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An examination of ice hockey players' imagery use and perspective

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An Examination of Ice Hockey Players' Imagery Use and Perspective

By

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ABSTRACT

Mental imagery is an effective performance enhancing technique for athletes (Driskell, Copper, & Moran, 1994), and therefore has been the topic of extensive investigation in the sport psychology domain. To date, the few studies that have examined imagery across position of play have neglected to examine goaltenders as a distinct position from defense. As such, comparisons can only be made between forwards and defense. The purpose the present study was to examine differences in imagery use and perspective in male ice hockey players across playing position. Participants included 258 competitive male ice hockey players (*n* = 122 forwards, *n* = 68 defense, *n* = 68 goaltenders), between the ages of 16 and 29 (19.12 ±1.96). Two separate MANOVAs revealed significant overall effects for both imagery frequency and perspective across playing position. Univariate follow-up ANOVAs found that goaltenders use significantly more MG-M and CS imagery than forwards and defense. Furthermore, it was found that goaltenders have significantly more clear and vivid images from an internal perspective and an external perspective than forwards, but not defense. Findings from the present study provide sport psychologists with research that can guide the development of more individually tailored imagery interventions for ice hockey athletes.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

RESEARCH ARTICLE

Introduction

Mental imagery use in sport has been found to be a highly effective performance enhancement technique for athletes (Driskell, Copper, & Moran, 1994; Feltz & Landers, 1983). Given the vast research providing support for the positive effects of mental imagery, it has been cited as the cornerstone of sport psychology (Cornelius, 2002), with coaches and athletes advocating its usefulness in sport (Murphy, Jowdy, & Durtschi, 1990). White and Hardy (1998) have defined mental imagery as:

> an experience that mimics real experience. We can be aware of "seeing" an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing. Sometimes people find that it helps to close their eyes. It differs from dreams in that we are awake and conscious when we form an image. (p. 389)

For the last decade, imagery research has supported Paivio's (1985) general analytic framework of imagery use. Paivio indicated that the use of imagery in sport serves two functions, motivational and cognitive, with both functions operating at a specific or general level. Therefore, there are four functions of imagery. First, motivational specific imagery (MS) includes images related to individual goals (e.g., imagining receiving a medal). Second, motivational general imagery (MG) includes images relating to physiological arousal levels and emotions (e.g., imagining feeling calm and relaxed in front of a large crowd). Third, cognitive specific imagery (CS) includes images of specific sport skills (e.g., imaging a wrist shot in ice hockey). Fourth, cognitive general imagery (CG) includes images of strategies, game plans, or routines (e.g., imaging a penalty kill strategy in ice hockey). Following Paivio's original conceptualization of imagery use, Hall, Mack, Paivio, and Hausenblas (1998) found the motivational general function of imagery to represent two functions rather than one. Motivational general-arousal (MG-A) involves imagery associated with arousal and stress, while motivational general-mastery (MG-M) involves imagery associated with being mentally tough, in control, and self-confident.

Much of the recent imagery research has focused on the five functions of imagery as outlined by Hall et al. (1998). Findings have indicated that elite athletes use the five functions of imagery more than their novice counterparts and that these functions are used most prior to competition (Hall, Rodgers, & Barr, 1990; Munroe, Giacobbi, Hall, & Weinberg, 2000). In addition, athletes tend to use the five functions of imagery later in the season rather than earlier in the season (Munroe, Hall, Simms, & Weinberg, 1998). Moreover, sport type influences athletes' use of imagery and may play a role in determining the specific functions of imagery used (Munroe et al., 1998). For imagery to be most effective, the images should be positive (Hall, 2001) and the function of the image should match the intended outcome (Martin, Moritz, & Hall, 1999).

In addition to the functions of imagery, or why athletes use imagery, one's ability to image has also been widely studied (Morris, Spittle, & Watt, 2005). Morris (1997) defined imagery ability as "an individual's capability of forming vivid, controllable images and retaining them for sufficient time to effect the desired imagery rehearsal" (p. 37). Self-report paper-pencil questionnaires such as the Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1997) and the Vividness of Movement Imagery Questionnaire (VMIQ; Isaac, Marks, & Russell, 1986) are two tools used to assess imagery ability.

Imagery ability is conceptualized as a moderating variable in Martin and colleagues' (1999) Applied Model of Imagery Use. The model was developed in order to better understand athletes' use of imagery in sport. The model centers on imagery type (or function), which includes the five functions of imagery from Paivio's (1985) original conceptual model (i.e., CS, CG, MS, MG-M, MG-A). Imagery type is influenced by the sport situation, which may include training, competition, or rehabilitation. Furthermore, imagery type influences the cognitive, affective, and behavioral outcomes of imagery use and these relationships are moderated by imagery ability (i.e., visual and kinesthetic). Kinesthetic imagery refers to the sensory experiences that come from kinesthetic information, namely information from receptors throughout the body about all body movements (Morris et al., 2005), whereas visual imagery refers to sensory experiences that relate to the perceptual experience of seeing (Morris et al.). Based on Martin and colleagues' model, as well as generalized imagery findings, the greater the imagery ability, the greater the benefits of imagery use. For example, research indicates that higher imagery ability is associated with better sport performance (Orlick & Partington, 1988).

Most of the research examining imagery ability has focused on visual imagery and more specifically on imagery perspective. Athletes can imagine the execution of a skill from their own vantage point (internal imagery) or athletes can view themselves from the perspective of an external observer such that it is as if you are watching yourself as a spectator in the stands (external imagery). Much of the imagery perspective findings have been equivocal. For instance, Mahoney and Avener (1977) indicated that imagery perspective differed as a function of skill level, wherein more skilled athletes preferred imaging from an internal perspective rather than an external perspective. In contrast, Meyers, Cooke, Cullen, and Liles (1979) found no significant difference between less skilled versus more skilled athletes' preference for one imagery perspective over the other. Furthermore, in a qualitative study conducted by Munroe and colleagues (2000) in which they examined what athletes were imaging, elite athletes from a variety of individual and team sports indicated that they incorporated both internal and external perspectives.

Despite these equivocal findings, imagery perspective research as it relates to specific tasks has shown some trends. Specifically, implementing imagery from an external perspective appears to be more beneficial for athletes undergoing tasks that require form (e.g., gymnastics). Specifically, Hardy and Callow (1999) conducted several experiments to investigate imagery perspectives in three sport tasks requiring form. In particular, karateist learned a new kata, gymnasts learned a new floor routine, and rock climbers dealt with difficult boulder problems. The results indicated that external visual imagery was significantly more effective than internal visual imagery in athletes engaging in tasks requiring form.

In contrast, imaging from an internal perspective appears to be more beneficial for athletes engaged in tasks involving open skills (Spittle & Morris, 2000), such as ice hockey athletes. White and Hardy (1995) experimentally examined imagery perspectives and its influence on learning and performance on two different tasks; a slalom type task and gymnastic type task. Participants engaged in the slalom type task were required to negotiate a course as quickly as possible with a minimum number of errors. Findings indicated that with respect to athletes learning a slalom type task, an internal perspective was most beneficial. The slalom task is considered an open skill given that the task is executed in a changing environment (Poulton, 1957). In contrast, closed skills involve skills performed in a stable environment, such as a floor routine in gymnastics (Poulton).

Although ice hockey is considered an open skill sport and therefore we might expect athletes to benefit more from using internal imagery than external imagery, the three different playing positions (forward, defense, and goaltender) entail different working environments, thus making it possible that imagery perspective may differ by position. Ice hockey goaltenders, rather than forwards or defense, may be more analogous to gymnasts or karateists in that they are executing complex skill movements requiring form and as such may benefit more from using external imagery than forwards and defense who execute skill movements with less emphasis on form. Specifically, goaltenders implement a variety of motor skills that differ from those implemented by forwards and defense. For example, in practice, drills aimed at goaltenders include knee drops, kick saves, and executing a variety of saves while maintaining balance, stance, positioning and navigating around the crease appropriately (Chambers, 1994). In contrast, drills aimed at forwards and defense focus primarily on game strategies such as regroups, breakouts, specialty teams (e.g., power play and penalty kill), defense zone tactics, and offensive zone tactics, with some emphasis on basic skills such as passing, shooting, and checking (Chambers). Based on the imagery perspective literature indicating that open skilled sport athletes may benefit more from an internal imagery perspective and that athletes engaged in a sport emphasizing form may benefit more from an external imagery perspective, it is possible that goaltenders may be better able to image using a combination of both internal and external imagery. Contrastingly, those playing positions with less emphasis on form and yet still encompassing an open skill (i.e., forwards and defense) would benefit more from an external imagery perspective.

Ice hockey is an especially popular team sport in Canada and, as such, researchers have examined various psychological constructs in ice hockey, including team building (Dunn & Holt, 2004), self-talk (Amirault, 2001), and mental imagery (Cumming & Hall, 2002a). Key findings with respect to ice hockey players' use of mental imagery have revealed they use imagery more for its motivational function than its cognitive function (Hall et al., 1998). Results also suggested that ice hockey players use MG-M imagery the most (Moritz, Hall, Martin, & Vadocz, 1996) and MS imagery the least (Munroe et al., 1998). Despite these findings, many of the studies that have examined the psychological skills of ice hockey players have included ice hockey players as only one small portion of their sample. For example, Hall and colleagues (1990) examined ice hockey in addition to football, soccer, squash, gymnastics, and figure skating. Subsequently, generalizations are made about imagery across all sports, rather than specific sports. Additionally, most studies that have included ice hockey players in their sample have examined all hockey players as a collective, rather than looking at each position independently (i.e., forwards, defense, goaltenders). To date, one study has examined the use of imagery in a specific sample of ice hockey players (Wilson, 2007), albeit a youth sample. Wilson examined how skill level (competitive vs. recreational) impacted the frequency of imagery use in young athletes. The results indicated that, contrary to adults, youth athletes' imagery use did not differ across skill level, but that CG imagery (images related to strategy) differed across forwards and defense. Although Wilson also examined player position, all three positions were not examined independently. That is, goaltenders were collapsed with defense and comparisons were made against forwards.

Although researchers have determined that type of sport influences athletes' use of imagery (Munroe et al., 1998), they have not been able to determine whether the difference is due to a specific sport classification (e.g., individual vs. team, interactive vs. coactive). For example, Munroe and colleagues (1998) examined the use of imagery across a variety of team and individual sports. They found that imagery use did differ, but it was dependent upon the sport rather than sport classification (i.e., team vs. individual). These equivocal findings may be due to the fact that imagery use is influenced by player position and the demands of the task rather than the sport itself. Although Munroe-Chandler and Hall (2005) did examine imagery use with respect to playing position in the sport of soccer, they neglected to examine each position independently. Specifically, forwards and midfielders were examined independently while defense and goaltenders were grouped to form one position. It is possible that other differences in imagery use may emerge across different tasks and in this case the three different playing positions in ice hockey (forward, defense, and goaltender). Given the open skill nature of the sport, all three positions would benefit from an internal perspective more so than an external perspective. However, due to the nature of tasks related to goaltending (e.g., emphasis on technique and form), goaltenders may also benefit from using an external perspective.

Research examining goaltenders' use of psychological skills has, for the most part, been neglected. Moreover, the few studies that have included ice hockey goaltenders in their sample have not examined them as a distinct position from defense (e.g., Wilson, 2007). As such, comparisons can only be made between forwards and defense. Anecdotal evidence suggests that there is a distinct difference between goaltenders and the other two positions in ice hockey, forwards and defense (Olshansky, 2007). Ron Hextall (as cited in Olshansky), a former NHL goaltender himself, suggests one difference between the positions in ice hockey may be due to that fact that "you can make mistakes up front [forwards], but obviously at the back end [goaltenders], it's tough to make mistakes" (http://www.cstv.com/sports/m-hockey/stories/071207aaa.html). Head coach of the Michigan Wolverine's (as cited in Olshansky) agrees with Hextall:

> You rarely find a 19 or 20 year old goalie playing in the NHL, whereas you will find the odd 18 or 19 year old forward. The forwards, you can get way with their mistakes, and play them when they're younger. Defensemen, their mistakes are more important, and it takes them longer, and goalie mistakes are critical. (http://www.cstv.com/sports/m-hockey/stories/071207aaa.html)

Indeed, the position of goaltender bears more responsibility and subsequent pressure, thus making their mental strength an imperative component of their success (Miller, 2001). Miller indicated that all ice hockey players must learn to cope with pressure by managing their emotions, focus, and attitude. He noted, however, that it is especially imperative for goaltenders to cope with the unique intense pressure experienced in the position. This type of pressure was described by one of the greatest goaltenders of all time, Jacques Plante, when he said, "Imagine a job where every time you make a mistake, a red light flashes and 15,000 people stand up and cheer" (as cited in Miller, p. 187). Since the position demands that a goaltender stays on the ice for the entire game, remaining focused for every minute is of utmost importance. In contrast, forwards and defense get breaks in play (e.g., during shift changes) and as such their need to remain focused for the entire duration of the game is not as imperative. Further evidence to support the differences in player position is found in instructional hockey books in which they separate information based on position. Although linked together by the commonality of the sport, the different playing positions in ice hockey fulfill different roles (Miller; Percival, 1997) and as such may require the use of different mental skills.

The first aim of the study was to examine the frequency of imagery use across all three playing positions in ice hockey. It was hypothesized that goaltenders would exhibit a higher frequency of imagery use than forwards or defense given their unique pressure and their increased need for mental toughness (Miller, 2001). Due to the equivocal findings with respect to imagery use, no specific a priori hypotheses were made for the specific functions of imagery use (i.e., CS, CG, MS. MG-M, MG-A) by playing position. Previous research has also indicated that differing motor skills influences the mental imagery perspective used by athletes (White & Hardy, 1995). More specifically, those athletes whose primary task requires form (e.g., gymnasts) were better able to image from an external imagery perspective than an internal imagery perspective. In addition, previous research (Hardy & Callow, 1999) found that internal imagery was superior to external imagery by athletes executing open skills rather than closed skills. As such, the second aim of the current study was to examine the influence of ice hockey position on mental imagery perspective. Specifically, it was predicted that goaltenders would be better able to use a combination of internal and external visual imagery given that the position incorporates open skills and emphasizes form. Forward and defense, on the other hand, would be better able to image from an internal perspective than an external perspective due to the open skill nature of the tasks required to play those positions.

Method

Participants

The current study included 258 competitive male ice hockey players (*n* = 122 forwards, *n* = 68 defense, *n* = 68 goaltenders) and ranged in age between 16 and 29 years, with a mean age of 19.12 ±1.96. Competitive ice hockey players were defined as those individuals currently participating in the following leagues: Varsity (*n* = 29), Ontario Hockey League (*n* = 14), Ontario Provincial Junior A (*n* = 104), Major Junior B (*n* = 22), Major Junior C (*n* = 75), Senior AAA (*n* = 11), and Professional European Hockey (*n* = 3). No house league or pickup leagues were included in the current study. Given the number of goaltenders required, goaltending clinics were utilized. Twenty-seven goaltenders were recruited from goaltending clinics, while the remaining were recruited from intact ice hockey teams (*n* = 41).

Measures

Personal characteristics. Participants were asked to report their age, ice hockey position, years of ice hockey experience, years of experience at their current competitive level, and coaches' encouragement of imagery use (Appendix A). Descriptive statistics of all participant characteristics are displayed in Table 1.

Imagery frequency. The Sport Imagery Questionnaire (SIQ; Hall et al., 1998) is a 30-item measurement tool used to assess the frequency of imagery use (Appendix A). The SIQ is composed of five subscales (CS, CG, MS, MG-M, MG-A) that assess both the cognitive and motivational functions of imagery. The CS subscale is composed of seven items with an example item being "I can consistently control the image of a physical skill". The CG subscale is composed of six items with an example item being "I make up new plans/strategies in my head". The MS subscale is composed of five items with an example item being "I imagine other athletes congratulating me on a good performance". The MG-M subscale is composed of six items with an example item being "I imagine the emotions I feel while doing my sport". Finally, the MG-A subscale is composed of six items with an example item being "I image giving 100%". All items are measured on a 7-point scale from 1 = *rarely* to 7 = *often*, with higher scores being reflective of greater imagery use. The SIQ remains the preferred instrument used to measure the frequency of imagery in both research and applied areas (Morris et al., 2005). Previous literature has consistently demonstrated both predictive and content validity (Hall et al, 1998). Furthermore, each subscale has demonstrated acceptable internal consistencies with alpha coefficients greater than .70 (Hall et al., 1998).

Imagery ability. The Vividness of Movement Imagery Questionnaire-2 (VMIQ-2; Roberts, Callow, Hardy, Markland, & Bringer, 2008) is composed of 36 items assessing the vividness of movement imagery (Appendix B). More specifically, the VMIQ-2 assesses external visual imagery (e.g., EVI; watching yourself performing the movement), internal visual imagery (e.g., IVI; looking through your own eyes whilst performing the movement), and kinesthetic imagery (e.g., KI; feeling yourself do the movement) on a variety of motor tasks (e.g., running, kicking a stone). All items are measured on a 5-point scale from 1 = *perfectly clear and as vivid as normal vision*, to 5 = *no image at all, you only know that you are thinking of the skill*, with lower scores representing greater vividness of movement imagery. Despite the novelty of the VMIQ-2, it has shown adequate reliability with alphas ranging from .93 to .95 (Roberts et al.) as well as adequate factorial, concurrent, and construct validity (e.g., Isaac et al., 1986) as well as shown acceptable validity and reliability (Isaac et al.). The VMIQ-2 was constructed from the original VMIQ with a focus on reducing some of the limitations existent on the original VMIQ. More specifically, the VMIQ-2 differs from the original VMIQ in three ways. First, the instruction set provides a clearer description of the construct under assessment. Second, following confirmatory factor analysis procedures the number of items included in the questionnaire were reduced from 24 items to 12 items. Finally, the new response format allows participants to complete the questionnaire with more ease than the VMIQ.

Procedure

After receiving ethics clearance from the university's Research Ethics Board, the investigator approached potential competitive hockey leagues and teams via an e-mail or standardized telephone call, in which the proposed study was outlined in order to recruit participants (Appendix C). Given the ratio of players to goaltenders on ice hockey teams, ice hockey goaltending clinics and training camps were also contacted to recruit competitive ice hockey goaltenders. Upon recruitment, participants were informed of their right to confidentiality and right to withdraw at any time through a consent to participation form (Appendix D). In addition, a letter of information (Appendix E) was provided. Once consent was obtained, participants were requested to complete the package of paper-pencil questionnaires. In order to ensure consistency, all data collection occurred following practice.

Data Analyses

Tabachnick and Fidell (2001) indicate that it is crucial for researchers to check data during the collection and entry phases, prior to running primary data analyses.

Specifically, the current study employed a number of statistical screening procedures in order to identify and treat problems in the database such as missing data and outliers. Once data screening and cleaning was complete, the reliability of the SIQ and VMIQ-2 was examined through Cronbach alpha coefficient tests. Subscales exhibiting alpha coefficients of .70 and above were accepted as reliable (Nunnally, 1978). Descriptive analyses were run including the means and standard deviations for age of participants, years of experience, number of years on the current team, and the scores on the subscales of the SIQ and VMIQ-2. In addition, linearity, normality, and homoscedasticity were examined. Moreover, the assumptions of a multivariate analysis of variance (MANOVA) were examined. The assumptions of MANOVA that were met included random sample, normal distribution, equal variances across the groups on the dependent variables, and the dependent variable having a multivariate normal distribution with the same variance covariance matrix in each group (Munro, 2005). Frequencies were calculated for playing position and coaches' encouragement of imagery use. Finally, bivariate correlations were run for all subscales.

Given our need to examine several dependent variables (CS, CG, MS, MG-A, MG-M and EVI, IVI, KI) and several independent variables (offense, defense, and goaltender), two separate MANOVAs were conducted.

Results

Preliminary Analysis

The current study employed a number of statistical screening procedures in order to identify and treat problems in the database such as missing data and outliers. In accordance with Tabachnick and Fidell (2001), missing data were detected through the examination of frequencies and treated by deletion or mean substitution. Univariate outliers for continuous variables were examined through inspection of z-scores with variables falling outside of ± 3.29 considered a potential outlier. In order to detect multivariate outliers, Mahalanobis distance was used. Finally, four extreme cases (two forwards and two defense) identified through this procedure were treated by deletion.

Following screening for extreme and influential cases, separate univariate analysis of variance (ANOVA) revealed no significant differences ($p > .05$) between groups on any of the demographic variables (i.e., age, years of ice hockey experience, years of experience at their current competitive level, and coaches' encouragement of imagery use). Subsequently, the assumptions of MANOVA were examined and met.

Internal Reliability

Cronbach's Alpha coefficients were calculated in order to examine the internal consistency reliabilities of the SIQ subscales (CS, CG, MS, MG-M, and MG-A) and VMIQ-2 subscales (EVI, IVI, KI) and these are presented in Table 2. The coefficients for the SIQ ranged between .71-.81, while the coefficients for the VMIQ-2 ranged between .94-.96, indicating adequate reliability for both measures (Nunnally, 1978).

Descriptive Statistics

Means and standard deviations were calculated for the five types of imagery (CS, CG, MS, MG-M and MG-A) and the three types of imagery ability (EVI, IVI, KI) and these are presented in Table 2. In addition, bivariate correlations indicated the five subscales of the SIQ were low to moderately correlated to one another with Pearson Correlation coefficients ranging from .38 to .71 ($p < .01$) and the VMIQ-2 subscales were moderately correlated, with Pearson Correlation coefficients ranging from .65 to .70 ($p < .01$). These are presented in Table 3. Not surprisingly the correlations between the five subscales of the SIQ and the three subscales of the VMIQ-2 were low, albeit significant, indicating that they are measuring different concepts (i.e., imagery frequency and imagery perspective) and providing evidence of concurrent validity for the newly revised VMIQ-2.

Primary Analysis

Imagery use. In order to examine group differences in imagery frequency based on playing position, a MANOVA was conducted with position (forward, defense, goaltender) as the independent variable and the five subscales of the SIQ (CS, CG, MS, MG-M, MG-A) as the dependent variables. A non-significant Box's M revealed that the assumption of homogeneity of variance-covariance matrices was upheld (Box's M = 15.35, $F(12, 133752) = 1.59, p > .001$). A significant overall multivariate effect was found for imagery use based on position (Pillai's Trace = .173, $F(10, 504) = 4.77, p < .01, \eta^2 = .086$). Univariate analyses revealed that two (CS and MG-M) of the five subscales of the SIQ differed significantly across position (CS, $F(2, 258) = 8.18, p = .000$; MG-M, $F(2, 258) = 10.78, p = .000$). The remaining three subscales showed no significant difference (CG, $F(2, 258) = 1.14, p = .323$; MS, $F(2, 258) = .59, p = .554$;

MG-A, $F(2, 258) = 1.03$, $p = 359$). Tukey post-hoc tests revealed that goaltenders used significantly more CS ($M = 5.53 \pm 0.81$) imagery and MG-M imagery ($M = 5.95 \pm 0.80$) when compared to forwards (CS $M = 5.12 \pm 1.04$, MG-M $M = 5.40 \pm 1.05$) and defense (CS $M = 4.83 \pm 1.11$, MG-M $M = 5.21 \pm 1.10$) (all $p < .01$). No significant differences emerged between forwards and defense on their use of imagery.

Imagery perspective. In order to examine differences in imagery perspective based on playing position, a MANOVA was conducted with position (forward, defense, goaltender) as the independent variable and the three subscales of the VMIQ-2 (EVI, IVI, KI) as the dependent variables. A non-significant Box's M revealed that the assumption of homogeneity of variance-covariance matrices was upheld (Box's M = 49.17, $F(30, 193551) = 1.26$, $p > .001$). The MANOVA revealed a significant overall multivariate effect for imagery perspective based on position (Pillai's Trace = .065, $F(6, 508) = 2.85$, $p < .01$, $\eta^2 = .033$). Univariate analyses revealed that all three subscales of the VMIQ-2 differed significantly across position (EVI, $F(2, 258) = 5.39$, $p = .005$; IVI, $F(2, 258) = 7.12$, $p = .001$; KI, $F(2, 258) = 3.10$, $p = .047$. Specifically, Tukey post-hoc tests revealed that goaltenders image more vividly from an EVI perspective ($M = 2.06 \pm .85$) and IVI perspective ($M = 1.81 \pm .80$) than forwards (EVI $M = 2.53 \pm .10$; IVI $M = 2.40 \pm 1.03$) (all $p < .01$), while no significant differences emerged between goaltenders and defense (EVI $M = 2.43 \pm .1.02$; IVI $M = 2.20 \pm 1.05$). Although not significant in the Tukey post-hoc, goaltenders image more vividly on KI ($M = 2.10 \pm .84$) than forwards ($M = 2.40 \pm .10$) and defense ($M = 2.41 \pm .10$). Across all three subscales of imagery ability, the means indicated that goaltenders imaged more vividly than forwards and defense whereas defense imaged less vividly than goaltenders and forwards.

Discussion

The present study investigated differences in imagery frequency and imagery perspective across playing position (forward, defense, goaltender) in competitive male ice hockey players. The first hypothesis predicted that goaltenders would exhibit a higher frequency of imagery use than forwards and defense given the unique pressures involved in the position of goaltender and the subsequent increased need for mental toughness (Miller, 2001). As predicted, results indicated that imagery use differed significantly across playing position, providing evidence that goaltenders report using imagery more frequently than do forwards and defense.

Previous research indicates that ice hockey goaltenders do image and that imagery helps improve performance (McFadden, 1982; Rogerson & Hrycaiko, 2002).The current study provides further insight into goaltenders' use of imagery as it explores goaltenders in relation to the other positions within the sport of ice hockey. Hall (2001) suggested that imagery use by athletes from various sports may differ and that this may be due to sport specific time availability for athletes to implement imagery during the sporting event. For example, ice hockey players may be better able to use imagery as a mental tool than track and field sprinting athletes due to the time available during competition. However, it should be noted that when examining ice hockey, it is not accurate to presume that all hockey players have the same time availability to image. Forwards and defense have breaks in play while on the bench for shift changes or during game stoppage (i.e., whistles). During this time, forwards and defense are often interacting with coaches or teammates, providing them little time to implement imagery during these breaks in play. Although the starting goaltender is on the ice for the entire game, he does have time available during lapses in play (i.e., whistles) or when the play is in the opposing end. Contrary to forwards and defense, however, the goaltenders' interactions with others throughout the game are minimal and therefore he may be afforded more quality time to image. Furthermore, there is always one backup goaltender who sits on the bench for the duration of the game, with ample time to image. Assuming the play will be in the opposing end to some extent and that there is always one goaltender on the bench for the duration of the game, it is speculated that goaltenders not only have more time available to image but that the quality of their time to image is superior to that of forwards and defense. Thus, differences in time availability between goaltenders and the two remaining positions may be one explanation for this disparity in imagery use based on position.

Although no a priori hypotheses were made with respect to the specific functions of imagery used (i.e., CS, CG, MS. MG-M, MG-A) across position, the current research found that goaltenders reported using significantly more MG-M (images related to confidence and mental toughness). Forwards and defense, however, did not differ significantly from one another in their use of those specific functions of imagery. These findings are not surprising given the nature of the position. Experts on ice hockey goaltending recognize the need for high confidence by goaltenders as a psychological advantage over the opponent (Daccord, 1998). Not only do goaltenders require a high confidence level but they also need to showcase this confidence by using specific physical techniques (Daccord). For example, a goaltender may exhibit confidence by coming out of the crease to challenge the shooter. Additionally, a more confident goaltender may position his body in such a way that he maximizes net coverage thus creating a physical presence in order to intimidate the opposition into making key mistakes that result in overall game repercussions. Indeed, it may also be important for forwards and defense to demonstrate confidence; however, the resulting consequences may not have the same effect on the overall outcome of a game as those behaviours exhibited by a goaltender given that the goaltender is the last line of defense.

The current study also found that goaltenders use CS imagery significantly more than forwards and defense, whereas forwards and defense did not differ significantly from one another in their use of CS imagery. Although CS imagery is most commonly referred to as imagery related to skill execution, Munroe and colleagues (2000) suggested further categorization of CS imagery to include technique and correction. Indeed, depending on the goal of the athlete, CS imagery may be used for very different and distinct purposes. While speculative, goaltenders' use of CS imagery may be more specific to skill correction, rather than execution. It is possible that once a game or practice is over, goaltenders spend time reviewing mistakes in play that resulted in goals against and may use CS imagery as a means to skill correction.

Regardless of playing position, athletes in the current study reported using MG-M and CS imagery the most and MS imagery the least. These results are consistent with previous imagery studies which have found MG-M and CS imagery to be used most often by athletes (Cumming & Hall, 2002b; Hall et al., 1998; Moritz et al., 1996) and MS imagery the least (Munroe et al., 1998). Furthermore, consistent with findings in the current study, Arvinen-Barrow, Weigand, Thomas, Hemmings, and Walley (2007) found that MG-M imagery was used significantly more by athletes in open skill sports when compared to those athletes in closed skill sports and that elite athletes engaged in CS imagery more than their less elite counterparts. Overall, results from the current study suggest that competitive male ice hockey players report using imagery most often for mental toughness and confidence, in addition to imagery related to skills.

The second aim of the present research was to examine imagery ability across all three playing positions in ice hockey, and as hypothesized significant differences emerged. Specific hypotheses were generated based on previous research that found individuals engaged in tasks focusing on form image benefit from an external perspective (Hardy & Callow, 1999) and individuals engaged in open skill tasks image benefit from an internal perspective (Spittle & Morris, 2000). It was predicted that goaltenders would be better able to image with a combination of internal and external visual imagery given that the position incorporates open skills and emphasizes form. In contrast, it was believed that forward and defense would be better able to image using more internal than external imagery due to the open skill nature of the tasks required by those in such positions. This hypothesis was partially supported in that goaltenders' combination of EVI and IVI was significantly more vivid than forwards. Murphy (1994) specified that in addition to task type, it is imperative that the demands of the different tasks be considered when examining the imagery perspective used. This may provide some explanation for the differences in imagery perspective between goaltenders and forwards. Goaltending requires an explicit awareness and vast knowledge of the game. Corsi and Hannon (2002) stated that goaltenders must be capable of tracking all play action including the puck and all players on the ice; constantly evaluating and reacting to it. As Daccord (1998) suggested, the goaltender often plays the role of a quarterback. Their ability to see the entire playing surface allows them to communicate with teammates, providing instructions that will inform teammates. In addition, the position permits for more accurate decisions thus demonstrating a goaltender's leadership and confidence (Daccord). Consequently, the specific tasks required of the goaltender may contribute to the significant difference in imagery perspective from that of forwards. By imaging from both perspectives (EVI and IVI), goaltenders may be better able to produce a more comprehensive visual image of the entire ice surface and the abundance of information that they are required to track during games. Hardy (1997) suggested that an athletes' choice of imagery perspective may be most related to the beneficial information that it provides the athletes. Thus, goaltenders' ability to execute the demands of the position may be more adequately attained by using both perspectives, rather than just one.

Contrary to our hypothesis, no significant differences emerged between goaltenders and defense on imagery perspective. The lack of significance may be due to similarities that exist between goaltenders and defense. The playing positions are alike in that they are both defending against the opposition scoring a goal. Furthermore, defense is similarly responsible for communicating instructions to teammates, although not to the same extent as the goaltenders. Comparable to goaltenders, defense may image from both perspectives in order to gain a more comprehensive visual image of the game. Given these explanations are speculative, further research is required to examine in more depth the imagery perspectives used by all three playing positions.

Although univariate analysis indicated differences on players' use of KI, post hoc analysis showed no significant differences across playing position. Trends in the means did reveal, however, that goaltenders imaged more vividly on KI than forwards and defense. It could be argued that the position of goaltender focuses more on physical form and technique than forwards and defense. Given the focus on feeling the movements that

KI entails, goaltenders may use more kinesthetic imagery. Accordingly, a goaltender could use KI in order to image more precisely the form and technique required in the position. For example, a goaltender may be better able to navigate around the crease while using KI in order to gain awareness of his positioning in the crease.

Regardless of playing position, the results from the current study revealed that competitive male ice hockey players possess a high ability to image from visual (external and internal) and kinesthetic perspectives with responses indicating they can image with clarity and vividness. This is consistent with previous research (Hall et al., 1990; Salmon, Hall, & Haslam, 1994), wherein both elite and non-elite athletes in team sports reported extensive use of both visual and kinesthetic imagery. The current study extends previous findings suggesting that player position influences imagery perspective, with goaltenders exhibiting higher imagery ability than forwards and defense on all three measures of imagery ability.

Athletes in the current study were asked "have any of your previous coaches encouraged you to use imagery?" The majority of athletes reported having been encouraged by a coach to use imagery (75.2%). Although not a significant difference, more goaltenders (76.5%) reported being encouraged by coaches than forwards (74.6%) and defense (75.4%). Given the competitive level of the participants, it is likely that a large majority of the teams would have goaltending coaches that focus their attention entirely on the goaltenders. This may allow the coach more time to encourage the use of mental skills, namely imagery. In addition, with some of the participants recruited from goaltending clinics, it is highly plausible that mental skills (e.g. imagery) may have been encouraged during their clinic. The current findings are consistent with previous research that indicates coaches often encourage imagery use (Jedlic, Hall, Munroe-Chandler, & Hall, 2007).

The current study is not without limitations. One limitation is the inconsistency in the recruitment of participants across playing position. All forwards and defense included in the study were recruited from competitive teams, whereas a large number of goaltenders came from goaltending clinics. In future studies, researchers should attempt to recruit athletes solely from clinics or by limiting themselves to recruiting from intact teams. Although not the purpose of the current study, no significant differences emerged between goaltenders recruited from clinics and those recruited from teams on their imagery use and ability thus suggesting that the method of recruitment did not influence the current findings. A second possible limitation may be that goaltenders' status as starter or backup goaltender as well as whether they had a goaltending coach was not collected from the participants, which may have impacted their frequency and perspective of imagery use.

Additional research on imagery use across playing position in ice hockey remains. The available time to image, based on position is one factor that could impact athletes' use of imagery. Whether that available time is prior to, during, and following games may also impact players' use of imagery. Furthermore, player status (e.g., starter versus backup goaltender) may influence one's time availability to image and subsequently imagery use. Qualitative interviews or focus groups may be a valuable research method in order to investigate the issue of time availability. In addition, future research may explore whether implementing all five functions of imagery would have a greater positive effect on performance than merely using one or two functions. That is; does using more imagery lead to greater performance outcomes?

Although further research is necessary, findings from the current study do provide valuable implications. Vealey and Greenleaf (2006) indicated that sport psychologist must tailor mental skills programs specifically to each individual. Findings from the present study provide sport psychologists with research that can guide the development of more individually tailored imagery interventions for ice hockey athletes. Given that ice hockey athletes are currently employing MG-M and CS imagery the most, and presuming that 'more is better', coaches and sport psychologists may encourage greater use of CG, MS, and MG-A imagery in order to reap the full benefits of imagery use. With respect to imagery perspective, sport psychologist may encourage ice hockey players to use all three perspectives in order to meet the demands of the tasks they are required to complete. Furthermore, in order to strengthen research in any academic field, it is important that measurement tools be psychometrically sound. Due to the recent development of a revised version of the VMIQ, the present study contributes to the field of sport psychology by providing evidence of validity and reliability for the VMIQ-2. The findings from the present study suggest that imagery use and perspective differs across playing position. Given these findings, it is not enough to tailor imagery interventions aimed at a specific sport but rather aimed at the various positions within each sport.

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Table 1

Means, Standard Deviations, Frequencies, and Percentages for all Descriptive Statistics

	Age (years)	Experience (years)	Level (years)
Mean	19.12	13.88	2.70
Standard Deviation	1.96	2.84	2.23

	Coaches' Encouragement[a]		Playing Position		
	Yes	No	Forward	Defense	Goaltender
Frequency	194	57	122	68	68
Percentage %	75.2	22.1	47.3	26.4	26.4

Note: Experience = hockey experience; Level = current competitive level.

[a]Six participants did not indicate coaches' encouragement

Table 2

Cronbach's Alpha Coefficients, Means, and Standard Deviations for the SIQ and the VMIQ-2

	Position								
	Forward		Defense		Goaltender		All Positions		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*a*
SIQ									
CS	5.11	1.04	4.83	1.11	5.53	.81	5.15	1.04	.80
CG	4.86	.99	4.84	1.00	5.06	.92	4.91	.98	.71
MS	4.84	1.25	4.64	1.31	4.73	1.25	4.76	1.27	.73
MG-M	5.37	1.05	5.21	.79	5.95	.79	5.48	1.04	.80
MG-A	4.90	1.03	4.66	1.10	4.80	1.17	4.81	1.09	.73
VMIQ2									
EVI	2.53	.96	2.43	1.02	2.06	.85	2.38	.96	.94
IVI	2.37	1.03	2.20	1.05	1.81	.78	2.18	.10	.96
KI	2.37	.98	2.41	.99	2.05	.84	2.29	.96	.95

Note: SIQ= Sport Imagery Questionnaire; CS = cognitive specific; CG = cognitive general; MS = motivational specific; MG-M = motivational general-mastery; MG-A = motivational general-arousal; VMIQ2 = Vividness of Movement Imagery Questionanire Revised; EVI = external visual imagery; IVI = internal visual imagery; KI = kinesthetic imagery; SD = standard deviation; *a* = Cronbach alpha coefficients. The SIQ is scored on a 1 – 7 Likert Scale with 1 = *rarely* and 7 = *often*. The VMIQ-2 is scored on a 1 – 5 Likert Scale with 1 = *perfectly clear* and 5 = *no image at all.*

Table 3

Bivariate Correlations between the SIQ subscales and the VMIQ-2 subscales

Variable	1	2	3	4	5	6	7	8
1. CS	-	.70**	.38**	.71**	.53**	-.16*	-.20	-.07
2. CG		-	.38**	.66**	.52**	-.14*	-.14	-.06
3. MS			-	.43**	.51**	-.05	.02	-.02
4. MG-M				-	.63**	-.14*	-.21**	-.11
5. MG-A					-	-.14*	-.09	-.08
6. EVI						-	.70**	.70**
7. IVI							-	.65**
8. KI								-

Note: CS = cognitive specific; CG = cognitive general; MS = motivational specific; MG-M = motivational general-mastery; MG-A = motivational general-arousal; EVI = external visual imagery; IVI = internal visual imagery; KI = kinesthetic imagery

* $p < .05$.

** $p < .01$.

LITERATURE REVIEW

Sport psychologists advocate the use of mental skills to enhance athletes' sport performance (Weinberg & Gould, 2007). The most common mental skills include goal setting, positive self-talk, attention control, and mental imagery (Weinberg & Gould). Mental imagery is considered the cornerstone of sport psychology (Cornelius, 2002) due to the fact it has consistently been shown to enhance sport performance (Feltz & Landers, 1983; Martin, Moritz, & Hall, 1999). Research aside, anecdotal evidence for the use of mental imagery, in addition to the belief in the effectiveness of mental imagery is abundant across sport psychologists, coaches, and athletes. This is evident by Wayne Gretzky's personal testimony to mental imagery:

> We taped a lot of famous pictures on the locker-room door: Bobby Orr, Potvin, Beliveau, all holding the Stanley Cup. We'd stand back and look at them and envision ourselves doing it. I really believe if you visualize yourself doing something, you can make that image come true…I must have rehearsed it ten thousand times. And when it came true it was like an electric jolt went up my spine (cited in Orlick, 1998, p. 67).

Furthermore, descriptive research conducted by Orlick and Partington (1988) found that 99 percent of male and female Olympic athletes reported the inclusion of mental imagery as an important component of their preparation strategy. Similarly, Murphy, Jowdy, and Durtschi (1990) reported that 90 percent of Olympic athletes used some form of mental imagery and 97 percent of these athletes held the belief that mental imagery helped their performance. However, it is not simply the athletes who believe in the effectiveness of mental imagery, coaches also advocate its use. Murphy et al. found that 94 percent of Olympic coaches used mental imagery with their athletes during their training sessions and often credited the mental imagery training program they implemented for the improvement and success of the athletes. More recent support for this finding comes from Jedlic, Hall, Munroe-Chandler, and Hall (2007) in which they examined coaches' encouragement of imagery use in over 500 coaches and athletes using the Coaches Encouragement of Athletes' Imagery Use Questionnaire. The results indicated that coaches encourage the use of imagery across athletes competing in various sports such as volleyball, basketball, and ice hockey.

Ice hockey is often cited as our Nation's passion. Across Canada over 540,000 males and females participate in the sport recreationally and competitively (Hockey Canada, 2007), while many more enjoy viewing the sport. Ice hockey has been the focus of some sport psychology research, including studies that have examined player aggression (Loughead & Leith, 2001; Shapcott, Bloom, & Loughead, 2007), leadership (Dupuis, Bloom, & Loughead, 2006), perfectionism (Gotwals & Dunn, 2007), and perception of a season long mental skills program (Dunn & Holt, 2003). In addition, ice hockey players have been included with other sport athletes in various studies examining psychological constructs (Eys, Loughead, & Hardy, 2007; Munroe, Hall, Simms, & Weinberg, 1998). Furthermore, most studies using ice hockey players as their sample have examined these athletes as a collective, rather than looking at each playing position independently (i.e., forwards, defense, goaltenders). As such, psychological skills research has neglected to examine ice hockey goaltenders specifically. The few studies that have included ice hockey goaltenders in their sample have collapsed goaltenders with the defense in order to compare forwards and defense (Wilson, 2007). However, various anecdotal references allude to a distinct difference between goaltenders and other positions on the ice. For example, Peter Sidorkiewicz, an ice hockey goaltender himself stated, "We're definitely a different breed. We're different because so much rides on our shoulders" (as cited in McDonnell, 1997, p. 7).

Miller (2001) indicated that all ice hockey players must learn to cope with pressure by managing their emotions, focus, and attitude. He noted, however, that it is especially imperative for goaltenders to cope with the unique intense pressure experienced in the position. The unique intense pressure was described by one of the greatest goaltenders of all time, Jacques Plante; he stated, "Imagine a job where every time you make a mistake, a red light flashes and 15,000 people stand up and cheer" (as cited in Miller, p. 187). Since the position demands that a goaltender stays on the ice for the entire game, remaining focused for every minute is crucial. In contrast, forwards and defense get breaks in play, for example during shift changes, and as such there is not the need to remain focused for the entire duration of the game. Further evidence to support the differences in player position is found in instructional hockey books in which they separate information based on playing position. Although linked together by the commonality of the sport, the different positions in ice hockey fulfill different roles (Miller; Percival, 1997) and as such may require the use of different mental skills. Although anecdotal evidence would suggest distinct differences between goaltenders and other ice hockey positions given the unique pressures of the goaltender position and the differences across positions in motor skills engaged, no previous research has compared their use of imagery. White and Hardy (1995) suggested that one aspect of mental imagery, imagery perspective, was influenced by the motor skill being executed. Indeed, the motor skills differ significantly between positions in ice hockey, which could potentially lead to differences in the use of mental imagery. Moreover, Munroe, Hall, Simms and Weinberg (1998) found that the frequency of imagery use is dependent upon the sport, not the sport classification (i.e., team vs. individual). It is possible that the frequency of imagery use may differ at a more micro-level, that is, position within one sport. Thus, the aim of the current study is to explore the specific psychological skill of mental imagery across all three playing positions in the sport of ice hockey. The frequency and perspective of athletes' mental images will be assessed in a sample of adult male ice hockey players. Based on previous mental imagery research, it is hypothesized that significant differences will be found in the frequency and ability of imagery depending on playing position. More specifically, two hypotheses will be explored in the current study. First, given the increased pressure placed goaltenders requiring superior mental toughness, it is predicted that goaltenders will exhibit a higher frequency of imagery use than forwards or defense. Second, it was predicted that goaltenders would be better able to use a combination of internal and external visual imagery given that the position incorporates open skills and emphasizes form. Forward and defense, on the other hand, would be better able to image from an internal perspective than an external perspective due to the open skill nature of the tasks required to play those positions.

Mental Imagery

Richardson (1969) defined mental imagery as "those quasi-perceptual experiences of which we are self-consciously aware and which exist for us in the absence of those stimulus conditions that are known to produce their genuine sensory or perceptual counterparts" (p. 2-3). More recently, Vealey and Greenleaf (2006) defined mental imagery as a mental creation or re-creation of experiences, using all senses. Despite there being a number of definitions that exist for mental imagery, the most comprehensive and accepted definition to date is provided by White and Hardy (1998) in which they define mental imagery as:

> an experience that mimics real experience. We can be aware of "seeing" an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing. Sometimes people find that it helps to close their eyes. It differs from dreams in that we are awake and conscious when we form an image. (p. 389)

Indeed, the most effective mental imagery incorporates as many senses as possible, including sight, auditory, olfactory, tactile, and kinesthetic (Vealey & Greenleaf, 2006). An example of imagery encompassing senses beyond that of sight alone can be seen in an ice hockey goaltender that sees himself in the crease, feels his legs burn as he remains in his stance, and tastes the salt from the sweat across his lips.

Mental Imagery Theories and Conceptual Models

Theories provide a foundation upon which new research can be based as well as an understanding of what mental imagery is, and how and why mental imagery is utilized to enhance motor and sport performance. Throughout the years, the mental imagery literature has provided many theories of imagery use. However, as the imagery research evolved, so too did the imagery theories. Similar to theories, models are an essential component to strengthening our understanding of the applicability of research to real sport settings. Murphy (1990) suggested that when research is conducted on imagery in sport as a means to developing a model, models developed outside of sport should be used as a guide.

Dual-code theory. Developed by Paivio (1975), Dual-code theory places significant importance on memory and learning. According to this theory, two independent memory codes are formed as a result of creating an image. Most importantly, the two codes subsequently facilitate recall. For example, if an individual stores the word 'puck' along with an image of a puck in memory, he can recall the image or the word from memory. Murphy and Jowdy (1992) have criticized this theory for its primary focus on visual imagery, neglecting the other senses involved in successful mental imagery programs.

Bioinformational theory. Originally developed by Lang (1977), this theory was developed for mainstream psychology rather than sport psychology. Information processing provides the foundation for Bioinformational theory. According to this theory, mental images are comprised of an organized set of characteristics, stored in the brain's long-term memory (Lang, 1979). More specifically, if an athlete engages in imagery, he activates stimulus characteristics and response characteristics. Stimulus characteristics provide a description of the content of the image, while response characteristics provide a description of responses to the stimuli in that imaged situation. For example, an ice hockey goaltender making a glove save in the final seconds of a close game would include the stimulus characteristics of the feel of his body in stance, the sight of the player coming in for a shot with the puck on his stick, and the sound of the crowd. The response characteristics for this image might include muscular tension in the legs, increased perspiration, and the sight of the puck in his glove after the game saving stop.

Bioinformational theory indicates that response characteristics facilitate sport performance. That is, once response characteristics are activated, they can be modified, improved and strengthened, thus facilitating sport performance. One criticism of Lang's Bioinformation theory is that it may not be readily applicable to sport due to its original purpose to increase understanding of phobias and anxieties (Morris, Spittle, & Watt, 2005). In addition, Hall (2001) suggested the theory neglected to explain the motivational functions of imagery (e.g., regulation of arousal and achievement of goals) despite the psychophysiological basis of the theory.

Triple-code theory. According to Ahsen's (1984) Triple-code theory, three components are a prerequisite to understanding how imagery influences sport performance. The first component involves the image itself. The second component involves the somatic response. Finally, the third component involves the meaning of the image. The most important aspect of this theory is the third component, which extends previous imagery theories. Ahsen suggests that the meaning of the image will vary across individuals depending on their backgrounds and histories. For example, an experienced Olympic athlete may image differently than a novice athlete as a result of their varied levels of play. One limitation of the Triple-code theory is its inability to explain the cognitive effects of imagery (Morris et al., 2005) such as learning and skill development.

Paivio's Conceptual Model. Paivio (1985) developed a general analytic framework that has emerged as an integral component of imagery research. Paivio (1985) suggested that people engage in imagery to serve various functions that will in turn influence motor performance. More specifically, the use of imagery in sport provides athletes with two functions: motivational and cognitive. Both functions operate at a specific or general level. Motivational specific imagery (MS) includes images related to individual goals (e.g., imagining receiving a medal). Motivational general imagery (MG) includes images relating to physiological arousal levels and emotions (e.g., imagining feeling calm and relaxed in front of a large crowd). Cognitive specific imagery (CS) includes images of specific sport skills (e.g., imaging a wrist shot in ice hockey). Cognitive general imagery (CG) includes images of strategies, game plans, or routines (e.g., imaging a penalty kill strategy in ice hockey). The identification of the function of imagery was important because it allowed researchers to gain insight into specific reasons why imagery can and should be used by athletes (Morris et al., 2005). Indeed, the four functions explained by Paivio provided a blueprint for the use of imagery in practice and competition, contributing unique functions at varying times.

Through factor analytic techniques, Hall, Mack, Paivio, and Hausenblas (1998) revisited Paivio's original analytic framework of imagery resulting in two motivational general functions (see Figure 1). Motivational general-arousal (MG-A) involves imagery associated with arousal and stress, while motivational general-mastery (MG-M) involves imagery associated with being mentally tough, in control, and self-confident. The addition of MG-A and MG-M to Paivio's (1985) original analytic framework allowed for a more comprehensive understanding of the functions of imagery and as a result has been the most widely employed model of imagery use. Subsequent to this addition, an Applied Model of Imagery Use was developed.

The Applied Model of Imagery Use. Martin and colleagues (1999) synthesized the major findings in imagery literature in order to produce an applied model of imagery use in sport. The model centers around the imagery type (function), which is influenced by the sport situation. Furthermore, imagery type influences the cognitive, affective, and behavioral outcomes of imagery use and these relationships are moderated by imagery ability (see Figure 2).

The sport situation is comprised of training, competition, and rehabilitation. Previous imagery research (Hall, Rodgers, & Barr, 1990) found that athletes from a variety of individual and team sports used imagery both in training and competition. Munroe, Giacobbi, Hall, and Weinberg (2000) confirmed those findings in a qualitative study, in which athletes reported using imagery more in conjunction with competition than with practice. In addition, the athletes in higher competitive levels reported using imagery more often than lower competitive level athletes in practice, in competition, and prior to an event. An additional situation in which athletes implement imagery is rehabilitation (Jones & Stuth, 1997). Rehabilitation imagery is used to prevent injury (Green, 1992) or to heal/rehabilitate an injury that has already occurred (Durso-Cupal, 1998).

Imagery type is comprised of the five functions of imagery (CS, CG, MS, MG-M, MG-A). In support of Hall et al.'s (1998) findings, athletes in Munroe and colleagues' (2000) study also identified the same five functions of imagery. These five functions are measured with the Sport Imagery Questionnaire (SIQ; Hall et al., 1998). In the development of the SIQ, Hall and colleagues (1998) assumed all five functions of imagery to be orthogonal. After three phases of development, the SIQ remains a valid and reliable 30-item measurement tool composed of five subscales that assesses two cognitive and three motivational functions of imagery. Athletes rate their responses on a 7-point scale from 1 = *rarely* to 7 = *often*, with higher scores being reflective of greater imagery use and lower scores reflecting less imagery use. Compared to previous mental imagery questionnaires such as the Imagery Use Questionnaire (IUQ; Hall et al., 1990), a strength of the SIQ is that it is based on a Paivio's (1985) analytic framework. In addition, the SIQ is general in nature, thus lending its use to a variety of sports.

Since the development of the SIQ, an array of studies have emerged examining imagery type by way of the five functions of imagery (Arvinen-Barrow, Weigand, Thomas, Hemmings, & Walley, 2007; Gregg & Hall, 2006; Munroe et al.,1998) and remains one of the most used instruments in mental imagery research. All five subscales have demonstrated acceptable internal consistencies with alpha coefficients greater than .70 (Hall et al., 1998). Munroe and colleagues (1998) and Abma, Fry, Li, and Relyea (2002) found corresponding internal consistencies that ranged from .68 to .90. Hall and colleagues (1998) demonstrated construct validity wherein regression analyses revealed that the cognitive functions of imagery were more likely to predict the performance of higher level athletes, whereas the motivational functions of imagery were more likely to predict the performance of lower level athletes. Weinberg, Butt, Knight, Burke, and Jackson (2003) also examined the construct validity of the SIQ and found that individual athletes implement the use of motivational imagery more than team athletes.

One important aspect of mental imagery is ability (Vealey & Greenleaf, 2006). Controllability is the ability of athletes to imagine exactly what they intend to imagine, and also the ability to manipulate aspects of the images they wish to change. For example, an ice hockey player is in control if he can image himself implementing a strategy to score a goal and manipulating that strategy in response to the opposing team's different defensive techniques employed. Vividness refers to how clearly athletes can see an image and how detailed the image appears to them. For example, a goaltender whose images are vivid may see an opposing offense coming in on a breakaway and cue in on the swift movements of his stick on the puck. In the Applied Model of Imagery Use (Martin et al., 1999), imagery ability includes kinesthetic imagery and visual imagery (i.e., internal and external). Kinesthetic imagery refers to the sensory experiences that come from kinesthetic information, namely information from receptors throughout the body about all body movements (Morris et al., 2005). Visual imagery refers to sensory experiences that relate to the perceptual experience of seeing (Morris et al.). Research indicates that these two components moderate the effect of imagery use on outcomes.

Imagery ability is often examined through self-report paper-pencil questionnaires such as the Movement Imagery Questionnaire Revised (MIQ-R; Hall & Martin, 1997) and the Vividness of Movement Imagery Questionnaire-2 (VMIQ-2; Roberts, Callow, Hardy, Markland, & Bringer, 2008). The MIQ-R is comprised of 8 items assessing visual and kinesthetic imagery abilities. Participants completing the questionnaire must complete arm, leg, and whole body movements and rate the ease and/or difficulty with which he or she imagines the movement on a 7-point scale, where 1 = *very easy to picture/feel* and 7 = *very difficult to picture/feel*. The MIQ-R has been found to be a valid and reliable instrument (Hall & Martin; Vadocz, Hall, & Moritz, 1997) that is relevant to individuals involved in motor performance. However, the MIQ-R is limited in that it is best delivered to a small group of participants at any one time and although it assesses two modalities, visual and kinesthetic, it does not assess internal and external visual imagery perspectives.

The VMIQ-2 (Roberts et al., 2008) is comprised of 36 items and is used to determine vividness of movement imagery. More specifically, the VMIQ-2 assesses external visual imagery, internal visual imagery, and kinesthetic imagery on a variety of motor tasks (e.g., running, kicking a stone). All items are measured on a 5-point scale from 1 = *perfectly clear and as vivid as normal vision,* to 5 = *no image at all, you only know that you are thinking of the skill*, with lower scores representing greater vividness of movement imagery. The VMIQ-2 was constructed from the original VMIQ (Isaac, Marks, & Russell, 1986) with a focus on reducing some of the limitations existent on the original VMIQ. More specifically, the VMIQ-2 differs from the original VMIQ in three ways. First, the instruction set provides a clearer description of the construct under assessment. Second, following confirmatory factor analysis (CFA) procedures the number of items included in the questionnaire were reduced from 24 items to 12 items. Finally, the new response format allows participants to complete the questionnaire with more ease than the VMIQ. Roberts and colleagues provided evidence of the factorial, concurrent, and construct validity of the VMIQ-2. Given the collection of data will take place in large group settings with limited space, as well as the added ability of assessing kinesthetic imagery, the VMIQ-2 is best suited for the purposes of the current study.

In the Applied Model of Imagery Use (Martin et al., 1999), outcome is comprised of acquisition and improved performance of skills and strategies, modification of cognitions, and regulation of arousal and anxiety. As the model suggests, the function of imagery should match the intended outcome. For example, if an ice hockey goaltender has the desire to learn to t-shuffle in the crease, which is a specific sport skill, CS imagery rather than the other four functions of imagery would be the most advantageous.

In order for the field of sport psychology to improve its understandings of mental skills, it is imperative that conceptual models and frameworks are developed. The Applied Model of Imagery Use is an integral part of the imagery literature in that it provides structure to subsequent mental imagery research, increasing understanding and the applicability of research findings.

Mental Imagery Perspectives

Prior to 1990, the study of mental imagery in sport was largely focused on imagery perspectives (Hall et al., 1990). The image that an individual creates can be from two different perspectives including internal imagery (first person) and external imagery (third person) (Mahoney & Avener, 1977). Internal imagery refers to imagining the execution of a skill from your own vantage point. For example, an ice hockey goaltender executing a glove-save would see the puck flying through the air and he would follow it directly into his glove. Conversely, external imagery involves viewing yourself from the perspective of an external observer. That is, it is as if you are watching yourself as a spectator in the stands or on television. For example, an ice hockey goaltender would image his entire body moving across the crease to block a shot as well as see the expression on his face as he saved the shot. Imagery perspective can limit an athlete's use of his senses. For example, an athlete imaging from an internal perspective has the ability to include the sense of feeling each movement (kinesthetic sense), whereas an athlete imaging from an external perspective would not (Vealey & Greenleaf, 2006).

Results from imagery perspective studies have been equivocal. Mahoney and Avener (1977) are credited with the first study to examine imagery perspectives in elite athletes. The findings indicated successful Olympic trial gymnasts used internal rather than external imagery use when compared to those Olympic trial gymnasts who were unsuccessful. Although Mahoney and Avener's original findings have been substantiated with literature supporting the finding that elite athletes are more likely to implement imagery from an internal perspective and non-elite athletes from an external perspective (Orlick & Partington, 1988; Rotella, Gransneder, Ojala, & Billing, 1980), others have not found support (Meyers, Cooke, Cullen, & Liles, 1979). In an attempt to replicate Mahoney and Avener's findings, Meyers et al. examined the imagery perspective of a different sample of athletes, namely racquetball players holding national championship status. Their results yielded contradictory findings in that the use of a specific imagery perspective did not differ as a function of skill level.

In the early 1990s, researchers recognized an important limitation in the imagery perspective literature. That is, no research had been conducted to determine the influence that the type of task may have on imagery perspective. White and Hardy (1995) experimentally examined imagery perspectives and its influence on learning and performance on two different tasks; namely, a slalom-type task and a gymnastic-type task. The slalom task required participants to negotiate a course as quickly as possible with the minimum number of errors (much like an ice hockey player negotiating the dynamic environment in ice hockey). In the slalom task, results indicated that those imaging from an external perspective focused on the speed of performance whereas those imaging from an internal perspective focused on the accuracy of performance (Spittle & Morris, 2000). Thus, athletes participating in a task with a dynamic visual field, imaging from an internal perspective may be more beneficial in terms of accuracy. In contrast to the slalom task, the gymnastic task required participants to complete a movement sequence in static positions (i.e., emphasizing form). Participants completing the gymnastic task from an external perspective rather than an internal perspective displayed more effective learning of the task. Similarly, Hardy and Callow (1999) conducted several experiments in which they examined imagery perspectives in three tasks requiring form. Specifically, karateist learned a new kata, gymnasts learned a new floor routine, and rock climbers dealt with difficult boulder problems. Results for the karate, gymnastic, and rock climbing tasks indicated that external visual imagery was significantly more effective for learning the task than internal imagery and other conditions (e.g., no imagery). Similar to that of White and Hardy (1995), other researchers (Annett, 1995; Hardy & Callow, 1999; Spittle & Morris, 2000) also found support for the influence that task has on imagery perspective. Spittle and Morris investigated the role of imagery perspective in open and closed skill tasks and found that internal was preferred overall.

Indeed, research suggests that an athlete's choice of imagery perspective (internal or external) may be a function of skill level and tasks being executed (Morris et al., 2005). As indicated previously, with respect to skill level and imagery perspective, no conclusive findings have emerged. However, clarity has emerged for the influence of tasks being executed on imagery perspective (Morris et al.). In ice hockey, the three different positions entail different working environments, thus making imagery perspective an important factor to examine. Ice hockey goaltenders, rather than forwards or defense, may be more analogous to gymnasts in that they are executing complex skill movements requiring technique or form. For example, in practice, drills aimed at goaltenders include knee drops, kick saves, and executing a variety of saves while maintaining balance, stance, positioning and navigating around the crease appropriately (Chambers, 1994). In contrast, drills aimed at forwards and defense focus primarily on game strategies such as regroups, breakouts, specialty teams (e.g., power play and penalty kill), defense zone tactics, and offensive zone tactics, with lesser emphasis on basic skills such as passing, shooting, and checking (Chambers). Based on the imagery perspective literature, it is possible that ice hockey goaltenders would differ in their use of imagery compared to forwards and defense. Specifically, the findings from White and Hardy (1995) and Hardy and Callow (1999) would suggest that goaltenders may use a combination of internal and external perspective, given the open skill nature of the position and the fact they execute complex skill movements requiring form. Moreover, given the execution of open skills across all three positions in ice hockey, findings from Spittle and Morris (2000) would suggest that all positions will image from internal perspective.

Imagery in Sport

Much research has been conducted on mental imagery as it relates to performance enhancement in sport. Mental imagery has been investigated in a variety of individual sports such as gymnastics (Calmels, Lopez, Holmes, & Naman, 2006), figure skating (Hall & Rodgers, 1989), and golf (Gregg & Hall, 2006), and team sports such as soccer (Thelwell, Greenlees, & Weston, 2006), volleyball (Cumming, Hall, & Starkes, 2005), and football (Shackell & Standing, 2007). Over the years, a number of key findings have emerged. Early research conducted by Feltz and Landers (1983) indicated that practicing mental imagery when physical practice is not available improves athlete performance on motor skills. However, when physical practice is available it should be given priority since physical practice is superior to mental imagery (Hird, Landers, Thomas, & Horan, 1991).

Another major finding in mental imagery research is that level of competition influences mental imagery use. That is, as competitive level increases so does imagery use (Hall et al., 1990). More recently, Cummings and Hall (2002) found that during the off-season competitive athletes in a variety of different sports engaged in significantly more imagery than their novice counterparts. Other research suggests that elite athletes may be more apt to use a specific type of imagery than non-elite athletes. For example, Arvinen-Barrow and colleagues (2007) found that elite athletes used significantly more CS and CG imagery than novice athletes whereas MS, MG-A, and MG-M did not differ significantly across competitive level.

Research has also found that imagery is used differentially throughout an athlete's competitive season (Barr & Hall, 1992; Munroe et al., 1998) and is dependent upon the sport (Munroe at al.). The influence of time of season (early versus late) and type of sport (team versus individual) on athletes' use of imagery was examined by Munroe and colleagues. Ten sports were examined with the majority of the individual and team sports demonstrating a significant increase in the use of MS imagery over time, while the most consistent finding was that for most sports the use of CG imagery increased. These results indicate that imagery use changes during the competitive season, but these changes are dependent upon the sport. Although many significant findings have been reported with respect to the use of imagery across a variety of sports, research has neglected to examine imagery use across specific player positions within each individual sport (e.g., forward, defense, and goaltender in ice hockey). Each position in ice hockey emphasizes different technical (e.g., motor skills) and psychological demands (e.g., pressure) and as such, it is possible their use of imagery may differ. It is possible that in one sport, athletes occupying the various playing positions (e.g., forward, defense and goaltender) may use the five functions of imagery differently.

In sport, imagery is a mental tool advocated by sport psychologists due to its effectiveness in enhancing sport performance and learning. Vealey and Greenleaf (2006) discuss three ways in which mental imagery influences sport performance and learning. First, mental imagery can provide mental practice in that a specific sport skill can be practiced repetitively in ones mind. For example, an ice hockey goaltender may practice executing the butterfly in order to effectively stop shots directed towards low net. Second, mental imagery can be implemented in order to better prepare for games, specifically by enabling athletes to more effectively psych up, calm down, or focus on relevant aspects of the sport. For example, a goaltender may image a wide range of game saving stops in order to psych up effectively. Third, mental imagery can be used as one aspect of a multimodal mental training intervention. For example, a sport psychologist may develop a mental training program for a goaltender that consists of imagery, relaxation, and self-talk training to improve consistency in game performance.

Imagery Specific to Position in Sport

Although a wide variety of different team sports (e.g., volleyball, football, soccer, basketball) have been examined in relation to mental imagery, few studies have examined imagery with respect to playing position in these team sports. This is surprising given sport psychologist advocate imagery programs should be specific to each individual (Vealey & Greenleaf, 2006). However, one study conducted by Munroe-Chandler and

Hall (2005) did examine position within the sport of soccer. Munroe-Chandler and Hall implemented an MG-M imagery intervention with the intention of increasing a soccer team's collective efficacy. The three positions (forward, midfielder, and defender/goal keeper) were used in order to implement a staggered multiple baseline design. As a weekly post manipulation check the Imagery Assessment Questionnaire was completed by each athlete. All three positions reported using imagery four to six times per week. However, when asked to rate the effectiveness of the imagery script, variation across position emerged. On a scale from 1 to 10 with 10 being optimal, forwards, midfielders, and defender/goal keepers reported imagery effectiveness as 8.04, 6.22, and 6.04, respectively.

Thelwell et al. (2006) examined the position-specific performance effect of a psychological skills intervention on the midfielder position in soccer. The intervention included the following psychological skills: relaxation, mental imagery, and self-talk. Performance effects were found for each of the three psychological skills. Most often, studies examining a mental skills intervention specific to position only examine one position rather than all positions specific to that sport. In order to fully understand appropriate intervention guidelines for position in team sports, each position must be examined.

Psychological Skills and Goaltending

Despite the studies examining the technical aspect of ice hockey goaltending (Lariviere & Lamontagne, 1981; Panchuk & Vickers, 2006; Salmela & Fiorito, 1979), research specific to goaltending and psychological skills is in its infancy (Rogerson & Hrycaiko, 2002). Gelinas and Munroe-Chandler (2006) highlighted how imagery in addition to several other psychological skills including concentration, arousal control, imagery, and self-talk could be useful techniques to ice hockey goaltenders. With respect to mental imagery specifically, Gelinas and Munroe-Chandler suggested ways in which imagery can be applied to ice hockey goaltenders. For example, they suggested that given the function of imagery in enhancing sport skills, strategies and confidence, goaltenders could use imagery as a means to correct errors or flaws in their performance. Although this paper was insightful, descriptive research specific to these psychological skills in goaltending is lacking

In their study examining psychological skills with ice hockey goaltenders, Rogerson and Hrycaiko (2002) examined the effectiveness of two mental skills (relaxation and self-talk) on performance. The intervention study lasted six months and included five male Junior A ice hockey goaltenders. Mental training sessions lasted 40 to 60 minutes and introduced goaltenders to three types of self-talk (e.g., positioning/focus, self-affirming, and mood words). A worksheet designed to facilitate understanding of self-talk as it relates to performance was completed by each goaltender. Once completed, relaxation was introduced to the goaltenders. Various relaxation techniques were explained (e.g., centering, breathing). Finally, athletes were encouraged to use the mental skills presented to them after every whistle during their games and at all practice scrimmages. Once the intervention session was completed, participants were asked to complete a self-assessment form after every game to motivate and remind them to use the mental skills at the appropriate times. In support of their hypothesis, the save percentage of goaltenders was improved as a result of the psychological skills intervention.

In one of the few studies investigating the effects of mental imagery training and rehearsal on the performance of ice hockey goaltenders, McFadden (1982) used a unique task to measure response times (electrically simulated puck shots). The purpose of McFadden's study was two fold; first, to compare subjects in an imagery training group to subjects in a no imagery training group, and second, to determine if imagery perspective (internal versus external) differs in enhancing performance. A simulated puck shooting period was used to determine baseline measures of saves and response rates of 63 participants. Given the similarity of baseline measures on these variables, participants were assigned to one of four experimental conditions. One of two imagery rehearsal groups (internal imagery and external imagery), film placebo, and delayed treatment control group. All sessions, save the delayed treatment control group, took part in four one-hour training sessions. The imagery rehearsal sessions involved two trained instructors educating the athletes in their respective types of imagery, whereas subjects in the film placebo session viewed professional hockey videos and were provided rationale as to why watching films is beneficial to performance. Finally, the delayed treatment control group did not participate in any training sessions and did not have any experimental contact. Following the end of the sessions, two post-tests were completed. That is, goaltenders were tested on the puck shooting task and were measured on the number of saves made and their average response time. Results indicated a significant decline in response time by those participants in the imagery rehearsal group versus those in the film placebo treatment group and the delayed training control group. Interestingly, no significant difference was found when internal versus external imagery conditions were compared. Finally, results indicated that there was no difference in the number of saves across experimental conditions. These findings indicate that regardless of imagery perspective, imagery, when compared to no imagery, is successful at enhancing the performance of ice hockey goaltenders.

Although experimental research is imperative and interventions are advantageous due to their applicability to sport, research is still required with respect to goaltenders. Descriptive research on the imagery use of ice hockey goaltenders will lead to more specific interventions and as such, more effective sport performance. Overall, the study of ice hockey goaltenders' use of mental skills is rare. Moreover, the study of their imagery use in comparison to offense and defense is non-existent. Thus, the current study will fill this gap in the literature and examine the important mental skill of imagery in ice hockey goaltenders.

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Figure Captions

Figure 1. Analytic Framework of Imagery Effects

Figure 2. Applied Model of Imagery Use in Sport

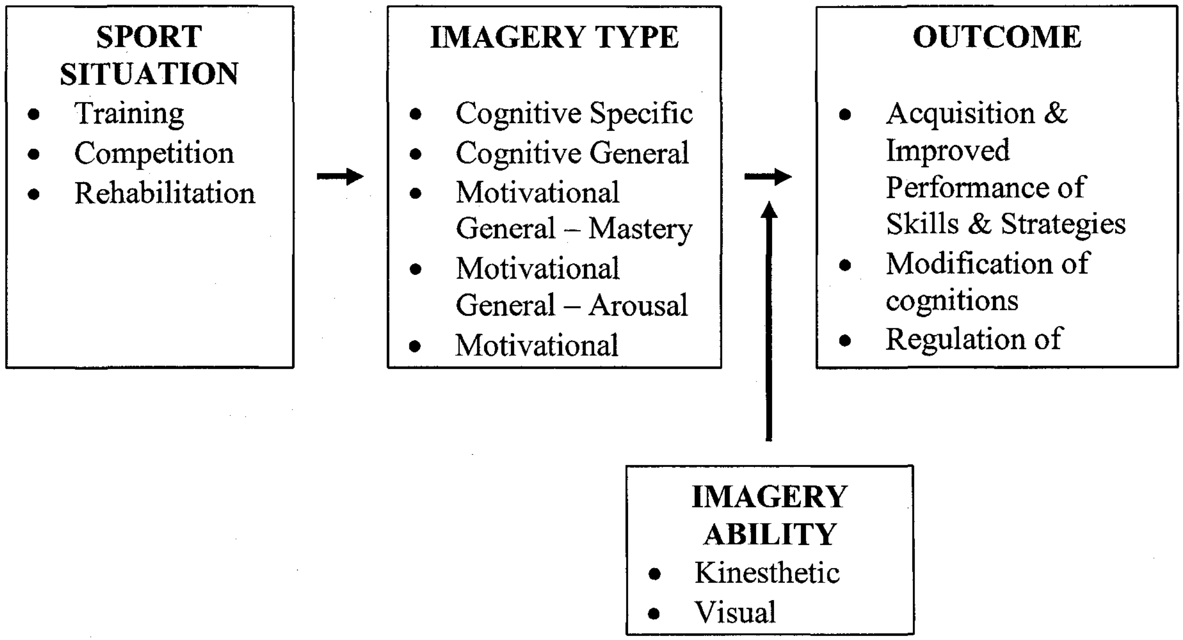
Figure 1

	MOTIVATION	**COGNITIVE**
GENERAL	MASTERY (MG-M) & AROUSAL (MG-A)	STATEGIES (CG)
SPECIFIC	GOAL ORIENTED RESPONSES (MS)	SKILLS (CS)

Adapted from:

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

Figure 2



Adapted from:

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

Appendix A

Sport Imagery Questionnaire (SIQ)

(Hall, Mack, Paivio, & Hausenblas, 1998)

Please fill in the blank or circle the appropriate answer:

Age: ____

Position: (please circle one) Goaltender Offense Defense

Competitive level: __________

Years of hockey experience: __________

Years of experience at current competitive level: __________

Have any of your previous coaches encouraged you to use imagery (please circle one) Yes No

Please read the following instructions before completing the rest of the questionnaire:

Athletes use mental imagery in training and in competition. This questionnaire was designed to assess the extent to which you incorporate imagery into hockey. *Your ratings will be made on a seven-point scale, where **one** is **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 write in the blank the appropriate number from the scale provided to indicate the degree to which the statement applies to you when you are practicing or competing in your sport. 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 or never engage in that kind of imagery						Often engage in that kind of imagery
1. I make up new plans/strategies in my head.	1	2	3	4	5	6	7
2. I imagine the atmosphere of winning a championship (e.g.,	1	2	3	4	5	6	7

the excitement that follows winning a championship).							
3. I image giving 100%.	1	2	3	4	5	6	7
4. I can consistently control the image of a physical skill.	1	2	3	4	5	6	7
5. I imagine the emotions I feel while doing my sport.	1	2	3	4	5	6	7
6. I imagine my skills improving.	1	2	3	4	5	6	7
7. I image alternative strategies in case my event/game plan fails.	1	2	3	4	5	6	7
8. I imagine myself handling the arousal and excitement associated with my sport.	1	2	3	4	5	6	7
9. I imagine myself appearing self-confident in front of my opponents.	1	2	3	4	5	6	7
10. I imagine other athletes congratulating me on a good performance.	1	2	3	4	5	6	7
11. I image each section of an event/game (e.g., offense vs. defense, fast vs. slow).	1	2	3	4	5	6	7
12. I imagine myself being in control in difficult situations.	1	2	3	4	5	6	7
13. I can easily change an image of a skill.	1	2	3	4	5	6	7
14. I image others applauding my performance.	1	2	3	4	5	6	7
15. When imaging a particular skill, I consistently perform it perfectly in my mind.	1	2	3	4	5	6	7
16. I image myself winning a medal.	1	2	3	4	5	6	7
17. I imagine the stress and anxiety associated with my sport.	1	2	3	4	5	6	7
18. I image myself continuing with my game/even plan, even when performing poorly.	1	2	3	4	5	6	7
19. When I image myself performing, I feel myself getting psyched up.	1	2	3	4	5	6	7
20. I can mentally make corrections to physical skills.	1	2	3	4	5	6	7

21. I imagine executing entire plays/programs/sections just the way I want them to happen in an event/game.	1	2	3	4	5	6	7
22. Before attempting a particular skills, I imagine myself performing it perfectly.	1	2	3	4	5	6	7
23. I imagine myself being mentally tough	1	2	3	4	5	6	7
24. When I image myself participating in my sport, I feel anxious	1	2	3	4	5	6	7
25. I imagine excitement associated with performing.	1	2	3	4	5	6	7
26. I imagine myself being interview as a champion.	1	2	3	4	5	6	7
27. I image myself to be focused during a challenging situation.	1	2	3	4	5	6	7
28. When learning a new skill, I imagine myself performing it perfectly.	1	2	3	4	5	6	7
29. I imagine myself successfully following my game/event plan.	1	2	3	4	5	6	7
30. I image myself working successfully through tough situations (e.g., a player short, sore ankle, etc).	1	2	3	4	5	6	7

Appendix B

Vividness of Movement Imagery Questionnaire-2 (VMIQ-2)

(Roberts, Callow, Hardy, Markland, & Bringer, 2008)

Movement imagery refers to the ability to imagine a movement. The aim of this questionnaire is to determine the vividness of your movement imagery. The items of the questionnaire are designed to bring certain images to your mind. You are asked to rate the vividness of each item by reference to the 5-point scale. After each item, circle the appropriate number in the boxes provided. The first column is for an image obtained watching yourself performing the movement from an external point of view (External Visual Imagery), and the second column is for an image obtained from an internal point of view, as if you were looking out through your own eyes whilst performing the movement (Internal Visual Imagery). The third column is for an image obtained by feeling yourself do the movement (Kinesethic Imagery). Try to do each item separately, independently of how you may have done the other items. Complete all items from an external visual perspective and then return to the beginning of the questionnaire and complete all of the items from an internal visual perspective, and finally return to the beginning of the questionnaire and complete the items while feeling the movement. The three ratings for a given item may not in all cases be the same. For all items please have your eyes CLOSED.

Think of each of the following acts that appear on the next page, and classify the images according to the degree of clearness and vividness as shown on the RATING SCALE.

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

Watching yourself performing the movement (External Visual Imagery)

ITEM	Perfectly clear & vivid as normal vision	Clear & reasonably vivid	Moderately clear & vivid	Vague & dim	No image at all, you only know that you are thinking of the skill
1. Walking	1	2	3	4	5
2. Running	1	2	3	4	5
3. Kicking a stone	1	2	3	4	5
4. Bending to pick up a coin	1	2	3	4	5
5. Running up stairs	1	2	3	4	5
6. Jumping sideways	1	2	3	4	5
7. Throwing a stone into water	1	2	3	4	5
8. Kicking a ball in the air	1	2	3	4	5
9. Running downhill	1	2	3	4	5
10. Riding a bike	1	2	3	4	5
11. Swinging on a rope	1	2	3	4	5
12. Jumping off a high wall	1	2	3	4	5

Looking through your own eyes whilst performing the movement (Internal Visual Imagery)

ITEM	Perfectly clear & vivid as normal vision	Clear & reasonably vivid	Moderately clear & vivid	Vague & dim	No image at all, you only know that you are thinking of the skill
1. Walking	1	2	3	4	5
2. Running	1	2	3	4	5
3. Kicking a stone	1	2	3	4	5
4. Bending to pick up a coin	1	2	3	4	5
5. Running up stairs	1	2	3	4	5
6. Jumping sideways	1	2	3	4	5
7. Throwing a stone into water	1	2	3	4	5
8. Kicking a ball in the air	1	2	3	4	5
9. Running downhill	1	2	3	4	5
10. Riding a bike	1	2	3	4	5
11. Swinging on a rope	1	2	3	4	5
12. Jumping off a high wall	1	2	3	4	5

Feeling yourself do the movement (Kinesthetic Imagery)

ITEM	Perfectly clear & vivid as normal vision	Clear & reasonably vivid	Moderately clear & vivid	Vague & dim	No image at all, you only know that you are thinking of the skill
1. Walking	1	2	3	4	5
2. Running	1	2	3	4	5
3. Kicking a stone	1	2	3	4	5
4. Bending to pick up a coin	1	2	3	4	5
5. Running up stairs	1	2	3	4	5
6. Jumping sideways	1	2	3	4	5
7. Throwing a stone into water	1	2	3	4	5
8. Kicking a ball in the air	1	2	3	4	5
9. Running downhill	1	2	3	4	5
10. Riding a bike	1	2	3	4	5
11. Swinging on a rope	1	2	3	4	5
12. Jumping off a high wall	1	2	3	4	5

Appendix C

E-mail to League President

Hello (insert name of League President),

My name is Trista Hallman. I am a Masters Candidate in Sport & Exercise Psychology, in the faculty of Human Kinetics at the University of Windsor.

Over the last few years, the Sport Psychology Graduate Program at the University of Windsor has been working on developing more comprehensive mental imagery training programs for athletes. This venture is being lead by Dr. Krista Chandler, a leading researcher and expert in mental imagery use in sport.

The purpose of this letter is to invite your hockey organization to take part in this exciting and valuable research. Currently, we are focusing on identifying whether the use of mental imagery varies with ice hockey position in competitive men's hockey. Specifically, the purpose of the study is to investigate the influence of position (e.g., goaltender, forward, defense) on hockey athletes' use of imagery, imagery ability, and imagery perspective. To do so, we need the assistance of competitive adult ice hockey organizations, such as yours. We are looking for adult male (18 years and older) hockey players competing at any competitive level of ice hockey.

All that we require of these athletes is that they complete 2 briefs questionnaires, one questionnaire for imagery frequency (SIQ) and one questionnaire for imagery ability and perspective (VMIQ-2). In addition, we ask the athlete to provide some demographic information (e.g., position, years of experience, age). The questionnaires will take approximately 15 minutes to complete.

Of course, we will be more than happy to arrange to come to each team's venue, at a time that is convenient for each team, administer the questionnaire and answer any questions that may arise. By collecting this information we will be able to advance our knowledge with respect to imagery use specific to position in hockey.

We hope that your organization may be able to assist us in this new research, as the success of this project is going to be dependent on our ability to gather information from these athletes.

If you are willing to allow us to approach your competitive men's teams, or if you would like any further information, please do not hesitate to contact me at the following email address (hallma3@uwindsor.ca). I can also be reached via phone at: 519-253-3000 ext. 4058. If you agree to this study, contact with your coaches and data collection will not begin until December or January. The purpose of this letter is to introduce this idea and ask permission from your hockey association to contact your teams.

I look forward to hearing from you, and thank you in advance for your time and consideration. Please do not hesitate to contact myself or my advisor if you have any questions.

Thank you,

Trista Hallman
MHK Candidate
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Ph: 519 253 3000 ext. 4058
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Krista Chandler, PhD
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Appendix D

Consent Form

University of Windsor

Consent Form

An Examination of Ice Hockey Players' Imagery Use and Perspective

You are asked to participate in a research study conducted by Trista Hallman, graduate student, and Dr. Krista Chandler, faculty member, from the Department of Kinesiology at the University of Windsor. Results will be contributed to a Master's thesis project.

If you have any questions or concerns about the research, please feel to contact Trista Hallman at 519-253-3000 ext. 4058, or via email at hallma3@uwindsor.ca.

PURPOSE OF THE STUDY

The purpose of the study is to investigate the influence of position (e.g., goaltender, forward, defense) on ice hockey athletes' use of imagery, imagery ability, and imagery perspective.

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

Complete a questionnaire including imagery frequency, ability and perspective. In addition, we ask that you provide some demographic information (e.g., position, years of experience, age,). The questionnaire will take approximately 15 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

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

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Subjects will benefit from participation in this study, as their exposure to research will be increased. In addition, participants may gain insight into the benefits of imagery as a mental training technique.

PAYMENT FOR PARTICIPATION

Subjects will not be compensated for participation in this study.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. All data will be stored in a locked filing cabinet to ensure confidentiality. There is no access to this cabinet by anyone other than the investigators. Data will be destroyed within five years.

PARTICIPATION AND WITHDRAWAL

Participation in this study is voluntary. You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

Research findings will be available to subjects through the University of Windsor Research Ethics Board website in the form of a summary report.

Web address: www.uwindsor.ca/reb
Date when results are available: May 2008

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study **"An Investigation of Imagery Across Position in Ice Hockey"** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Name of Subject

Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

Signature of Investigator Date

Appendix E

Letter of Information

University of Windsor

LETTER OF INFORMATION

An Examination of Ice Hockey Players' Imagery Use and Perspective

You are asked to participate in a research study conducted by Trista Hallman, graduate student, and Dr. Krista Chandler, faculty member, from the Department of Kinesiology at the University of Windsor. Results will be contributed to a Master's thesis project.

If you have any questions or concerns about the research, please feel free to contact Trista Hallman at 519-253-3000 ext. 4058, or via email at hallma3@uwindsor.ca.

PURPOSE OF THE STUDY

The purpose of the study is to investigate the influence of position (e.g., goaltender, forward, defense) on ice hockey athletes' use of imagery, imagery ability, and imagery perspective.

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

Complete a questionnaire including imagery frequency, ability and perspective. In addition, we ask that you provide some demographic information (e.g., position, years of experience, age,). The questionnaire will take approximately 15 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

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

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Subjects will benefit from participation in this study, as their exposure to research will be increased. In addition, participants may gain insight into the benefits of imagery as a mental training technique.

PAYMENT FOR PARTICIPATION

Subjects will not be compensated for participation in this study.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. All data will be stored in a locked filing cabinet to ensure confidentiality. There is no access to this cabinet by anyone other than the investigators. Data will be destroyed within five years.

PARTICIPATION AND WITHDRAWAL

Participation in this study is voluntary. You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

Research findings will be available to subjects through the University of Windsor Research Ethics Board website in the form of a summary report.

Web address: www.uwindsor.ca/reb
Date when results are available: May 2008

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study **"An Investigation of Imagery Across Position in Ice Hockey"** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form. These are the terms under which I will conduct research.

Signature of Investigator

Date

VITA AUCTORIS

NAME: Trista Hallman

PLACE OF BIRTH: Toronto, Ontario, Canada

YEAR OF BIRTH: 1983

EDUCATION:

University of Windsor, Windsor, Ontario
2006-2008, M.H.K.

University of Windsor, Windsor, Ontario
2002-2006, B.A. Psychology Hons.

Patrick Fogarty Secondary School,
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1998-2002

Orillia District Collegiate & Vocational
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1997-1998

PRESENTATIONS:

"Are Ice Hockey Goaltenders a "Different Breed"? Investigating their Imagery Use and Perspective". Presented at Kinesiology Research Day, University of Windsor, Windsor, Ontario, April, 2008.

"An Examination of Ice Hockey Players' Imagery Use and Perspective". Presented at the Eastern Canadian Sport & Exercise Psychology Symposium, Laurentian University, Sudbury, Ontario, March, 2008.

"The Relationship Between Self-esteem and the Drive for Muscularity". Presented at the North American Society for the Psychology of Sport and Physical Activity, San Diego, California, June, 2007.

"The Relationship Between the Drive for Muscularity and Self-esteem: A Proposed Study". Presented at the Eastern Canadian Sport & Exercise Psychology Symposium, QueensUniversity, Kingston, Ontario, March, 2007.

"The Relationship Between Self-esteem and the Drive for Muscularity". Presented at Kinesiology Research Day, University of Windsor, Windsor, Ontario, March, 2007.

"The Muscular Ideal: A Qualitative Analysis". Presented at the Canadian Society for Psychomotor Learning and Sport Psychology, Dalhousie, Halifax, Nova Scotia, November, 2006.

"The Muscular Ideal: A Qualitative Analysis". Presented at the Eastern Canadian Sport & Exercise Psychology Symposium, University of Ottawa, Ottawa, Ontario, March, 2006.

SCHOLARLY EXPERIENCES:

Eastern Canadian Sport & Exercise Psychology Symposium,
Organizing Committee
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University of Windsor
Windsor, ON
September 2004 – March 2005

SCAPPS, Niagara Falls, 2005

ECSEPS, Ottawa, 2006

SCAPPS, Halifax, 2006

ECSEPS, Kingston, 2007

NASPSPA, San Diego, 2007

SCAPPS, Windsor, 2007

ECSEPS, Sudbury, 2008