggested that athletic identity may be multidimensional and contain three distinct factors (i.e., social identity, exclusivity, and negative affectivity). Despite this, a total AIMS score is still the most common method used when distinguishing between sport levels (Lamont-Mills & Christensen, 2006). For this reason, more research is needed to determine the best model for measuring athletic identity and whether it is a unidimensional or multidimensional construct. A final limitation regarding the present study concerns the findings' lack of generalizability with other sports, an issue that is commonly noted with these types of studies (e.g., Abma, Fry, Li, & Reylea, 2002; Arvinen-Barrow et al., 2008). Thus, this study needs to be replicated in a variety of other sports, including both individual and team sports, and encompassing both open and closed skills, in order to determine whether the same pattern of results exists across various other competitive and recreational sports.

Implications and Conclusions

Motivation, whether intrinsic, extrinsic, or amotivation, is known to lead to cognitive, affective, or behavioural consequences (Vallerand & Ratelle, 2002). Previous research has not examined the relationships between imagery use and the various behavioural regulations as posited by SDT, which can have its own cognitive, affective, or behavioural consequences, depending on the function used (Martin et al., 1999). In both club and competitive curlers, athletic identity and at least one of the autonomous forms of behavioural regulation predicted the use of all five imagery functions. Athletic identity refers to the degree to which individuals see themselves as occupying an athletic

role. Both identified regulation and integrated regulation consist of behaviours that are related to the self; however, they differ in the degree to which they fully assimilated with it – behaviours are only seen as personally important with respect to identified regulation. With integrated regulation being more self-determined and autonomous than identified regulation, behaviours regulated by it are fully integrated within the self-concept, and are the most similar to behaviours engaged in by athletes with a strong athletic identity. The present findings revealed that integrated regulation predicted imagery use in competitive curlers only, while identified regulation predicted imagery use most often in club curlers.

These findings can be useful in the development of more effective psychological skills training programs to improve the performance of curlers through imagery use. Having a better understanding of the motivational regulations that exist among different competitive levels may permit the development more specific psychological training programs for athletes that take into account the motivational basis for their participation. Treasure and colleagues (2007) suggested that coaches and sport psychologists who take the time to understand motivation and how it functions will be able to help their athletes have a competitive advantage over their opponents, as well as enhance their athletic development, performance, and overall psychological well-being. Also, self-determined motivation should be supported in order to enhance long-term sport participation (Sarrazin, Boiché, & Pelletier, 2007). Knowing that competitive athletes are best motivated when engaging in behaviours through integrated regulation, coaches and sport psychologists should encourage their athletes to internalize more of their behaviours, and teach them to recognize when they are experiencing adversity in order to help them deal with it more effectively (Treasure et al., 2007).

Given the results of the present study in regards to club curlers, it would appear that the best avenue to do this would be through identified regulation. It should be noted that club curlers who play in organized curling leagues typically do not have any contact with coaches or sport psychologists. However, one avenue where club curlers would interact with coaches would be at introductory curling clinics or if they choose to attend a curling development camp. In these instances, curling instructors could take the opportunity to create an autonomy supportive environment in which club curlers could learn or improve upon their skills by helping them view these behaviours as personally important, thus increasing their levels of identified regulation.

Taken as a whole, the findings of the present study suggest an avenue through which researchers and practitioners can explore how to heighten an athlete's competitive edge over their opponents by increasing their imagery use. The results provide support for the use of the self-determination continuum as a way to determine why athletes employ certain imagery functions and how this differs depending on competitive level.

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APPENDIX A

Glossary

Amotivation (AM)¹ Behaviours engaged in without the intent to act; sometimes described as “going through the motions” of a behaviour.

Athletic Identity² The degree to which athletes identify themselves with a particular athletic role.

External Regulation¹ Behaviours engaged in to avoid punishment or gain external rewards.

Extrinsic Motivation (EM)¹ Behaviours engaged in to obtain tangible rewards or in response to the values of others; consists of four subtypes: external regulation, introjected regulation, identified regulation, and integrated regulation.

Cognitive General (CG) imagery³ The rehearsal of strategies and tactics used in sport.

Cognitive Specific (CS) imagery³ The rehearsal of specific skills performed in sport.

Identified Regulation¹ Behaviours engaged in because they are personally valued.

Integrated Regulation¹ Behaviours engaged in because they are considered to be part of one’s self-concept.

Intrinsic Motivation (IM)¹ Behaviours engaged in for personal interest and enjoyment.

Introjected Regulation¹ Behaviours engaged in to boost one’s ego or feelings of self-worth, as well as decrease feelings of shame or guilt.

Motivational General-Arousal (MG-A) imagery³ The use of imagery to regulate arousal and stress while performing a sport.

Motivational General-Mastery (MG-M) imagery³ The use of imagery to increase one’s mental toughness, focus and self-confidence while performing a sport.

Motivational Specific (MS) imagery³ The rehearsal of goal-oriented responses (e.g., seeing oneself winning a national championship).

Self-Determination Theory (SDT)¹ A framework by which researchers can organize human motivation based on the notion that individuals will always strive to actualize their human potentials.

¹Ryan & Deci (2002); ²Brewer, Van Raalte, & Linder (1993); ³Hall, Mack, Paivio, & Hausenblas (1998)

APPENDIX B

Letter of Information

**Examining the Relationships between Imagery, Sport Motivation,
and Athletic Identity in Curling**

You are being invited to participate in a study titled “Examining the Relationships between Imagery, Sport Motivation, and Athletic Identity in Curling.” Research has indicated that individuals who maintain a strong athletic identity (i.e., they think of themselves as ‘an athlete’) are more likely to continue to participate in sport. Self-determination theory; Deci & Ryan (1985) suggest that exercise related-identity should be related to motivation however this has not been tested. Since both identity and motivation are linked to sport adherence, understanding the link between imagery use, motivation, and identity is useful as it allows researchers and sport psychologists to develop effective psychological skills training programs. The purpose of this study is to examine the relationships between imagery, sport motivation, and athletic identity.

In order to be eligible to participate, you must be over the age of 18 and curl either competitively or as part of a structured curling league. If you meet the inclusion criteria for this study and agree to take part in this research you will be asked to complete a questionnaire package including; the extent to which you incorporate imagery into curling, your motivation in curling, and the degree to which you identify yourself as a curler. When you have completed the questionnaires, you will be directed to a screen indicating that you are finished. This process will take approximately 20 minutes to complete.

Your participation in this study is completely voluntary. Your agreement to participate in this study is indicated by completing and returning these questionnaires. You may refuse to participate, refuse to answer any question or withdraw from the study at any time with no effect on your status at UWO if you are a student there. There are no known risks associated with your participation in this study. If you chose to participate in this study, you may help to provide an understanding of how imagery use is related to both sport motivation and athletic identity.

All data collected in the study are anonymous. If the results of this study are published, your name will not be used and no information that discloses your identity will be published. Your questionnaire results will be stored in a locked cabinet in a secure room and will be destroyed after three years.

Please print this page for your records. If you have any questions, or would like more information about this study, please do not hesitate to contact the investigators listed below. If you have any questions about the ethical conduct of this study or your rights as a research subject, you may contact: Office of Research Ethics, The University of Western Ontario.

Thank you!

Investigators:

Dr. Craig Hall
Professor, School of Kinesiology
The University of Western Ontario

Nicole Westlund
MA Candidate, School of Kinesiology
The University of Western Ontario

APPENDIX C

Online Questionnaire

Demographic Questionnaire

Please fill in the blank or check the appropriate answer:

1. Age: _____
2. Gender: _____ Male _____ Female
3. How many years have you curled? _____
4. Please select the level at which you are currently competing in curling:
 - _____ Recreational (e.g., do not practice/play curling regularly)
 - _____ Club Curler (e.g., play in a club league regularly)
 - _____ Competitive (e.g., play in competitive events/practice regularly)

IF YOU INDICATED THAT YOU ARE A COMPETITIVE CURLER (If you are not a competitive curler, skip ahead to question 5):

Please select the highest level at which you have competed in curling:

- _____ Zones
 - _____ Regionals
 - _____ Provincials
 - _____ Nationals
 - _____ International (i.e., World Championships)
 - _____ Olympics
5. How many days per week do you practice (i.e., outside of competitions/games)?

 6. Do you do engage in any forms of off-ice training? _____ Yes _____ No
- IF YES:
- a) How many days per week do you do off-ice training? _____
 - b) What kind of off-ice training do you do (select all that apply):

_____ Cardiovascular exercise	_____ Speed
_____ Strength training	_____ Endurance
_____ Flexibility/Yoga	_____ Other – explain: _____

The Sport Imagery Questionnaire

Athletes use mental imagery in training and competition. Imagery serves two functions. The motivational function of imagery can represent emotion-arousing situations as well as specific goals and goal-oriented behaviors. The cognitive function entails the mental rehearsal of skills and strategies of play. A strategy is a plan or method of achieving some goal. In sport, this often is referred to as a game plan. An example of a strategy used in curling would be playing a defensively; how this is actually accomplished (i.e., the shots executed) would vary considerably over the course of a game. This questionnaire was designed to assess the extent to which you incorporate imagery into curling. Any statement depicting a function of imagery that you rarely use should be given a low rating. In contrast, any statement describing a function of imagery which you use frequently should be given a high rating. Your ratings will be made on a seven-point scale, where one is the rarely or never engage in that kind of imagery end of the scale and seven is the often engage in that kind of imagery end of the scale. Statements that fall within these two extremes should be rated accordingly along the rest of the scale. Read each statement below and fill in the blank the appropriate number from the scale provided to indicate the degree to which the statement applies to you when you are practising or competing in curling. Don't be 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.

	Rarely						Often	
	1	2	3	4	5	6	7	
1	I make up new plans/strategies in my head.							_____
2	I image the atmosphere of winning a championship (e.g., the excitement that follows winning a championship).							_____
3	I image giving 100%.							_____
4	I can consistently control the image of a physical skill.							_____
5	I imagine the emotions I feel while curling.							_____
6	I imagine my skills improving.							_____
7	I image alternative strategies in case my event/game plan fails.							_____
8	I imagine myself handling the arousal and excitement associated with curling.							_____
9	I imagine myself appearing self-confident in front of my opponents.							_____
10	I imagine other athletes congratulating me on a good performance.							_____

- 11 I image each section of an event/game (e.g., offense vs. defence, early ends vs. late ends). _____
- 12 I imagine myself being in control in difficult situations. _____
- 13 I can easily change an image of a skill. _____
- 14 I image others applauding my performance. _____
- 15 When imaging a particular skill, I consistently perform it perfectly in my mind. _____
- 16 I image myself winning a medal. _____
- 17 I imagine the stress and anxiety associated with curling. _____
- 18 I image myself continuing with my game/event plan, even when performing poorly. _____
- 19 When I image myself performing, I feel myself getting psyched up. _____
- 20 I can mentally make corrections to physical skills. _____
- 21 I imagine executing entire plays/programs/sections just the way I want them to happen in an event/game. _____
- 22 Before attempting a particular skill, I imagine myself performing it perfectly. _____
- 23 I imagine myself being mentally tough. _____
- 24 When I image myself participating in curling, I feel anxious. _____
- 25 I imagine the excitement associated with performing. _____
- 26 I image myself being interviewed as a champion. _____
- 27 I image myself to be focussed during a challenging situation. _____
- 28 When learning a new skill, I imagine myself performing it perfectly. _____
- 29 I imagine myself successfully following my game/event plan. _____
- 30 I image myself working successfully through tough situations (e.g., a player short, sore ankle, etc.). _____

Behavioral Regulations in Sport Questionnaire

Below are some reasons why people participate in sport. Using the scale provided, please indicate how true each of the following statements is for you. When deciding if this is one of the reasons why you participate, please think about all the reasons why you participate. There are no right or wrong answers, so do not spend too much time on any one question and please answer as honestly as you can. Some items may appear similar but please respond to all the statements by circling the number under the most appropriate heading.

I participate in curling...	Not at all true	Somewhat true	Very true
1 because I enjoy it.	1	2 3 4 5	6 7
2 because of the pleasure I experience when I feel completely absorbed in curling.	1	2 3 4 5	6 7
3 because it's a part of who I am.	1	2 3 4 5	6 7
4 because it's an opportunity to just be who I am.	1	2 3 4 5	6 7
5 because I would feel ashamed if I quit.	1	2 3 4 5	6 7
6 but the reasons why are not clear to me anymore.	1	2 3 4 5	6 7
7 because I would feel like a failure if I quit.	1	2 3 4 5	6 7
8 but I wonder what's the point.	1	2 3 4 5	6 7
9 because what I do in curling is an expression of who I am.	1	2 3 4 5	6 7
10 because the benefits of curling are important to me.	1	2 3 4 5	6 7
11 because I enjoy the feeling of achievement when trying to reach long-term goals.	1	2 3 4 5	6 7
12 because I enjoy the feeling of success when I am working towards achieving something important.	1	2 3 4 5	6 7
13 because if I don't other people will not be pleased with me.	1	2 3 4 5	6 7
14 because I like it.	1	2 3 4 5	6 7
15 because I enjoy learning something new about curling.	1	2 3 4 5	6 7
16 because I feel obligated to continue.	1	2 3 4 5	6 7
17 but I question why I continue.	1	2 3 4 5	6 7

I participate in curling...		Not at all true		Somewhat true			Very true	
18	because I feel pressure from other people to curl.	1	2	3	4	5	6	7
19	because of the excitement I feel when I am really involved in curling.	1	2	3	4	5	6	7
20	because people push me to play.	1	2	3	4	5	6	7
21	because it's fun.	1	2	3	4	5	6	7
22	because it teaches me self-discipline.	1	2	3	4	5	6	7
23	because I enjoy doing something to the best of my ability.	1	2	3	4	5	6	7
24	because I would feel guilty if I quit.	1	2	3	4	5	6	7
25	because I find it pleasurable.	1	2	3	4	5	6	7
26	because I like learning how to apply new techniques.	1	2	3	4	5	6	7
27	because I value the benefits of curling.	1	2	3	4	5	6	7
28	because I enjoy learning new techniques.	1	2	3	4	5	6	7
29	because I love the extreme highs that I feel during curling.	1	2	3	4	5	6	7
30	but I question why I am putting myself through this.	1	2	3	4	5	6	7
31	because it is a good way to learn things which could be useful to me in my life.	1	2	3	4	5	6	7
32	because of the positive feelings that I experience while curling.	1	2	3	4	5	6	7
33	in order to satisfy people who want me to play.	1	2	3	4	5	6	7
34	because I get a sense of accomplishment when I strive to achieve my goals.	1	2	3	4	5	6	7
35	because it allows me to live in a way that is true to my values.	1	2	3	4	5	6	7
36	for the pleasure it gives me to know more about curling.	1	2	3	4	5	6	7

Athletic Identity Measurement Scale

Please fill in the blank or check the appropriate answer:

Strongly Disagree

Strongly Agree

1 2 3 4 5 6 7

- (1) I consider myself a curler. _____
- (2) I have many goals related to curling. _____
- (3) Most of my friends are curlers. _____
- (4) Curling is the most important part of my life. _____
- (5) I spend more time thinking about curling than anything else. _____
- (6) I feel bad about myself when I do poorly in curling. _____
- (7) I would be very depressed if I were injured and could not compete in curling. _____

CURRICULUM VITAE

CURRICULUM VITAE FOR NICOLE WESTLUND**POST-SECONDARY EDUCATION**

- 2010 – 2012 Master of Arts in Kinesiology (Sport Psychology)
University of Western Ontario, London, ON
- 2006 – 2010 Bachelor of Science with Specialized Honours in Psychology
Lakehead University, Thunder Bay, ON

AWARDS & HONOURS

- | | | |
|-------------|--------------------------------------------------------------------------------|---------------------|
| 2011 – 2012 | Ontario Graduate Scholarship Master's Award | \$15,000 for 1 year |
| 2011 – 2012 | Western Graduate Research Scholarship | \$3,000 for 1 year |
| 2010 – 2011 | SSHRC CGS Master's Award | \$17,500 for 1 year |
| 2010 – 2011 | Western Graduate Research Scholarship | \$3,000 for 1 year |
| 2010 | Canadian Psychological Association Certificate of Academic Excellence Laureate | |
| 2006 – 2010 | Lakehead University Academic Excellence Scholarship | \$2,500/yr, 4 years |
| 2006 – 2010 | Queen Elizabeth Aim for the Top Scholarship | \$1,226/yr, 4 years |
| 2006 – 2010 | Lakehead University Dean's List | |

REFEREED CONFERENCE PRESENTATIONS

Westlund, N., & Hall, C. (2011). *Examining the relationships between imagery, sport motivation, and athletic identity in curling*. Verbal presentation at the 2011 annual meeting of the Canadian Society for Psychomotor Learning and Sport Psychology, Winnipeg, Manitoba.

Oinonen, K., Richards, M., Mazmanian, D., Marshall, B., & **Westlund, N.** *Earlier menarche is associated with lower positive impression management and higher social detachment*. Co-author on poster at the 2010 annual meeting of the Canadian Psychological Association, Winnipeg, Manitoba.

NON-REFEREED PRESENTATIONS

Westlund, N., Oinonen, K., Mazmanian, D., Bird, J., Bong, M., McLean, M., & Coates, M. (March, 2010). *Middle-phalangeal hair measurement: Reliability, validity, and value in psychological research*. Poster presented at the Annual Lakehead University Psychology Research Day,

TEACHING EXPERIENCE

- 2010 – 2012 *Graduate Teaching Assistant: KIN 2276: Psychology of Exercise.*
Department of Kinesiology, University of Western Ontario.
- 2010 – 2011 *Graduate Teaching Assistant: KIN 2221: Curling Activity Course.*
Department of Kinesiology, University of Western Ontario.

RESEARCH EXPERIENCE

- 2009 – 2010 *Undergraduate Research Assistant: Health, Hormones, and Behaviour (HHAB) Lab, Lakehead University.*

GUEST LECTURES

- 2012 *Mental Toughness in Sport.* Lecture for KIN 3474: Psychological Interventions in Exercise Rehabilitation. Department of Kinesiology, University of Western Ontario.
- 2011 *APA Formatting.* Lecture for KIN 2276: Psychology of Exercise. Department of Kinesiology, University of Western Ontario.
- 2011 *Introduction to Imagery in Curling.* Lesson as an Assistant Instructor at Trillium Curling Camp, Guelph, ON.
- 2011 *Mental Toughness in Sport.* Lecture for KIN 3474: Psychological Interventions in Exercise Rehabilitation. Department of Kinesiology, University of Western Ontario.
- 2010 *APA Formatting.* Lecture for KIN 2276: Psychology of Exercise. Department of Kinesiology, University of Western Ontario.

OTHER SCHOLARLY ACTIVITIES

- 2011 – 2012 Planning committee (Treasurer) for the Eastern Canadian Sport and Exercise Psychology Symposium, held at the University of Western Ontario, London, ON.
- 2010 – 2011 Reviewer in collaboration with Dr. Craig Hall for *The Sport Psychologist and Perceptual and Motor Skills.*
- 2010 – 2011 Assistant to the conference chair for the 2011 North American Society for the Psychology of Sport and Physical Activity conference, held in Burlington, VT.

RELATED EXPERIENCE AND CERTIFICATIONS

- 2011 – Present Assistant Instructor, Trillium Curling Camp, Guelph, ON
- 2000 – Present Curling Instructor, Youth and adult curling leagues
- 2010 Level 2 Certified Curling Coach, National Coaching Certification Program