Team and Individual Athletes' Perceived Control and Use of Imagery

by

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Abstract

The primary purpose of this study was to investigate whether athletes classified by combining individual versus team categories with categories based on varying degrees of perceived control (i.e., outcome control, performance control, and difficulty control) differ in their use of imagery. To help accomplish this purpose, the Subjective and Experiential Control Questionnaire (SECQ) was developed to assess perceived control. A modified version of the Sport Imagery Questionnaire (SIQ-2) was employed to measure the motivational and cognitive functions of imagery use. The SECQ and SIQ-2 were administered to Canadian athletes (n=1358) and USA athletes (n=1890) competing in a variety of individual and team sports. It was found that athletes classified according to six sport categories showed some differences in perceived control. Furthermore, they also reported differences in their use of motivational and cognitive imagery. Given these findings, some implications are made for coaches and sport psychologists developing and implementing imagery interventions with Canadian and USA athletes.

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In recent years, more and more athletes have become aware of the importance of the mental component of physical activity. The terms mental practice, mental rehearsal, and mental imagery all refer to "the symbolic rehearsal of physical activity in the absence of any gross muscular movement" (Richardson, 1967, p.95). Athletes who have reported incorporating mental imagery in their training regimen and in conjunction with competition, believe it not only helps them learn new skills, but actually facilitates their performance (see Hall, Schmidt, Durand, & Buckolz, 1994 for a review of the imagery literature). Research supports the claims made by athletes using mental imagery and has demonstrated imagery to be beneficial in facilitating both learning and performance (Hall et al., 1994). In the mid 1980's, researchers turned their attention to the broader issue of the role of imagery in sport. Paivio (1985) proposed that imagery has both a cognitive and a motivational function in human performance. With this in mind, researchers have since investigated the functions imagery serves in sports such as figure skating (Rodgers, Hall, & Buckolz, 1991), rowing (Barr & Hall, 1992), and soccer (Salmon, Hall, & Haslam, 1994).

The Functions of Imagery

In his classic paper, Paivio (1985) proposed that imagery has both a motivational and cognitive function in human performance, each operating at either a general or specific level. The relationship was presented as a 2x2 model with the motivational-cognitive contrast as one dimension and the general-specific contrast as the second. In Paivio's model, the ***Cognitive General*** (CG) function refers to those images related to strategies of play, such as full court pressure in basketball. The ***Cognitive Specific*** (CS) function refers to imagery directly aimed at improving specific motor skills, such as imagining shooting or passing a ball. The ***Motivational General*** (MG) function refers to images related to general physiological and emotional arousal, such as imagining the stress, anxiety or excitement associated with performing. Finally, the ***Motivational Specific*** (MS) function refers to goal-oriented imagery, such as imagining winning or receiving a medal.

Measuring Imagery Use

Paivio's (1985) model formed the basis of several instruments specifically designed to measure individual differences in the use of imagery by athletes in various sports. Prompted, in part, by Paivio's (1985) proposal, Hall et al. (1990) developed the Imagery Use Questionnaire (IUQ) to investigate the use of imagery by athletes. They found some

general trends with respect to imagery use. All athletes, regardless of skill level, reported using imagery, however, elite athletes were found to use imagery more extensively than non-elites. Athletes also reported using imagery more in conjunction with competition than practice and tended to adopt an internal and external imagery perspective with equal frequency. Upon conclusion of the study, Hall et al. (1990) suggested the two primary uses of mental imagery by athletes are to prime themselves for peak performance and to enhance skill learning.

Barr and Hall (1992) extended the research of Hall et al. (1990). They employed a sport specific version of the IUQ administering it to rowers at the high school, college, and national team levels. They found that the majority of rowers reported using imagery and they used it most often just prior to competition. Rowers also indicated using more internal than external imagery, and reported that incorporating `feel' into their images was an important aspect of their imagery practice. Elite rowers reported more structure and regularity in their imagery sessions than non-elites, and non-elite rowers indicated seeing themselves rowing incorrectly more often than elite rowers. The authors suggested that elite athletes may use imagery more for performance enhancement, while novice athletes may use imagery more for acquiring motor skills. Salmon et al. (1994) also developed a sport specific version of the IUQ. The Imagery Use Questionnaire for Soccer Players (IUQ-SP) was based partially on the original IUQ (Hall et al., 1990) and partly on

Paivio's (1985) framework. In agreement with earlier studies, Salmon et al. (1994) found that imagery was used more in conjunction with competition than practice, and that elite players reported higher use of imagery than non-elites.

Since the original IUQ did not include a thorough examination of the motivational function of imagery and other versions of the IUQ were sport specific, Hall, Mack, Paivio, and Hausenblas (1998) developed the Sport Imagery Questionnaire (SIQ) as a general measure of individual differences in the use of imagery. This instrument was developed over a series of four experiments and one important extension of Paivio's (1985) model was that the Motivational General function was found to include two separate components. The first was labeled ***Motivational General-Mastery*** (MG-M) since athletes reported imagining themselves mastering the competitive situation. Their images included being in control, being mentally tough, and staying focused. The second component was labeled ***Motivational General-Arousal*** (MG-A) which represented the excitement and emotions of competing. Athletes reported imagining themselves getting psyched up to compete and the stress associated with competing.

Research on Motivational Imagery Use by Athletes

There has been virtually no empirical studies of cognitive general imagery while cognitive specific imagery has received the most empirical investigation (see Hall et al., 1994 for a

review). Paivio's (1985) framework and more current research suggests it is just as important to look at the motivational function of mental imagery. Martin and Hall (1995) examined whether mental imagery enhances the intrinsic motivation of beginner golfers on a putting task. Results showed beginner golfers, who employed mental imagery, actually set higher goals, spent more time practicing the putting task, and adhered longer to the training program than golfers in the control condition. Moritz, Hall, Martin, and Vadocz (1996) set out to determine just what confident athletes were imaging. Results of the study revealed that high sport confident athletes used more mastery and arousal imagery, and had better kinesthetic and visual imagery ability than low sport confident athletes. These results seem to suggest that when it comes to sport confidence, the imagery of sport related mastery experiences and emotions tend to be more important than the imaged rehearsal of specific sport skills. Vadocz, Hall, and Moritz (1997) explored the relationships among imagery use, imagery ability, competitive anxiety and performance and found that imagery can be used to enhance self-confidence and to help control competitive anxiety levels.

Sport Classifications and Imagery Use

Sports can be classified in a number of different ways. One sport classification receiving attention from imagery researchers has been closed-skill versus open-skill sports. Closed-skill sports are those in which the environmental surroundings remain

relatively constant, while open-skill sports are those in which skills are executed in a constantly changing environment. Highlen and Bennett (1983) examined imagery use by elite divers and wrestlers representing closed- and open-skill sports, respectively. Specifically, the authors hypothesized that imagery strategies would differentiate successful (qualifying) closed-skill athletes from their less successful (non-qualifying) counterparts, whereas no such differences were expected to be found in the open-skill sport. It was also predicted that as a group, elite closed-skill athletes would utilize more visual strategies than elite open-skill athletes. No differences, however, were found for how the elite divers and wrestlers used imagery.

Another classification is team versus individual sports. Hall et al. (1998) considered whether individual and team sport athletes use the various functions of imagery (i.e., cognitive general, cognitive specific, motivational general-mastery, motivational general-arousal, and motivational specific) differently. It was found that team sport athletes made greater use of motivational general-mastery and motivational specific imagery than individual sport athletes. While they concluded that individual and team sport athletes may be using imagery differently, Munroe, Hall, Simms, and Weinberg (in press) failed to find any support for this conclusion.

Another classification system, that may also influence the use of imagery by athletes, takes into account the amount of

perceived control athletes feel they have over the competition or game outcome. Sport-related research investigating perceived control as a motivational variable has examined the developmental variability among children and is based on the assumption that perceived control influences whether an individual's motivational orientation is intrinsic or extrinsic (Wong & Bridges, 1993).

Children's perceptions of control reflect the sources they believe are responsible for what happens to them (Connell, 1985). With this in mind, Harter (1981) developed a causal model of motivation which proposed that perceived control causally determines performance and motivational orientation. Using children participating in a sport camp, Harter found that low unknown control was associated with higher levels of physical performance and was predictive of an intrinsic motivation orientation. Weiss, Bredemeier, and Shewchuck (1986) supported Harter's (1981) hypothesis acknowledging that the child who is intrinsically motivated within a given mastery domain (cognitive, social, physical) would also perceive him or herself to be relatively competent in that domain, and would take personal responsibility for his or her successes and failures. In turn, these positive feelings of competence and perceptions of personal control over outcomes would be associated with higher levels of actual achievement.

A Theoretical Foundation for the Construct of Control

To date, sport-related research in the area of perceived control has focused on a youth rather than an adult population. Control, however, is important to psychological functioning in a variety of life domains and must be considered over an individual's entire life span, from early childhood to late adulthood (Skinner, 1996). Studies have demonstrated that differences in perceived control can be related to a variety of positive outcomes including, health, achievement, persistence, motivation, self-esteem, success and failure (Skinner, 1996). Researchers have suggested that a sense of control can be a powerful predictor of both mental and physical well-being (Baltes & Baltes, 1986; Bandura, 1989; Fiske & Taylor, 1991). However, as Skinner noted, a variety of constructs related to the concept of control remain "closely related, if not identical"(Skinner, 1996, p.549). For theoretical and empirical purposes, an organized framework of control related constructs is necessary in order to reduce ambiguity, which Skinner shows has been costly to the study of control (Skinner, 1996).

An Integrative Framework of the Control Construct

With an integrative framework designed to organize the heterogeneous constructs related to control, Skinner (1996) analyzed more than one hundred terms reflecting various aspects of control. Skinner's (1996) control framework is applied to the present study and provides the theoretical basis with which to

investigate mental imagery and the amount of perceived control athletes feel they have when training and competing in sport.

In Skinner's model (1996) two basic distinctions are used to form a framework when considering constructs of control. The first distinguishes among three important aspects of control including, objective control, subjective control, and experiences of control (of these three aspects, subjective control and experiences of control are the two aspects of interest to the present study). The second distinguishes among agents, means, and ends of control.

Objective and Subjective Control and Experiences of Control

According to Skinner (1996), actual control, or the amount of objective control present in the context and the person, differs significantly from perceived control, or subjective control, an individual's belief about how much control is available. Langer (1979) suggested that the difference between objective and subjective control is so great that the effects of objectively losing control will only have psychological significance if the person recognizes the gain or loss. Other control researchers (Averill, 1973; Burger, 1989) are convinced that subjective control is a more powerful predictor of functioning than actual objective control. In sport, and for the purpose of this study, subjective control refers to an athlete's perception of control over the outcome of his or her sport.

Experiences of control refer to an individual's feelings as he or she is interacting with the environment while attempting to produce a desired outcome or prevent an undesired outcome (Skinner, 1996, p.551). Experiences of control, in which an individual intentionally exerts effort toward a goal and feels the effort transmitted to the environment to produce a certain outcome (Skinner, 1996), are sometimes referred to as experiences of mastery (Harter,1978) or feelings of efficacy (Bandura, 1977). Experiences of control in sport, or performance control, refers to the athlete's perception of his or her ability to complete the skill or skills necessary for their respective sport. In the context of sport, and as a summary, subjective control represents the amount of control athletes feel they have over possible outcomes in their sport, while experiences of control represent the amount of control athletes feel they have over their performance in sport.

Agents, Means and Ends of Control

The second distinction found within Skinner's framework for considering constructs of control is the distinction among agents, means, and ends of control. Agents of control refer to the individual or groups who exert control. An example of an agent in the context of sport would include the athlete, his or her opponent, and in some cases judges who are assigned to subjectively evaluate the athlete's performance and ultimately determine the outcome. Means of control refer to the pathways

through which control is exerted. An athlete's self confidence is an example of a means of control in sport. Ends of control refer to the desired or undesired outcomes over which control is exerted. Ends of control in sport can mean winning or losing the competitive event.

Various combinations of agents, means and ends of control are possible. Relevant and specific to the present study, which seeks to investigate mental imagery and its effect on perceived control in sport, are the distinctions between 1) subjective control and experiential control (as previously described) and 2) subjective agent-ends control and experiential agent-means control. Subjective agent-ends control beliefs refer to "the extent to which individuals are able to control (modify or regulate) their own behaviors, emotions and outlook" (Skinner, 1996, p.554). Subjective agent-ends control beliefs have been studied as perceived control (Skinner, 1995). Unlike subjective agent-ends control, experiential agent-means control beliefs refer to the extent to which a potential means is available to a particular agent (Skinner, 1996), and has been studied as self-efficacy expectations (Bandura, 1977). Skinner also stated, "agents may possess or have access to a means, or they may not" (Skinner, 1996, p.553). When determining kinds of agents, constructs of control usually focus on the self as an agent, although other agents of control have also been examined.

Athletes use imagery for a variety of purposes such as to prime themselves for peak performance and enhance skill learning

(Hall et. al., 1990), and to enhance self-confidence and help control competitive anxiety levels (Vadocz, et al., 1997). The present study assumes that imagery can serve as a means by which athletes adjust or modify their perceptions of control over the outcome (subjective control) and their perceptions of control over their own performance (experience of control). Skinner's (1996) control framework provides support and a theoretical basis from which the present study makes this assumption. In addition, Rotter's Locus of Control research and Bandura's Social Cognitive Theory, support two related assumptions. Rotter's Locus of control research offers support for the assumption that imagery can positively affect an athlete's subjective agent-ends control beliefs. Bandura's Social Cognitive theory provides support for the assumption that imagery can positively affect an athlete's experiential agent-means control beliefs.

Imagery, Subjective Control and Locus of Control Research

Research into the locus of control construct began with Rotter's (1966) locus of control model. Rotter (1966) described the term locus of control as the degree to which people report a sense of personal control. Rotter's representation of locus of control distinguishes two types of individuals, internals, who perceive the likelihood of an event occurring as a product of their own behavior, and externals, who view events as contingent on luck, chance, or other people (Rotter, 1966). With locus of

control assessed on a continuum, ranging from internal to external, individuals at the internal end of the locus of control continuum perceive both positive and negative events to be the result of their own actions or personality traits. Behavior or events for these individuals are said to be under their personal control (Rotter, 1966). It is important to note that the present study did not use Rotter's locus of control construct to represent perceived subjective control experienced by the athletes. Rotter's internal locus of control research and his findings were used as support for, and an example of, another construct effective in representing perceived outcome control.

Understanding subjective agent-ends control in terms of Rotter's (1966) Locus of Control research, and as it relates to the use of imagery by athletes participating in various sports, requires focusing on a sport specific example. The agent in the present study's proposed subjective agent-ends control equation is the athlete. The ends, possible desired or undesired outcomes over which the athlete exerts control included, winning or losing and placing or not placing. Subjective control is the strength of the athlete's belief that they ultimately have control over the possible outcomes in their respective sport. Adding imagery to the subjective agent-ends control equation, this study assumed that the use of imagery by athletes participating in sport can create a (or increase an existing) sense of positive internal control (positive subjective agent-ends control beliefs), for the athlete, over possible outcomes in their sport. Creating an

internal sense of control in the athlete, in turn, is assumed to result in an actual increased frequency of desired physical achievement outcomes.

Imagery, Experiential Control and Social Cognitive Theory

According to Bandura's (1977) social cognitive theory all behavioral changes are mediated by a common cognitive mechanism, namely, self-efficacy, the belief that one can successfully perform desired behaviors (Bandura, 1977). Bandura suggested self-efficacy can affect behavior in a number of ways including, (1) whether one attempts to perform a given task, (2) how persistent one is when difficulties are encountered, and (3) ultimately how successful one is in performing the task. Bandura (1977, p.103) defined an expectation of self-efficacy as, "the conviction that one can successfully execute the behavior required to produce the outcomes." The present study did not use Bandura's (1977) self-efficacy construct to represent perceived experiential control experienced by athletes. Bandura's self-efficacy research, and findings, were used simply as support for, and an example of, another construct effective for representing perceived performance control.

Understanding experiential agent-means control in terms of Bandura's self-efficacy concept, and as it relates to the use of imagery by athletes participating in various sports, also requires focusing on a sport specific example. Again, the agent in the study's proposed experiential agent-means control equation

is the athlete. The means, or pathway, with which the athlete participating in sport exerts control is through self-efficacy. Experiential control is the feeling the athlete experiences as they attempt to control their performance to produce desired outcomes. Adding imagery to the experiential agent-means control equation, this study assumes that the use of imagery by athletes participating in sport, can increase positive self-efficacy performance expectations (affecting the athlete's overall experiential agent-means control beliefs) and ultimately will result in higher levels of actual physical performance achievement.

The Purpose of the Study

The classification of sports into broad categories provides a basis for establishing generalizations, or principles, about how athletes learn and perform these sports (Magill, 1993). The most common classification system employed in examining the use of imagery by athletes in various sports has been to distinguish between individual and team sports. As previously noted, the results from these studies have produced equivocal results (Hall et al., 1998; Munroe et al., in press). A more effective classification system may be to combine the individual versus team categories with categories based on varying degrees of control. In some sports opponents influence how athletes perform, while in other sports athletes have almost total control over their own performance. In some sports athletes primarily

determine the outcome of the competition, while in others a panel of judges decides the outcome. Combining individual versus team categories with those based on control, the following six sport classification system is produced:

1) IJ; Individual Sports with a Judged Component (e.g., gymnastics)

2) TJ; Team Sports with a Judged Component (e.g., precision figure skating)

3) IOI; Individual Sports in which an Opponent Influences Performance (e.g., tennis)

4) TOI; Team Sports in which an Opponent Influences Performance (e.g., basketball)

5) IONI; Individual Sports in which an Opponent does not Influence Performance (e.g., swimming)

6) TONI; Team Sports in which an Opponent does not Influence Performance (e.g., rowing)

In order to determine whether this classification system does in fact capture varying degrees of control, a questionnaire was developed to assess the amount of perceived control athletes feel they have over their own performance and over the competition or game outcome. It was hypothesized that athletes competing in sports in which the opponent does not influence their performance (IONI and TONI sports) would have higher perceptions of control than athletes participating in sports in which the opponent does influence their performance (IOI and TOI sports). It was also hypothesized that athletes competing in

sports that are judged (TJ and IJ sports) would have lower perceptions of control with respect to the outcome of the competition or game than athletes competing in the other categories (IOI, TOI, IONI and TONI sports).

The primary purpose of the present study was to examine whether athletes in the various categories comprising the six sport classification system use imagery differently. To achieve this purpose, a modified version of the Sport Imagery Questionnaire was employed. Although the original Sport Imagery Questionnaire provides a thorough examination of both the motivational and cognitive functions of imagery use by athletes during competition, it does not consider how athletes use these functions of imagery during training. Therefore, a secondary purpose of the present study was to examine the factor structure and psychometric properties of a modified version of the original Sport Imagery Questionnaire. With a modified version of the Sport Imagery Questionnaire, a comprehensive instrument for assessing individual differences in the use of imagery, both during training and competition, is available.

Several specific hypotheses were formed with respect to athletes' use of imagery. While all athletes make extensive use of cognitive specific imagery (Hall et al., 1998), judged sports that stress proper technical execution (i.e., form) such as gymnastics and figure skating encourage participants to perfect specific skills. Since cognitive specific imagery is a type of skill rehearsal, it was hypothesized that athletes in IJ and TJ

sports would use this function of imagery more than athletes in the other sport categories. In team sports, in which an opponent influences the team's performance (TOI sports such as basketball and football), strategies and game plans are emphasized. Therefore, it was hypothesized that athletes competing in these sports would use more cognitive general imagery than athletes competing in the other categories. Athletes use imagery to set goals, however, it is easier to establish specific performance goals in sports where the athletes completely control their own performance and their goals can easily be quantified (e.g., swimming, rowing). Therefore, it was hypothesized that athletes in IONI and TONI sports would use more motivational specific imagery than other athletes. No specific hypotheses were established for the use of motivational general-mastery and motivational general-arousal imagery since it was believed that athletes in each of the six sport categories would benefit about equally from using these functions of imagery.

Method

Participants

Three thousand two hundred and forty-eight Canadian and USA athletes participated in the present study. Canadian athletes (n=1358) who participated in the study were recruited by approximately 60 students enrolled in a senior level kinesiology class at the University of Western Ontario as part of a research assignment. Each UWO student recruited at least 24 athletes

participating in one of 28 different sports (see Appendix B) competing at either a recreational (n=451), club (n=314), varsity (n=424), provincial (n=72), national (n=57), or international level (n=40).

USA athletes (n=1890) who participated in the study were also recruited by students enrolled in a senior level kinesiology class as part of a research assignment. Approximately 75 students from the University of North Carolina recruited at least 24 athletes participating in one of 34 different sports (see Appendix B) competing at either a recreational (n=538), club (n=470), intercollegiate (n=547), state (n=134), national (n=114), or international (n=41) level.

The athletes were male (n=1792) and female (n=1407) team and individual sports participants at least 18 years of age. The mean age of the Canadian athlete sample was 22.4. The mean age of the USA athlete sample was not available.

Measures

Sport Imagery Questionnaire-2 (SIQ-2)

The Sport Imagery Questionnaire (Hall et al., 1998) assesses the extent to which athletes use five functions of imagery in their sport. It is a 30-item, self report questionnaire that asks athletes to rate on a 7-point Likert scale (1 = rarely and 7 = often) how often they employ the following functions of imagery: cognitive general (i.e., imagining strategies of play), cognitive specific (i.e., imaging specific sport skills), motivational general-mastery (i.e., imaging staying focused and

working through problems), motivational general-arousal (i.e., imaging the arousal, stress, and anxiety that may accompany performance), and motivational specific (i.e., imaging specific goals such as winning). Research (Hall et al., 1998) has shown the Sport Imagery Questionnaire to have acceptable internal consistency estimates for the five subscales, with alpha coefficients ranging from .70 to .88.

The Sport Imagery Questionnaire provides an examination of both the motivational and cognitive functions of imagery use by athletes during competition, but it does not consider how athletes use these functions of imagery during training. Therefore, in constructing a modification of the Sport Imagery Questionnaire, the main objective was to change items so they would pertain to both training and competition. It was necessary to add two items to the MS imagery subscale since goals related to training (e.g., performance improvement) are different from goals related to competition (e.g., winning). Therefore, the Sport Imagery Questionnaire-2 is a 32-item, self-report questionnaire (see Appendix A) which asks athletes to rate, using a 7-point Likert scale (1 = rarely and 7 = often), how often they employ the five different functions of imagery.

Subjective and Experiential Control Questionnaire

Skinner stated, "researchers need to be explicit in their assessments of control if they want to operationalize their target constructs successfully" and that "in order to tap the

specific control construct measures must be more precise than common language (Skinner, 1996, p. 561)." Therefore, a questionnaire was developed to assess both subjective agent-ends control and experiential agent-means control among athletes participating in various sports. The Subjective and Experiential Control Questionnaire (SECQ; see Appendix A) was specifically designed for the present study and was based on criteria from Ajzen's (1986) perceived behavioral control model. The Subjective and Experiential Control Questionnaire was used to assess the amount of perceived control athletes feel they have over the competition or game outcome and their performance. The Subjective and Experiential Control Questionnaire is an 8-item self-report questionnaire. Five items on the Subjective and Experiential Control Questionnaire ask athletes to rate on a 7-point Likert scale (1 = very little control and 7 = complete control) how much control they perceive themselves as having over both the outcome and their performance when competing. The remaining three items on the Subjective and Experiential Control Questionnaire asks athletes to rate on a 7-point Likert scale (1 = extremely easy and 7 = extremely difficult) the perceived ease with which they can control both the game outcome and their performance during competition.

Procedure

Canadian athletes, participating under one of the six sport classification categories specified, were administered both the Sport Imagery Questionnaire-2 and the Subjective and Experiential Control Questionnaire. The questionnaires were administered before, during, or after a practice session and athletes were given specific instructions as to how to fill out both questionnaires using the scales provided. Participation was on a voluntary basis and informed consent (see Appendix A) was obtained prior to the administration of the questionnaires. Athletes completed the questionnaires in a group or individually and were asked to take their time and to answer each question. Completion of both the Sport Imagery Questionnaire-2 and the Subjective and Experiential Control Questionnaire took approximately 15 minutes and participants were told that the questionnaires were designed to assess both imagery use and amount of perceived control, respectively. The experimenter, a student from the University of Western Ontario, remained at the practice site to answer all questions and concerns and to collect completed questionnaires.

Procedures for administering the Sport Imagery Questionnaire-2 to USA athletes were similar to administration of the Sport Imagery Questionnaire-2 to Canadian athletes. The Sport Imagery Questionnaire-2 was administered before, during or after a practice session and specific instructions were given as to how to fill out the questionnaire using the scale provided.

Participation by USA athletes was on a voluntary basis and informed consent was obtained before administration of the questionnaire. Athletes completed the SIQ-2 in a group or individually and participants were told the questionnaire was designed to assess imagery use during training and competition. Completion of the Sport Imagery Questionnaire-2 took approximately 10 minutes. The experimenter, a student from the University of North Carolina, remained at the practice site to answer questions and collect completed questionnaires.

Data Analysis

Each of the two samples (i.e., Canadian and USA) were analyzed separately. For the Canadian sample, a principal components factor analysis was undertaken on the Subjective and Experiential Control Questionnaire items to examine the factor structure of the instrument. A confirmatory factor analysis (CFA) was conducted on the Sport Imagery Questionnaire-2 to determine if this modified version of the original Sport Imagery Questionnaire reflects the five functions of imagery as hypothesized. MANOVAs were then calculated to investigate whether athletes classified according to the six sport categories differ a) in their perceptions of controlling their performance and the outcome and the difficulty of doing so, and b) in their use of imagery.

For the USA sample, a CFA was conducted on the Sport Imagery Questionnaire-2. A MANOVA was then employed to examine whether

athletes in the six sport classifications differed in their use of imagery. For both samples, when a significant multivariate effect was found, univariate ANOVAs were undertaken and were then followed by Sheffe tests when appropriate. For these latter tests, statistical significance was set at $p<.05$.

Results

Similar statistical analyses were conducted on data collected from both the Canadian and the USA samples. Results of data collected from the Canadian sample included statistical analyses of both the Subjective and Experiential Control Questionnaire and the Sport Imagery Questionnaire-2 and are reported first.

Canadian Athlete Sample

A principal components factor analysis was conducted on the SECQ items to determine if the Subjective and Experiential Control Questionnaire measures distinct factors as hypothesized. Factor extraction with oblique rotation was employed. All items were entered and the criteria for retention of an item on a factor was set at .50. From this analysis a three-factor structure emerged accounting for 73.7% of the variance. The first factor was labeled Difficulty Control (e.g., "For me, performing well in my competition is..."), the second factor was labeled Outcome Control (e.g., "My control over winning or losing is..."), and the third factor was labeled Performance Control

(e.g., "My control over my performance during competition is...").

An examination of the three subscales of perceived control assessed by the Subjective and Experiential Control Questionnaire revealed that athletes perceive more control over their performance in sport than the outcome and the difficulty with which they are able to control both their performance and the outcome (see Table 1). Cronbach's alpha was calculated for the three subscales of the Subjective and Experiential Control Questionnaire. The Difficulty Control, Outcome Control and Performance Control subscales demonstrated sufficient reliability, with alpha coefficients of .77, .79, and .78, respectively.

A CFA using AMOS (Arbuckle, 1997) was conducted to test the factor structure of the Sport Imagery Questionnaire-2. As suggested by Crowley and Fan (1997), seven fit indices were used to determine the adequacy of the fit for the model (i.e., the five imagery functions). These included the chi-square index (χ^2), the ratio of chi-square to degrees of freedom (χ^2/df), the root mean square residual (RMSR), the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the Bentler-Bonnet nonnormed fit index (NFI), and the comparative fit index (CFI). A non-significant χ^2 index indicates a good fit, yet is rarely obtained in practice (Steiger, 1990). Good fits are indicated when the χ^2/df index is less than 2.0 and the RMSR index is less than .1. Nonnormed fit indices and comparative fit

Table 1

Means and Standard Deviations for the Imagery Subscales and SECQ Subscales for the Canadian Athletes

SECQ Subscales	M	SD
Performance	5.41	.90
Outcome	4.34	1.17
Difficulty	3.87	1.02
Imagery Subscales	**M**	**SD**
MG-M	5.41	1.06
CS	5.02	1.04
CG	4.89	1.08
MG-A	4.82	1.16
MS	4.73	1.22

indices range in value from 0 to 1.0, with higher values indicating a better fit. Values greater than .9 are considered a good model fit (Crowley & Fan, 1997). The results of the CFA are presented in Table 2. As can be seen, the model yielded only an acceptable fit, and the results indicate that further improvement to the model would be desirable. The factors were moderately correlated (see Table 1 in Appendix C); the range of the correlations was from .49 to .68 and the average correlation was .56 That the factors were correlated, would be expected since all the factors measure imagery functions. Previous research (e.g., Hall et al., 1998; Vadocz et al., 1997) has reported correlations ranging from .23 to .65.

An examination of the five functions of imagery assessed by the Sport Imagery Questionnaire-2 revealed that the athletes employed motivational general-mastery and cognitive specific imagery slightly more than cognitive general, motivational general-arousal, and motivational specific imagery (see Table 1). The internal consistency of the Sport Imagery Questionnaire-2 items measuring each function was evaluated using Cronbach's alpha. All five imagery subscales had acceptable internal consistencies: cognitive specific =.83, cognitive general =.76, motivational specific =.86, motivational general-arousal =.81, and motivational general-mastery =.82.

A MANOVA was conducted to determine if athletes, classified according to control, do in fact differ in their perceptions of controlling their performance and the outcome, and their

Table 2

Results of the Confirmatory Factor Analysis for Canadian Athletes

Fit Indices

	χ^2 (df)	χ^2/df	RMSR	GFI	AGFI	NFI	CFI
SIQ-2 Model	4054.78 (460)	8.82	.46	.85	.82	.78	.81

perceptions of the difficulty in controlling their performance and the outcome. Pillais multivariate test of significance revealed a significant difference for athletes participating in the six sport classifications with respect to their perceptions of control ($F(3,15)=7.526$, $p<.05$). Wilks lambda (.92) indicated that 8% of the variance in perceptions of control were due to the six sport classifications. Results of univariate ANOVAs indicated that significant differences existed for the six classifications on perceptions of difficulty to control performance and outcome in sport ($F(5,1352)=4.71$, $p<.05$), and on perceptions of ability to control the outcome in sport ($F(5,1352)=11.51$, $p<.05$).

Post hoc tests revealed two significant comparisons for the perceptions of difficulty subscale (see Table 3). First, individual athletes participating in sports in which the opponent does not influence their performance or the outcome ($M=4.10$, $SD=1.14$) showed more perceived difficulty in their ability to control both their performance and the outcome than team athletes participating in sports in which the opponent does influence their performance and the outcome ($M=3.78$, $SD=.95$). Second, individual athletes participating in sports in which the opponent does not influence their performance or the outcome ($M=4.10$, $SD=1.14$) were significantly higher in their perceptions of difficulty to control their performance and the outcome than their counterparts (team athletes participating in sports in which the opponent does not influence their performance and the

Table 3

Means and Standard Deviations for the SECQ Subscales for the Canadian Athletes in the Six Sport Classifications

	SECQ Subscales		
	Diff M (SD)	Perform M (SD)	Outcome M (SD)
Sport Classification			
TJ	3.69(.97)	5.44(.92)	3.53(1.42)
IJ	3.98(1.05)	5.34(.83)	4.11(1.19)
TOI	3.78(.95)	5.48(.82)	4.40(1.02)
IOI	3.95(1.01)	5.31(.97)	4.60(1.13)
TONI	3.74(1.06)	5.38(.95)	4.31(1.05)
IONI	4.10(1.14)	5.40(.98)	4.21(1.36)

outcome; M=3.74, SD=1.06).

Further analyses indicated four significant comparisons for the outcome subscale (see Table 3). Team athletes participating in sports with a judged component (M=3.53, SD=1.43) consistently and significantly had lower perceptions of outcome control when compared to athletes from every other sport classification, except individual athletes participating in sports with a judged component (M=4.12, SD=1.19). There was no significant difference in perceptions of outcome control for team verses individual athletes participating in sports with a judged component.

A second MANOVA was undertaken to determine whether athletes, classified according to perceived control used the five functions of imagery differently. Pillais multivariate test of significance revealed a significant difference for athletes participating in the six sport classifications with respect to their use of imagery ($F(5,25)=4.970$, $p<.05$). Wilks lambda (.91), indicated that 9% of the variance in use of imagery was due to the six sport classifications. Results of univariate ANOVAs indicated that significant differences existed for the sport classifications for all five of the imagery functions, cognitive general imagery ($F(5,1351)=5.51$, $p<.05$), cognitive specific imagery ($F(5,1351)=4.14$, $p<.05$), motivational general-arousal imagery ($F(5,1351)=6.31$, $p<.05$), motivational general-mastery imagery ($F(3,1351)=2.78$, $p<.05$), and motivational specific imagery ($F(5,1351)=6.37$, $p<.05$).

Further analyses revealed two significant comparisons for the cognitive general imagery subscale (see Table 4). First, team athletes participating in sports with a judged component (M=5.20, SD=.82) used the cognitive general function of imagery more than individual athletes participating in sports in which the opponent influences their performance and the outcome (M=4.73, SD=1.10). Second, team athletes participating in sports in which the opponent does not influence the outcome (M=5.15, SD=1.03) used CG imagery more than those individual athletes participating in sports in which the opponent influences their performance and the outcome.

Post hoc tests revealed one significant comparison for the cognitive specific imagery function (see Table 4). Individual athletes participating in sports with a judged component (M=5.39, SD=.78) used significantly more cognitive specific imagery than individual athletes participating in sports in which the opponent influences their performance and the outcome (M=4.85, SD=1.06).

For motivational general-arousal imagery, further analyses produced three significant comparisons (see Table 4). First, team athletes participating in sports with a judged component (M=5.11, SD=.85) used significantly more motivational general-arousal imagery than individual athletes participating in sports in which the opponent influences their performance and the outcome (M=4.51, SD=1.25). The second significant comparison showed team athletes participating in sports in which the opponent influences their performance and the outcome (M=4.91,

Table 4

Means and Standard Deviations for the Imagery Subscales for the Canadian Athletes in the Six Sport Classifications

	Imagery Subscales				
	CS M (SD)	CG M (SD)	MS M (SD)	MG-M M (SD)	MG-A M (SD)
Sport Classification					
TJ	5.19(1.01)	5.20(.82)	5.01(1.10)	5.47(.95)	5.11(.85)
IJ	5.39(.78)	5.19(.76)	4.97(1.24)	5.20(.80)	4.75(1.00)
TOI	5.06(.98)	4.86(.93)	4.86(1.16)	5.53(1.10)	4.91(1.12)
IOI	4.85(1.06)	4.73(1.10)	4.45(1.29)	5.34(1.01)	4.51(1.25)
TONI	5.11(1.11)	5.15(1.03)	4.75(1.25)	5.41(1.04)	4.87(1.18)
IONI	4.96(1.13)	4.83(1.42)	4.61(1.22)	5.29(1.10)	4.90(1.17)

SD= 1.12) used significantly more motivational general-arousal imagery than their counterparts (individual athletes also participating in sports in which the opponent influences their performance and the outcome; M=4.51, SD=1.25). Finally, individual athletes participating in sports in which the opponent does not influence their performance and the outcome (M=4.90, SD=1.17) were found to use motivational general-arousal imagery more than individual athletes participating in sports in which the opponent influences their performance or the outcome (M=4.51, SD=1.25).

Post hoc tests revealed two significant comparisons for the motivational specific imagery function (see Table 4). The first comparison showed team athletes participating in sports with a judged component (M=5.01, SD=1.10) to significantly use more motivational specific imagery than individual athletes participating in sports in which the opponent influences their performance and the outcome (M=4.45, SD=1.29). Also, team athletes participating in sports in which the opponent influences their performance and the outcome (M=4.86, SD=1.16) were found to use significantly more motivational specific imagery than their counterparts (individual athletes also participating in sports in which the opponent influences their performance and the outcome; M=4.45, SD=1.29).

Although the univariate ANOVA revealed a significant difference in the use of motivational general-mastery imagery by

athletes participating in the six sport classifications, post hoc tests did not produce any significant comparisons.

USA Athlete Sample

In order to test the factor structure of the Sport Imagery Questionnaire-2, a CFA was conducted. The same seven fit indices as employed for the Canadian sample of athletes were used to determine the adequacey of the fit for the model (i.e., the five imagery functions). The results of the CFA are presented in Table 5. The values obtained for the various indices are similar to those reported for the Canadian sample. Once again, the model yielded only an acceptable fit and further improvements to the model are desirable. As expected, the factors were moderately correlated (see Table 2 in Appendix C).

The Sport Imagery Questionnaire-2 subscale means for the USA sample of athletes are represented in Table 6. It can be seen that athletes used motivational general-mastery imagery slightly more than the other functions. The internal consistencies of the Sport Imagery Questionnaire-2 items measuring each function, as evaluated by Cronbach's alpha, were acceptable: cognitive specific =.84, cognitive general =.79, motivational specific =.87, motivational general-arousal =.82, and motivational general-mastery =.83.

A MANOVA was also conducted on the USA sample to determine whether these athletes, also classified according to perceived control, use the five functions of imagery differently. Pillais

Table 5

Results of the Confirmatory Factor Analysis for USA Athletes

Fit Indices

	χ^2 (df)	χ^2/df	RMSR	GFI	AGFI	NFI	CFI
SIQ-2 Model	5656.43 (460)	12.3	.60	.85	.82	.80	.81

Table 6

Means and Standard Deviations for the Imagery Subscales for the USA Athletes

Imagery Subscales	M	SD
MG-M	5.41	1.06
CS	5.02	1.04
CG	4.89	1.08
MG-A	4.82	1.16
MS	4.73	1.22

multivariate test of significance indicated a significant effect for the six sport classifications on the athletes' use of imagery ($F(5,25)=5.43$, $p<.05$). Wilks lambda (.93) revealed that 7% of the variance in imagery use was due to the six sport classifications. Results of univariate ANOVAs revealed that athletes classified into the six sport categories according to perceived control used four of the five functions of imagery differently. Significant differences were found to exist for cognitive specific imagery ($F(5,1844)=7.29$, $p<.05$), motivational specific imagery ($F(5,1844)=16.88$, $p<.05$), motivational general-arousal imagery ($F(5,1844)=7.79$, $p<.05$), and motivational general-mastery imagery ($F(5,1844)=4.88$, $p<.05$).

Post hoc tests revealed four significant comparisons for the cognitive specific imagery subscale (see Table 7). It was found that team athletes participating in sports with a judged component ($M=5.42$, $SD=1.14$) significantly used more cognitive specific imagery than athletes from every other classification (TOI $M=4.83$, $SD=1.14$; IOI $M=4.82$, $SD=1.14$; TONI $M=4.43$, $SD=1.25$; IONI $M=4.87$, $SD=1.12$) except individual athletes participating in sports with a judged component ($M=4.77$, $SD=1.11$), in which case there was no significant difference. For the motivational specific imagery subscale, further analyses indicated that four comparisons were significant (see Table 7). It was found that individual athletes participating in sports with a judged component ($M=3.58$, $SD=1.50$) consistently and significantly used

Table 7

Means and Standard Deviations for the Imagery Subscales for the USA Athletes in the Six Sport Classifications

Imagery Subscales

	CS	CG	MS	MG-M	MG-A
	M (SD)	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**
Sport Classification					
TJ	5.42(.93)	5.05(1.09)	4.85(1.07)	5.63(.96)	5.10(1.05)
IJ	4.77(1.11)	4.62(.86)	3.58(1.50)	4.71(1.21)	3.98(1.41)
TOI	4.83(1.14)	4.73(1.12)	4.79(1.27)	5.34(1.14)	4.76(1.21)
IOI	4.82(1.14)	4.79(1.03)	4.56(1.29)	5.30(1.06)	4.56(1.19)
TONI	4.43(1.25)	4.55(1.24)	4.14(1.25)	5.24(1.10)	4.67(1.08)
IONI	4.87(1.12)	4.84(1.12)	4.63(1.36)	5.28(1.10)	4.72(1.28)

less MS imagery than athletes from every other sport classification (TJ M=4.85, SD=1.07; TOI M=4.79, SD=1.27; IOI M=4.56, SD=1,29; IONI M=4.63, SD=1.36), except team athletes participating in sports in which the opponent does not influence their performance or outcome (M=4.14, SD=1.25). There was no significant difference between these athletes and individual athletes participating in sports with a judged component.

Post hoc tests also revealed three significant differences for the motivational general-arousal imagery subscale (see Table 7). Team athletes participating in sports with a judged component (M=5.10, SD=1.05) were found to use motivational general-arousal imagery more than both individual athletes participating in sports with a judged component (M=3.98, SD= 1.41) and individual athletes participating in sports in which the opponent influences their performance and the outcome (M=4.56, SD=1.19). The second significant comparison indicated that team athletes participating in sports in which the opponent influences the teams performance and the outcome (M=4.76, SD=1.21) used significantly more motivational general-arousal imagery than individual athletes participating in sports with a judged component (M=3.98, SD=1.41).

Further analyses indicated three significant comparisons for the motivational general-mastery imagery subscale (see Table 7). Team athletes participating in sports with a judged component (M=5.63, SD=.96) used significantly used more motivational general-mastery imagery than their counterparts (individual

athletes also participating in sports with a judged component; M=4.71, SD=1.21) and used significantly more motivational general-mastery imagery than individual athletes participating in sports in which the opponent influences their performance and the outcome (M=5.30, SD=1.06). Also, team athletes participating in sports in which the opponent influences the teams performance and the outcome (M=5.34, SD=1.14), significantly used more motivational general-mastery imagery than individual athletes participating in sports with a judged component (M=4.71, SD=1.21).

Discussion

This study investigated whether athletes, classified by combining individual versus team categories with categories based on varying degrees of control, use imagery differently. The first step was to test whether an instrument specifically developed for this study, the Subjective and Experiential Control Questionnaire, was an acceptable measure of perceived control. It was hypothesized that the Subjective and Experiential Control Questionnaire would measure two distinct constructs of control, namely, outcome and performance control. A three-factor structure emerged, however, with the three constructs of control being labeled as: a) **Outcome Control**, an athlete's belief about how much control is available over the outcome of his or her sport (subjective control); b) **Performance Control**, an athlete's perception of his or her ability to intentionally exert effort

over their performance (experiential control) when completing the skills necessary to produce a desired outcome; and c) **Difficulty Control**, an athlete's perception of the difficulty of controlling both subjective and experiential control in sport.

Having established that the Subjective and Experiential Control Questionnaire is an acceptable measure of perceived control, the next step was to determine if Canadian athletes in the six sport classification categories differed on the three subscales of the SECQ. In general, athletes reported higher perceptions of experiential (performance) control than subjective (outcome) control and the perceived difficulty of controlling both subjective and experiential control. These athletes had strong, positive feelings about their ability to interact with their sporting environment and perform the skills necessary to produce successful and desired outcomes (experiential performance control).

It was hypothesized that athletes participating in sports in which the opponent does not influence their performance (e.g., swimming, rowing) would have higher perceptions of control than athletes participating in sports in which the opponent does influence their performance. This hypothesis was not supported. Individual athletes participating in sports in which the opponent does not influence their performance reported more perceived difficulty over subjective and experiential control than their counterparts (TONI athletes) and team athletes participating in

sports in which the opponent does influence the outcome and their performance.

Only partial support was found for the hypothesis that athletes participating in sports with a judged component perceive less subjective (outcome) control than athletes participating in sports without a judged component (e.g., track, speed skating). While this was found for team judged sports it was not the case for individual judged sports. Athletes participating in sports with a judged component are an example of athletes experiencing subjective agent-ends control beliefs in sport (cf. Skinner, 1997). The judges are the agents who exert control over the athletes desired outcomes (or ends; i.e., placing first, receiving a medal). Therefore, some of these athletes (i.e., team athletes) have lower perceptions of subjective outcome control and experiential performance control than athletes participating in sports without a judged component.

The above results provide some support for the position that combining the categories of individual versus team with the categories based on varying degrees of control produces a more effective classification system than only considering individual versus team categories as has typically been done in previous research. What is not clear is why athletes in IONI sports would differ from athletes in TONI sports on the difficulty subscale of the Subjective and Experiential Control Questionnaire. Now that an instrument is available for examining perceived control in sport, future research can now consider this and other questions.

Imagery Use

A modified version of the Sport Imagery Questionnaire was employed in the present study to examine athletes' use of imagery in training and competition. Separate CFAs conducted on the Canadian and USA samples revealed similar results. While the model produced an acceptable fit, the CFAs for both samples suggest model modification is desirable. Therefore, additional work to improve the Sport Imagery Questionnaire-2 is warranted.

Similar to previous studies (Hall et al., 1998) athletes in both the Canadian and USA samples reported greater use of the motivational general-mastery imagery function than any other imagery function, and used motivational specific imagery the least. That is, these athletes used imagery more for mastering the situation (e.g., staying focused, being mentally tough and being in control) than for specific goal-oriented behaviors (e.g., imagining winning an event, imagining improving skills). With respect to the cognitive function of imagery, athletes used cognitive specific imagery more than cognitive general imagery. This has been a consistent finding (e.g., Hall et al., 1998; Munroe et al., in press; Salmon et al., 1994) with athletes in virtually all sports using imagery more for improving specific motor skills (e.g,, shooting or passing a ball) than for rehearsing strategies of play (e.g., full court pressure in basketball). Although cognitive general imagery was used the least of the two cognitive imagery functions, mean scores on the

cognitive general imagery subscale were, nonetheless, moderately high.

The value of a classification system is that it establishes a basis for making generalizations (Magill, 1993). The following generalizations stem from the results of employing the six sport classification system in the present study to examine imagery use by athletes.

With respect to cognitive specific imagery, similar trends were found among Canadian and USA athletes participating in sports with a judged component. Specifically, individual athletes participating in sports with a judged component used imagery aimed at improving specific motor skills more than individual athletes participating in sports in which the opponent influences the outcome and their performance and individual athletes participating in sports in which the opponent does not influence the outcome or their performance. Justification for this finding may lie in the fact that in judged sports the precise technical execution of the skills is fundamental to achieving success. That is, correct form is important in obtaining a high score from the judges. Therefore, practice entails rehearsing the same skills over and over to perfect their technical execution (i.e., form). Since cognitive specific imagery is a type of rehearsal, it follows that athletes participating in sports with a judged component would use cognitive specific imagery more than athletes participating in sports without a judged component.

It was hypothesized that team athletes competing in sports in which an opponent influences their performance (e.g., basketball, football) would use more cognitive general imagery than athletes competing in the other five sport categories. This hypothesis was not supported. Instead, it was found that team athletes participating in sports with a judged component (e.g., precision figure skating, cheerleading) and team athletes participating in sports in which the opponent does not influence the outcome or performance (e.g., canoeing, rowing) used more cognitive general imagery than individual athletes participating in sports in which the opponent influences the outcome and performance (e.g., tae kwon doe, tennis). This finding seems to stem from two trends. First, athletes competing in sports such as basketball and football (i.e., TOI sports) do not use cognitive general imagery any more extensively than athletes in other team sports (i.e., TJ and TONI sports). Second, athletes in sports such as tae kwon doe and tennis (i.e., IOI sports) use less cognitive general imagery than most other athletes. No explanation for these trends can be offered at the present time. However, the lack of an overall team sport versus individual sport differences for the use of cognitive general imagery supports the research of Munroe et al., (in press).

Athletes participating in sports in which the opponent does not influence the outcome and performance were expected to perceive having more control than their counterparts (i.e., athletes in TOI and IOI sports). With a feeling of control over

their performance and the desired outcome, it was predicted that these athletes would use more motivational specific imagery. Only very weak support for this hypothesis was found, and only for the USA athletes. USA athletes participating in TONI sports (e.g., rowing) used more motivational specific imagery than athletes in IONI sports (e.g., badminton). The other expected differences (e.g., TONI versus TOI and IONI versus IOI) failed to emerge. What was not hypothesized but was found were differences in motivational specific imagery use between judged sports and some other sport categories. Team athletes participating in sports with a judged component (e.g., precision figure skating) used more motivational specific imagery than IOI athletes (e.g., badminton, and IJ athletes (e.g., gymnastics) used less motivational specific imagery than TOI athletes (e.g., Basketball) and IOI athletes (e.g., tennis). Since no clear pattern of motivational specific imagery use seems to be evident across the six sport categories, explanations for the above findings are not possible at the present time. What is obvious is that the relationships between perceived control and motivational specific imagery use require further investigation.

Unfortunately, the use of motivational general-arousal imagery by athletes in the six sport classifications presents an equally diverse picture. The varying use of motivational general-arousal imagery may partially be accounted for by the dual role it can play. Since competitive anxiety can be both facilitative and debilitative (Jones, 1995), athletes may be

using motivational general-arousal imagery to either psyche themselves up or to calm themselves down (Vadocz et al., 1997). In turn, this may depend on the sport category in which they are competing. It was hypothesized that athletes in the six sport classifications would use motivational general-arousal to about the same extent, but this is definitely not the case. Further research should explore which categories tend to use imagery more for psyching up and which ones use it more for remaining calm and relaxed.

In contrast to the use of motivational specific and motivational general-arousal imagery, the use of motivational general-mastery imagery across the six sport classifications was essentially as expected. As shown in previous research (Hall et al., 1998; Salmon et al., 1994), all athletes used motivational general-mastery imagery extensively and as hypothesized, athletes in each of the six sport classifications employed motivational general-mastery imagery about equally. There were only two significant findings for motivational general-mastery imagery, and these were only for the USA athletes. It would appear that virtually all athletes recognize the value of using motivational general-mastery imagery for enhancing sport confidence and mental toughness.

Athletes from the six sport classifications were found to have different perceptions of performance and outcome control in sport. However, the relationship between perceived control, imagery use and the sport classification system suggested by the

present study warrants further investigation before specific conclusions can be drawn.

Application

Findings of the present study support Paivio's (1985) model of imagery. Imagery served both a motivational and a cognitive function in athletic performance. Furthermore, Canadian and USA athletes classified by combining individual versus team categories with categories based on varying degrees of control reported substantial differences in their use of these five functions of imagery. These findings suggest some practical application for coaches and sport psychologists who are implementing imagery interventions with athletes during training and competition.

While all athletes report the fairly extensive use of cognitive specific imagery, athletes participating in judged sports used cognitive specific imagery the most. These athletes are already incorporating imagery for rehearsal of specific motor skills and coaches should ensure these athletes continue to employ cognitive specific imagery, but do not neglect the other functions of imagery. Athletes participating in sports in which the opponent influences the outcome and performance used cognitive specific imagery the least. These athletes should be especially encouraged to use cognitive specific imagery, imagining the execution of specific skills in a large variety of situations they could be placed in by their opponents.

Of the two cognitive functions imagery serves, cognitive general imagery was used the least by the athletes. Especially surprising is that TOI sport athletes (e.g., basketball and football players) used less cognitive general imagery than athletes in some of the other sport categories, yet strategies of play are fundamental in TOI sports. Coaches and sport psychologists need to address this when working with their athletes. The strategic use of imagery should be emphasized as being highly relevant. It is possible that athletes are not fully aware of the importance of cognitive general imagery. Athletes should be educated with respect to the possibilities and advantages of using cognitive general imagery to facilitate the strategical and tactical components of their performance.

Motivational specific imagery was used the least of the three motivation imagery functions by athletes from both the Canadian and USA samples. Noteworthy is the lower use of motivational specific imagery by athletes in individual sports, especially those that are judged (e.g., gymnastics). Setting goals is a widely used and effective technique for the enhancement of performance in sport (Weinberg, 1992). Athletes report using imagery to set various types of goals (e.g., process, performance, and outcome) (Munroe, Giacobbi, Weinberg, & Hall, 1998), yet the present results suggest this function of imagery may be under utilized relative to the other imagery functions. Coaches and sport psychologists should bring imagery into the goal setting programs they employ with their athletes,

especially those athletes participating in individual sports. Athletes in sports such as gymnastics may be hesitant to set goals, especially outcome goals, since they feel the lack of control over the competition outcome. These athletes should be educated in the value of setting process and performance goals, and how imagery can be utilized to help develop these goals and plan the activities necessary to achieve them.

Athletes in all six categories and from both samples used motivational general-mastery imagery the most. Although USA athletes participating in judged sports employed this function of imagery less than athletes in some other sport categories, athletes seem to recognize the value of using motivational general-mastery imagery to develop, maintain, and regain sport confidence (cf. Moritz et al., 1996). Of the five imagery functions, coaches and sport psychologists can probably be least concerned with motivational general-mastery imagery. This is not to imply that an motivational general-mastery imagery intervention is not of value. Callow, Hardy, and Hall (1998) recently demonstrated that such an intervention could increase the sport confidence of elite athletes participating in badminton.

Vadocz et al., (1997) suggested that motivational general-arousal imagery can be employed to help control competitive anxiety levels. Variability in the use of motivational general-arousal among the athletes classified according to the six sport categories was evident, however, for each sport category (except

sports in which the opponent does not influence the outcome and performance), team athletes reported greater use of motivational general-arousal imagery than individual athletes. Therefore, coaches and sport psychologists working with athletes in individual sports should put emphasis on the use of motivational general-arousal imagery to a) help athletes get psyched up and energized when they feel sluggish, and b) to help athletes calm down and relax when they feel anxious and stressed.

When developing and employing interventions with athletes, there is one other finding emerging from the present study that should be kept in mind. Canadian and USA athletes report some differences in their use of imagery, at least when classified according to the six sport system used in this study. While there are certainly more similarities than differences between the two groups, coaches and sport psychologists should not assume the two groups are the same. This finding is not surprising since the sport systems in the two countries are different, the coaching development and certification programs also differ, and there are some differences in why Canadian and USA athletes are involved in competitive sport.

Conclusions and Direction for Future Research

Findings from the present study provide researchers, coaches and applied sport psychologists insight into the uses of imagery by athletes in the six sport classifications. Not all sports are the same. In some sports, performances are quantified in terms

of time or distance, while in others performances are measured in points or goals scored. In yet others, performances are subjectively judged. The type of sport an athlete chooses to participate in can affect their perceptions of control and their use of imagery.

Four main conclusions can be drawn from the present results, each of which has implications for future research.

a) The Subjective and Experiential Control Questionnaire is an acceptable measure of perceived performance and outcome control. Given that an acceptable instrument is now available for measuring athletes' perceived control, researchers can examine the specific relationships among the components of perceived control (i.e., subjective control, experiential control and control difficulty) and the five functions of imagery. For example, it may be that certain functions of imagery predict subjective control, while others predict experiential control and control difficulty.

b) Athletes classified by combining individual versus team categories with categories based on varying degrees of control report some differences in their use of imagery. Future research could examine whether the six sport classifications employed in the present study can also differentiate athletes' uses of other performance enhancing techniques such as self-talk and coping strategies.

c) While the Sport Imagery Questionnaire-2 is an acceptable measure of imagery use by athletes in training and competition,

it could be improved. Further work to improve the fit of the hypothesized model should be undertaken.

d) When classified according to the six sport categories, there are differences in how Canadian and USA athletes use imagery. Future research can investigate why these differences exist and whether there are also differences in imagery use by athletes from other countries.

In addition to the above, it is clear that our understanding of why athletes in the six sport categories use motivational specific and motivational general-arousal imagery differently needs to be improved. Intervention studies specifically examining these two functions of imagery may be one possible approach. Nevertheless, coaches and sport psychologists can use the results of the present study to more effectively target their imagery interventions. That is, athletes in specific sport categories can be educated and encouraged to more extensively employ those functions of imagery they tend to under utilize.

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Appendix A

Consent Form

Imagery in Competitive Sports

I have read the letter of information, understand the nature of the study, and I agree to participate. All questions have been answered to my satisfaction.

Name (Please print) _____

Signature _____

Date _____

Dr. Craig Hall and Krista Munroe
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Please fill in the blank or circle the appropriate answer:

Sport: _____

Level of Competition: Recreational Club Varsity Provincial National International

Sex: M / F

Age: _____

Athletes use mental imagery in training and competition. Imagery serves two functions. The motivational function of imagery can represent emotion-arousing situations as well as specific goals and goal-oriented behaviors. The cognitive function entails the mental rehearsal of skills and strategies of play. A strategy is a plan or method of achieving some goal. In sport, this often is referred to as a game plan. For example, playing a *pressure game* to create turn overs is a possible strategy to use in basketball, and this could be done executing various skills and tactics (i.e., skills put together in a sequence) such as presses and man-on-man defences. Another example of a strategy would be playing a *baseline* game in tennis; how this is actually accomplished (i.e., the skills performed) would vary considerably over the course of a game. This questionnaire was designed to assess the extent to which you incorporate imagery into your sport. Any statement depicting a function of imagery that you rarely use should be given a low rating. In contrast, any statement describing a function of imagery which you use frequently should be given a high rating. Your ratings will be made on a seven-point scale, where *one* is the rarely or never engage in that kind of imagery end of the scale and *seven* is the often engage in that kind of imagery end of the scale. Statements that fall within these two extremes should be rated accordingly along the rest of the scale. Read each statement below and fill in the blank the appropriate number from the scale provided to indicate the degree to which the statement applies to you when you are practising or competing in 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						Often
1	2	3	4	5	6	7

(1) I make up new plans/strategies in my head. _____

(2) I image the atmosphere of winning a championship (e.g., the excitement that follows winning a championship). _____

(3) I image giving 100%. _____

(4) I can consistently control the image of a physical skill. _____

(5) I imagine the emotions I feel while doing my sport. _____

(6) I imagine my skills improving. _____

(7) I image alternative strategies in case my event/game plan fails. _____

(8) I imagine myself handling the arousal and excitement associated with my sport. _____

(10) I imagine other athletes congratulating me on a good performance. _____

(11) I image each section of an event/game (e.g., offense vs. defence, fast vs. slow). _____

(12) I imagine winning. _____

(13) I imagine myself being in control in difficult situations. _____

(14) I can easily change an image of a skill. _____

(15) I image others applauding my performance. _____

(16) When imaging a particular skill, I consistently perform it perfectly in my mind. _____

(17) I image myself winning a medal. _____

(18) I imagine the stress and anxiety associated with my sport. _____

(19) I image myself continuing with my game/event plan, even when performing poorly. _____

(20) When I image myself performing, I feel myself getting psyched up. _____

(21) I can mentally make corrections to physical skills. _____

(22) I imagine executing entire plays/programs/sections just the way I want them to happen in an event/game. _____

(23) Before attempting a particular skill, I imagine myself performing it perfectly. _____

(24) I imagine myself being mentally tough. _____

(25) When I image myself participating in my sport, I feel anxious. _____

(26) I imagine the excitement associated with performing. _____

(27) I image myself being interviewed as a champion. _____

(28) I image myself to be focused during a challenging situation. _____

(29) When learning a new skill, I imagine myself performing it perfectly. _____

(30) I imagine myself successfully following my game/event plan. _____

(31) I image myself working successfully through tough situations (e.g., a power play, sore ankle, etc.). _____

(32) I imagine being recognized for my skill improvement. _____

Perceptions of Outcome Control Questionnaire

1. My control over I how do in my competitions is...

1	2	3	4	5	6	7
Very Little control						Complete Control

2. My control over placing first. second. or third in a competition (tournament—for team sports) is...

1	2	3	4	5	6	7
Very Little control						Complete Control

3. My control over doing well in my competitions is...

1	2	3	4	5	6	7
Very Little control						Complete Control

4. My control over winning or losing is....

1	2	3	4	5	6	7
Very Little control						Complete Control

5. My control over my performance during competition is....

1	2	3	4	5	6	7
Very Little control						Complete Control

6. Placing first. second. or third in a competition (or tournament—for team sports) is...

1	2	3	4	5	6	7
Extremely Easy						Extremely Difficult

7. For me. performing well in my competitions is...

1	2	3	4	5	6	7
Extremely Easy						Extremely Difficult

8. For me. winning is....

1	2	3	4	5	6	7
Extremely Easy						Extremely Difficult

Appendix B

Canadian Sports

Sport	(n)	Classification
1. Ice Hockey	(n=209)	TOI
2. Golf	(n=41)	IONI
3. Baseball\Softball	(n=12)	TOI
4. Wrestling	(n=58)	IOI
5. Basketball	(n=102)	TOI
6. Track & Field	(n=82)	IONI
7. Rowing	(n=133)	TONI
8. Gymnastics	(n=36)	IJ
9. Volleyball	(n=68)	TOI
10. Football	(n=3)	TOI
11. Rugby	(n=50)	TOI
12. Field Hockey	(n=25)	TOI
13. Swimming	(n=59)	IONI
14. Tennis	(n=121)	IOI
15. Racquetball	(n=12)	IOI
16. Soccer	(n=57)	TOI
17. Dance\Cheerleading	(n=24)	TJ
18. Badminton	(n=12)	IOI
19. Tae Kwan Doe	(n=12)	IOI
20. Squash	(n=85)	IOI
21. Snowboarding	(n=12)	IONI
22. Mountain Biking	(n=12)	IONI
23. Canoeing	(n=11)	TONI
24. Speed Skating	(n=24)	IONI
25. Triathalon	(n=13)	IONI
26. Waterpolo	(n=12)	TOI
27. Figure Skating	(n=25)	IJ
28. Precision Figure Skating	(n=48)	TJ

USA Athletes

Sport	(n)	Classification
1. Ice Hockey	(n=15)	TOI
2. Golf	(n=103)	IONI
3. Baseball	(n=240)	TOI
4. Wrestling	(n=38)	IOI
5. Basketball	(n=221)	TOI
6. Track & Field	(n=143)	IONI
7. Rowing	(n=60)	TONI
8. Gymnastics	(n=57)	IJ
9. Volleyball	(n=105)	TOI
10. Football	(n=92)	TOI
11. Rugby	(n=46)	TOI
12. Ultimate Frisbee	(n=90	TOI
13. Equestrian	(n=23)	IONI
14. Lacrosse	(n=78)	TOI
15. Field Hockey	(n=26)	TOI
16. Swimming	(n=68)	IONI
17. Tennis	(n=124)	IOI
18. Racquetball	(n=6)	IOI
19. Soccer	(n=269)	TOI
20. Dance\Cheerleading	(n=76)	TJ
21. Bowling	(n=32)	IONI
22. Fencing	(n=26)	IOI
23. Roller Hockey	(n=1)	TOI
24. Waterskiing	(n=3)	IONI
25. Badminton	(n=1)	IOI
26. Tae Kwan Doe	(n=3)	IOI
27. Shooting	(n=1)	IONI
28. Polo	(n=1)	TOI
29. Karate	(n=1)	IOI
30. X-country Skiing	(n=1)	IONI
31. Archery	(n=2)	IONI

Sport	(n)	Classification
32. Baton Twirling	(n=1)	IJ
33. Sprint Car Racing	(n=1)	IONI
34. Diving	(n=12)	IJ

Appendix C

Table 1

Interfactor Correlations for the SIQ-2 for the Canadian Athletes

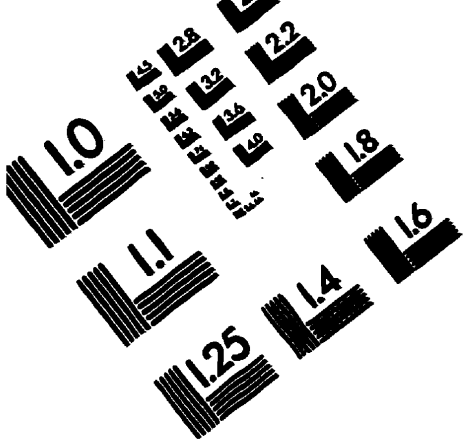
	MG-A	M-GM	MS	CS	CG
MG-A	1.00				
MG-M	.58	1.00			
MS	.68	.56	1.00		
CS	.52	.61	.51	1.00	
CG	.52	.60	.49	.67	1.00

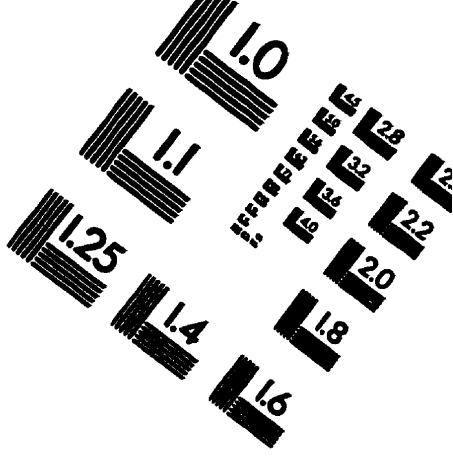
Table 2

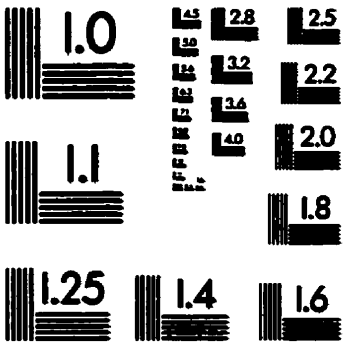
Interfactor Correlations for the SIQ-2 for the USA Athletes

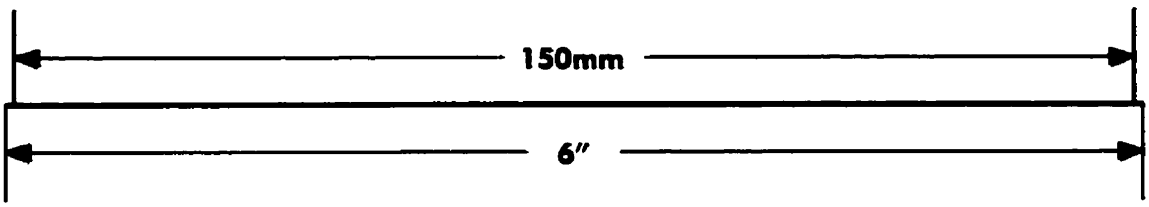
	MG-A	M-GM	MS	CS	CG
MG-A	1.00				
MG-M	.31	1.00			
MS	.56	.32	1.00		
CS	.37	.78	.41	1.00	
CG	.53	.34	.56	.42	1.00

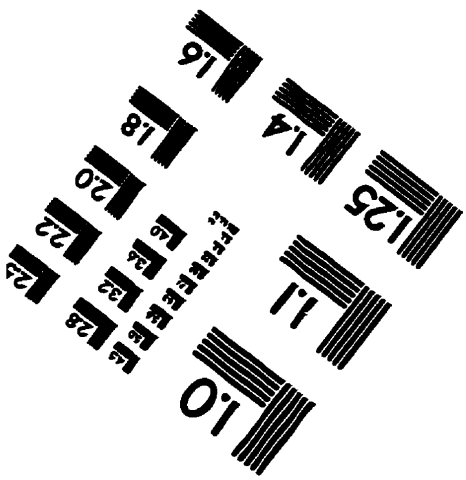
TEST TARGET (QA-3)

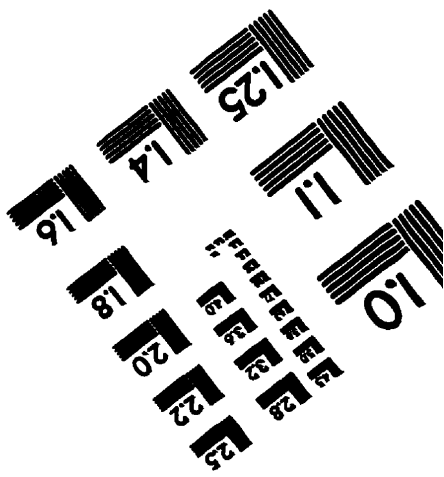












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