

Imagery use in sport: Mediation effects for efficacy

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Abstract

The factors that influence whether an athlete chooses to engage in imagery are largely unknown. One reason may be the amount of confidence athletes have in their ability to image. The aim of this study was to examine the relationships among efficacy in using imagery, imagery use and imagery ability. Consistent with Bandura's (1986, 1997) theory, it was hypothesized that there would be a positive correlation between efficacy in using imagery and imagery use, and that efficacy in using imagery would mediate the relationship between imagery ability and imagery use. Participants were 74 female athletes from various sports. The instruments we used were the Movement Imagery Questionnaire – Revised (Hall & Martin, 1997) for imagery ability, the Sport Imagery Questionnaire (Hall, Mack, Paivio, & Hausenblas, 1998) for imagery use, and a modified version of the latter questionnaire for efficacy in using imagery. Correlations showed that the more athletes were confident in their ability to use a certain image, the more they used it. Efficacy in using imagery was found to mediate only the relationship between imagery ability and cognitive imagery use.

Keywords: *Confidence, efficacy, imagery, imagery ability, imagery use, mediation*

Introduction

Self-efficacy (or confidence) is an important psychological state that affects performance in sport. It is generally used when referring to one's belief in one's ability to successfully perform a specific behaviour or set of behaviours necessary to obtain a certain outcome (Bandura, 1986, 1997). In sport, most researchers have considered the relationship between efficacy and physical performance. The relationship between efficacy and mental performance, or the use of psychological skills, has received less attention.

According to Bandura's (1986, 1997) social cognitive theory, efficacy beliefs influence thoughts and emotional reactions (e.g. goals, worries, attributions) and behaviours (e.g. choice, effort, persistence). In sport, researchers have consistently demonstrated a positive relationship between efficacy beliefs and behaviour in terms of performance, effort and persistence (Moritz, Feltz, Fahrback, & Mack, 2000). Interestingly, "choice", operationalized as the activities people choose to engage in, has not been investigated as much within sport, although there have been a few exceptions (e.g. Feltz, 1982). Social

cognitive theory posits that efficacy beliefs will influence the choices people make and the courses of action they pursue (Bandura, 1986, 1997). More specifically, people tend to do the things that they feel efficacious in: when an individual is highly efficacious for a particular task, he or she will initiate and persist in performing the task more than someone lower in efficacy for the same task. Individuals who are not efficacious in their ability for a particular task will avoid it.

In sport, there are many circumstances in which efficacy beliefs can play a role. For example, Brown (2003) stated that athletes need to have confidence in themselves, in their skills, in their equipment, in their team-mates, in their officials and in their coaches, as well as a high degree of social and competition confidence. The idea that efficacy can be multi-dimensional is not unique; current research on efficacy beliefs in coaches (Feltz, Chase, Moritz, & Sullivan, 1999) and teams (Short, Sullivan, & Feltz, 2005) suggests similar approaches. Most recently, Knight and Vealey (2002) developed a multidimensional measure of sport confidence that includes three dimensions: confidence in physical skills and

training, confidence in cognitive efficiency, and confidence in resilience. Included in their inventory are a few items related to one's confidence in one's ability to use psychological skills. It should be noted that we are making no distinction between the terms "efficacy" and "confidence". They both refer to a cognitive process by which people make judgements about their capabilities to accomplish a particular goal in a sport context (Feltz, 1994; Feltz & Chase, 1998; Moritz *et al.*, 2000). Confidence is used when referring to a specific theoretical approach, or when addressing more applied sport psychology concepts.

Of course, people can have confidence in their ability to use certain psychological skills. Intuitively, sport psychologists have probably known this for years based on their interactions with athletes. It is likely that if an athlete is confident in her ability to use a specific psychological technique, she will use that technique. This line of thinking is reflective of one of Bandura's (1997) key contentions regarding the role of efficacy beliefs in human functioning: that "people's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (p. 2). If this is true, then if an athlete is confident in her ability to use certain psychological skills, then she will be more likely to use those psychological skills. This is the research question that guided this study. We selected the psychological skill of mental imagery to study because imagery interventions are very popular among applied sport psychologists (Murphy & Jowdy, 1992; Short *et al.*, 2002).

Imagery has been operationalized 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. (White & Hardy, 1998, p. 389)

Over the years, researchers have found evidence that the use of imagery in sport can be a highly effective performance enhancement technique for athletes (for meta-analytic reviews, see Driskell, Copper, & Moran, 1994; Feltz & Landers, 1983). Over 200 studies have been conducted providing us with a framework of how imagery works, what images are used, as well as when, where and why imagery is used in sport (e.g. Hall, 2001; Martin, Moritz, & Hall, 1999; Munroe, Giacobbi, Hall, & Weinberg, 2000).

Most of the current imagery research in sport has utilized Paivio's (1985) conceptualization of imagery into cognitive and motivational functions that

operate on specific and general levels. These functions are: Cognitive Specific (CS: imaging skills), Cognitive General (CG: imaging strategies), Motivation Specific (MS: imaging goal-oriented responses and activities) and Motivation General (MG: affect and arousal). Based on this model, the Sport Imagery Questionnaire (SIQ; Hall, Mack, Paivio, & Hausenblas, 1998) was developed to assess the frequency with which athletes use these imagery functions. In contrast to Paivio's original model, the SIQ consists of five subscales, including Paivio's original cognitive and motivational functions, but the MG function is split into MG-Mastery (MG-M; e.g. imaging being confident) and MG-Arousal (MG-A; e.g. imaging physiological and emotional arousal). Research using the SIQ has shown relationships among the imagery functions and many psychological variables (e.g. efficacy, anxiety, motivation) and performance in sport (for a review, see Martin *et al.*, 1999).

The relationship between efficacy and imagery use has been of interest to many researchers. There have been three dominant areas of inquiry. The first area has focused on how high and low confident athletes differ in their imagery use (Abma, Fry, Li, & Relyea, 2002; Mills, Munroe, & Hall, 2000; Moritz, Hall, Martin, & Vadocz, 1996; Short & Short, 2004). The second has focused on which imagery functions best predict confidence (Callow & Hardy, 2001; Moritz *et al.*, 1996; Vadocz, Hall, & Moritz, 1997). The third concerns the use of imagery interventions designed to increase confidence for certain sport tasks (Callow, Hardy, & Hall, 2001; Feltz & Riessinger, 1990; Garza & Feltz, 1998; Lee, 1990; McKenzie & Howe, 1997; Short *et al.*, 2002). In another study, Beauchamp, Bray and Albinson (2002) combined these areas as they investigated the mediating effect of motivational imagery on the relationship between self-efficacy and performance in golf.

Despite the abundance of research investigating the relationship between efficacy and imagery in sport, the factors that influence whether an athlete chooses to engage in imagery are unknown. As mentioned previously, one reason may be the amount of confidence athletes have in their ability to image. To date, no researchers have investigated whether one's efficacy in one's ability to use imagery is related to the frequency with which an athlete uses imagery. This was the main aim of the present study and, based on the tenets of efficacy theory (Bandura, 1986, 1997), we hypothesized that there would be a positive correlation between efficacy in using imagery and imagery use.

A secondary aim of the study was to examine the relationships among efficacy in using imagery, imagery use and *imagery ability*. Imagery ability generally refers to an individual's ability to create images. It is considered to be innate in that everyone

has the ability to generate images but some people are better at it than others. According to Paivio (1985), these individual differences in imagery ability are a product of experience interacting with genetic variability. Although it is beyond the scope of this paper to speculate on the issue of why people differ so much in imagery abilities, it is an area that deserves research attention (Moran, 2004).

Imagery is considered to be a polysensory experience (Vealey & Greenleaf, 2001), but the two most popular modalities cited in sport research are visual (i.e. seeing) and kinaesthetic (i.e. feeling). To this end, imagery ability is often measured using the Movement Imagery Questionnaire (MIQ; Hall & Pongrac, 1983) or a revised version called the MIQ-R (Hall & Martin, 1997). Both versions of this questionnaire are designed to assess individual differences in both kinaesthetic and visual imagery ability. The following is a review of studies that have been conducted on imagery ability, as assessed by the MIQ or MIQ-R.

Research conducted in the area of motor learning has shown that there is a relationship between imagery ability and the acquisition, reacquisition and, to a lesser extent, the retention of movements (Goss, Hall, Buckolz, & Fishburne, 1986). Similarly, Hall, Buckolz and Fishburne (1992) showed that high imagers were more accurate than low imagers, although there were no differences according to imagery ability on a recall or recognition test. More pertinent to sport, Rodgers, Hall and Buckolz (1991) demonstrated that imagery ability of figure skaters was strengthened after a 16-week imagery-training programme. Their results showed that the skaters improved visual imagery first and improved their kinaesthetic imagery later during the programme. In another study, Callow *et al.* (2001) showed that an imagery-training programme improved the visual imagery ability of one of their four participants. However, Cumming and Ste-Marie (2001) reported that their 5-week imagery-training programme did not result in significant improvements in imagery as measured by the MIQ, but they did show improvements in visual and kinaesthetic imagery ability when looking at the results from a more skating-specific measure of imagery ability. Their sample consisted of 10- to 15-year-old novice ability female synchronized skaters. Given these results, Hall (2001) suggested that imagery should be considered to be a skill as well as ability, because skills can be improved through regular, deliberate practice.

With respect to the relationship between imagery ability and imagery use, several researchers have reported positive correlations. For example, Moritz *et al.* (1996; see also Vadocz *et al.*, 1997) showed that all correlations among visual imagery ability and the

SIQ subscales (CS, CG, MS, MG-M and MG-A) and among kinaesthetic imagery ability and the SIQ subscales were positive in direction, but only statistically significant between visual imagery ability and MG-M, and kinaesthetic imagery and CS and MG-A. Abma *et al.* (2002) showed that the kinaesthetic and visual imagery ability subscales were moderately to highly correlated with the SIQ subscales (correlations ranging from 0.30 to 0.81). Similarly, Monsma and Overby (2004) showed that kinaesthetic imagery ability was positively correlated with all subscales of the SIQ, and visual imagery ability was significantly correlated with the CS and CG subscales.

It is clear that there are individual differences in imagery ability and it may be that these differences influence the frequency with which imagery is used and how effective imagery will be. Furthermore, these differences in imagery ability may be one reason why people choose not to use imagery even when it could be beneficial. We believe that one's efficacy in using imagery is also important. Thus, we hypothesized that efficacy in using imagery would mediate the relationship between imagery ability and imagery use. Mediators (also called intervening or process variables) are variables that do not alter or modify the effects of one variable on another; rather, they are a mechanism by which one variable influences the other (Baron & Kenny, 1986; Kenny, 2003; Markland, 2000).

Using efficacy in using imagery as a mediator of the imagery ability-imagery use relationship is consistent with the tenets of efficacy theory. According to Bandura (1986, 1997), efficacy beliefs are cognitive mediators. That is, how people behave can often be better predicted by the beliefs they hold about their capabilities rather than by what they are actually capable of accomplishing. Applied to the present study, how often athletes use imagery may be better predicted by their efficacy in their ability to use imagery rather than by their imagery ability. This rationale helps to explain why people's behaviours are sometimes disjoined from their actual capabilities and why their behaviour may differ widely even when they have similar knowledge, skills and abilities (Pajares, 2002). For example, many talented people suffer frequent (and sometimes debilitating) bouts of self-doubt about capabilities they clearly possess, just as many individuals are confident about what they can accomplish despite possessing a modest repertoire of skills. Belief and reality are seldom perfectly matched, and individuals are typically guided by their beliefs when they engage the world. As a consequence, people's behaviours are generally better predicted by their self-efficacy beliefs than by their previous attainments, knowledge, skills or abilities.

In summary, the main aim of this study was to determine whether an athlete's efficacy in her ability to use imagery is related to the frequency with which she uses imagery. We hypothesized that there would be a positive correlation between efficacy in using imagery and imagery use. A secondary aim of the study was to examine the relationships among efficacy in using imagery, imagery use and imagery ability. We hypothesized that efficacy in using imagery would mediate the relationship between imagery ability and imagery use. The rationale for the study and the hypotheses are strongly entrenched in Bandura's (1986, 1997) social cognitive theory as related to efficacy beliefs.

Methods

Participants

The participants in this study were 74 female competitive athletes in six collegiate sports (basketball, hockey, soccer, tennis, softball and volleyball) from Division II universities. They ranged in age from 18 to 23 years (mean = 19.5, $s = 1.2$). They had been playing at university level for an average of 2.11 years ($s = 1.24$), and had been playing their sport in general for 10.4 years ($s = 3.7$). When questioned about their previous experience with imagery, 28.4% reported that they had prior training in imagery use. Most participants used an internal imagery perspective (53.4%) as opposed to an external perspective (38.4%). Six athletes indicated that they used both perspectives.

Measures

Background information. The background information sheet that was used in this study included questions relating to the participants' age, sex, sport, experience playing sport at university and experience playing sport in general. In addition, two questions inquired whether the participant had any "formal" training in imagery and what the imagery perspective the participant used (forced choice: internal, external or both). With the exception of the imagery-training item, the information obtained from the background information sheet was used only to describe the sample.

The Sport Imagery Questionnaire. The SIQ consists of 30 items comprising five subscales, on which athletes rate how frequently they image the item suggested. The Cognitive General (CG) subscale measures strategies (e.g. "I make up new plans/strategies in my head"). The Cognitive Specific (CS) subscale focuses on imaging particular skills (e.g. "I can mentally make corrections to physical skills"). The

Motivation Specific (MS) subscale assesses goal-oriented imagery (e.g. "I imagine other athletes congratulating me on a good performance"). Finally, the Motivation General (MG) subscales address Mastery (MG-M; e.g. "I imagine myself appearing self-confident in front of my opponents") and Arousal (MG-A; e.g. "I imagine myself being in control in difficult situations") imagery. The imagery functions are operationalized by six items and the items are rated on a 7-point Likert scale (1 = *rarely* and 7 = *often*).

Exploratory and confirmatory factor analyses have verified the five-factor structure of the SIQ (Hall et al., 1998; Hall, Moritz, & Mack, 1997). Its construct validity has also been supported. Past research has shown acceptable internal reliabilities for the SIQ subscales (for examples, see Hall et al., 1997; Moritz et al., 1996). Cronbach's (1951) alphas for this study were 0.85 for CS, 0.72 for CG, 0.87 for MS, 0.84 for MG-M and 0.79 for MG-A. These values were all above the generally accepted criterion of 0.70 (Nunnally, 1978).

Sport Imagery Questionnaire-Efficacy. To assess the athletes' efficacy in their ability to use imagery, the SIQ was modified by asking the participants to "rate your confidence in your ability to...". The end of each item corresponded to one of the original SIQ items. For example, an item from the MG-A subscale read "rate your confidence in your ability to image yourself being in control in difficult situations". All 30 of the items on the original SIQ were included. Our method of modifying the SIQ was consistent with that previously done by Weinberg, Butt, Knight, Burke and Jackson (2003). In contrast to the original SIQ, but similar to efficacy measures used in sport (Feltz & Chase, 1998), the ratings were made on a Likert scale where 0 = *not confident at all* and 10 = *extremely confident*. The reliabilities for this measure were excellent; Cronbach's (1951) alphas were 0.93 for CS, 0.85 for CG, 0.93 for MS, 0.87 for MG-M and 0.88 for MG-A. These alpha values were actually higher than those for the original SIQ.

Imagery ability. The Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1997) was used to assess visual and kinaesthetic imagery ability. The MIQ-R consists of eight simple motor movements that participants are asked to either "see" themselves making the movement with as clear and vivid a visual image as possible, or to "feel" themselves making the movement without actually doing it. Participants rate the ease/difficulty with which they were able to do the mental tasks on a scale ranging from 1 (*very hard to see/feel*) to 7 (*very easy to see/feel*). There are four items on each of the

subscales. Moritz-Short (2000) found support for the psychometric properties of the MIQ-R (i.e. factor structure, internal consistency, and test/retest and convergent and predictive validity). Confirmatory factor analyses have supported its two-factor structure (Moritz, Vadocz, & Hall, 1997). Reliability as measured by Cronbach's alpha in this study was 0.88 for the visual and 0.85 for the kinaesthetic subscale. The correlation between the MIQ-R subscales was 0.59, which is similar to that reported in other research (e.g. 0.66, Abma *et al.*, 2002; 0.59, Monsma and Overby, 2004; 0.44, Moritz *et al.*, 1996; 0.31, Short *et al.*, 2002) but still demonstrative of the fact that visual and kinaesthetic imagery abilities are related but should be assessed separately.

Procedure

Approval to conduct this study was granted by the appropriate institutional review board. Coaches were contacted verbally or by email and their permission requested for the researchers to use their athletes in the study. Athletes were administered the questionnaires at a team meeting or during a practice session. At that time, all participants were read the informed consent form, and were given verbal instructions on how to complete the SIQ and efficacy measures. They were also guided through the MIQ-R (Short & Short, 2002). The questionnaires were distributed and completed in a random order. The entire procedure took less than 30 min.

Results

Descriptive statistics for the SIQ subscales

Descriptive statistics (see Table I) for the SIQ subscales indicated that the athletes in this sample reported using MG-M imagery the most, followed by MG-A, CG, CS and MS. This order is similar to that reported in several other imagery studies (e.g. Abma *et al.*, 2002; Short, Monsma, & Short, 2004). Athletes also reported higher visual imagery ability scores than kinaesthetic imagery scores, which is also consistent with previous research in this area (e.g. Abma *et al.*, 2002; Callow & Hardy, 2001; Moritz *et al.*, 1996). The values in Table I for the SIQ-Efficacy measure show that the athletes were most confident in their ability to use MG-M imagery, and least confident in their ability to use MS imagery. The values for CS, CG and MG-A were all very similar.

Preliminary analyses

Of all the background information data that were collected, it seemed as though one's prior experience

Table I. Descriptive statistics for imagery use, efficacy in using imagery, and imagery ability.

Measure	Mean	Standard deviation	Range
SIQ			
CS	4.09	1.37	1.17–7.00
CG	4.31	1.14	1.83–6.33
MS	3.40	1.48	1.00–7.00
MG-A	4.42	1.35	1.17–6.67
MG-M	4.94	1.34	2.20–6.37
SIQ-Efficacy			
CS	6.61	2.00	0.00–10.00
CG	6.69	1.65	1.33–10.00
MS	6.24	2.19	0.83–10.00
MG-A	6.62	1.92	1.33–10.00
MG-M	7.46	1.71	2.50–10.00
MIQ-R			
Visual	23.32	4.38	10.00–28.00
Kinaesthetic	20.78	5.04	9.00–28.00

Abbreviations: CS = Cognitive Specific, CG = Cognitive General, MS = Motivation Specific, MG-A = Motivation General-Arousal, MG-M = Motivation General-Mastery.

with imagery could be a potential confounding variable. That is, it was possible that an athlete could be more confident in her ability to use imagery if she had prior training in imagery techniques. A multivariate analysis of variance was conducted using imagery training (yes/no) as the independent variable and the SIQ and SIQ-Efficacy subscales as dependent variables. The analysis was not significant at $P = 0.01$.

Correlations among efficacy in using imagery, imagery use and imagery ability

The correlations are shown in Table II. For the most part, as expected, the SIQ subscales were all significantly correlated with each other. The intra-correlations among the cognitive and motivational subscales (e.g. CS and CG, MG-A and MG-M) were higher than the inter-correlations among the cognitive and motivational subscales (e.g. CS and MS). This pattern was similar for the SIQ-Efficacy measure. The only difference was that the MS subscale was not correlated with either the CS or CG subscale on the SIQ, but it was significantly correlated with both cognitive subscales on the SIQ-Efficacy measure.

Of greater interest are the correlations between the measures. Results showed that the more athletes were confident in their ability to use a certain image, the more they tended to use it. More specifically, the highest correlations between imagery use and efficacy in using imagery were obtained for each pair:

CS frequency and CS efficacy, CG frequency and CG efficacy, and so on.

For imagery ability, with the exception of one pair (CS and kinaesthetic imagery ability), the correlations were higher for the imagery ability and efficacy in using imagery pairs than the imagery ability and imagery use pairs. Both imagery abilities were highly correlated with the cognitive subscales of the SIQ and the SIQ–Efficacy measure. Only visual imagery ability was significantly correlated with the MS and MG-A SIQ–Efficacy subscales, and neither visual nor kinaesthetic imagery ability were significantly correlated with the MG-M SIQ–Efficacy subscale.

Tests for mediation

Tests for the mediating effect of efficacy in using imagery on the relationship between imagery ability and imagery use were performed in accordance with the procedure outlined by Baron and Kenny (1986) and further described by Kenny (2003). There are four steps in establishing mediation that involve estimating three regression equations. First, regressing the mediator on the independent variable, then regressing the dependent variable on the independent variable and, finally, hierarchically regressing the dependent variable on the mediator and then on the independent variable. Because of the multiple subscales for the SIQ and SIQ–Efficacy measures, multiple mediators could be operating, so we first examined the bivariate correlations to remove any superfluous independent variables (Beauchamp *et al.*, 2002). As stated above, visual and kinaesthetic

imagery ability were not significantly correlated with the motivational subscales of the SIQ, so only the cognitive subscales were considered. Separate analyses were carried out for the CG and CS subscales, as well as for visual and kinaesthetic imagery ability, resulting in four mediation analyses and 12 separate regression equations.

As shown in Table III, the first regression equation for each analysis was statistically significant, indicating that imagery ability accounted for significant variance in efficacy in using imagery. In the second equation, imagery ability accounted for significant variance in imagery use. In the mediational model computed in equation (3), efficacy in using imagery accounted for significant variance in imagery use on Step 1. After controlling for the effects of efficacy in using imagery, the variance in imagery use accounted for by imagery ability was not significant for three of the analyses, thus supporting mediation. For kinaesthetic imagery ability and CS imagery, because the first three steps were met, but Step 4 was not, partial mediation was evident.

Discussion

Many imagery researchers have been interested in the relationship between efficacy and imagery in sport. It has been shown that there are individual differences in imagery ability and these differences could influence the frequency of use and effectiveness of imagery by athletes. Hall *et al.* (1992) stated that if low ability imagers are instructed to use an imagery strategy, it is possible that the imagery

Table II. Correlations for imagery use, efficacy in using imagery and imagery ability.

Measure	1	2	3	4	5	6	7	8	9	10	11
SIQ											
(1) CS	1.00										
(2) CG	0.67**	1.00									
(3) MS	0.21	0.19	1.00								
(4) MG-A	0.30*	0.33**	0.68**	1.00							
(5) MG-M	0.55**	0.60**	0.40**	0.53**	1.00						
SIQ–Efficacy											
(6) CS	0.62**	0.49**	0.26*	0.25*	0.43**	1.00					
(7) CG	0.58**	0.62**	0.26*	0.33**	0.52**	0.83**	1.00				
(8) MS	0.21	0.24*	0.66**	0.58**	0.34**	0.56**	0.58**	1.00			
(9) MG-A	0.26*	0.31**	0.53**	0.72**	0.58**	0.51**	0.63**	0.74**	1.00		
(10) MG-M	0.45**	0.43**	0.33**	0.40**	0.68**	0.66**	0.75**	0.62**	0.70**	1.00	
MIQ-R											
(11) Kinaesthetic imagery ability	0.36**	0.25*	0.06	0.15	0.11	0.28*	0.36**	0.20	0.19	0.15	1.00
(12) Visual imagery ability	0.39**	0.33**	0.18	0.22	0.16	0.45**	0.45**	0.29*	0.24*	0.15	0.58**

Abbreviations: CS = Cognitive Specific, CG = Cognitive General, MS = Motivation Specific, MG-A = Motivation General-Arousal, MG-M = Motivation General-Mastery.

** $P < 0.01$, * $P < 0.05$.

Table III. Summary of hierarchical regression analyses examining efficacy in using imagery as a mediator of the relationship between imagery ability and cognitive imagery use.

Analysis	Criterion		Predictor	<i>R</i>	<i>R</i> ²	<i>R</i> ² adj.	<i>B</i>	<i>B</i> _{SE}	β	<i>t</i>
CS and visual imagery ability										
Equation (1)	CS–Efficacy		Visual	0.45	0.20	0.19	0.20	0.05	0.45	3.99**
Equation (2)	CS–Use		Visual	0.39	0.15	0.14	0.12	0.04	0.39	3.50**
Equation (3)	CS–Use	Step 1	CS–Efficacy	0.62	0.39	0.38	0.41	0.07	0.62	6.28**
	CS–Use	Step 2	CS–Efficacy	0.62	0.39	0.38	0.37	0.07	0.56	5.06**
			Visual	0.63	0.40	0.38	0.04	0.03	0.15	1.32
CS and kinaesthetic imagery ability										
Equation (1)	CS–Efficacy		Kinaesthetic	0.28	0.08	0.06	0.11	0.05	0.28	2.34**
Equation (2)	CS–Use		Kinaesthetic	0.36	0.13	0.11	0.10	0.03	0.36	3.13**
Equation (3)	CS–Use	Step 1	CS–Efficacy	0.62	0.39	0.38	0.41	0.07	0.62	6.28**
	CS–Use	Step 2	CS–Efficacy	0.62	0.39	0.38	0.37	0.07	0.56	5.60**
			Kinaesthetic	0.65	0.42	0.40	0.05	0.03	0.20	2.02*
CG and visual imagery ability										
Equation (1)	CG–Efficacy		Visual	0.45	0.20	0.19	1.17	0.04	0.45	4.17**
Equation (2)	CG–Use		Visual	0.33	0.11	0.09	0.08	0.03	0.33	2.87**
Equation (3)	CG–Use	Step 1	CG–Efficacy	0.62	0.38	0.37	0.42	0.07	0.62	6.45**
	–Use	Step 2	CG–Efficacy	0.62	0.38	0.37	0.40	0.07	0.60	5.51**
			Visual	0.62	0.38	0.36	0.01	0.03	0.05	0.44
CG and kinaesthetic imagery ability										
Equation (1)	CG–Efficacy		Kinaesthetic	0.36	0.13	0.11	0.12	0.04	0.36	3.15**
Equation (2)	CG–Use		Kinaesthetic	0.25	0.06	0.05	0.06	0.03	0.25	2.16*
Equation (3)	CG–Use	Step 1	CG–Efficacy	0.62	0.38	0.37	0.42	0.07	0.62	6.45**
	CG–Use	Step 2	CG–Efficacy	0.62	0.38	0.37	0.42	0.07	0.61	5.91**
			Kinaesthetic	0.62	0.38	0.36	0.003	0.02	0.01	0.13

Note: *B* = unstandardized beta (regression) coefficient, *B*_{SE} = standard error of *B*, β = standardized beta (regression) coefficient, *t* = *t*-statistic. CS = Cognitive Specific, CG = Cognitive General.

* *P* < 0.05, ** *P* < 0.01.

instructions will have little or no effect. High ability imagers, however, using the same instructions should be able to use imagery very effectively. The implications of this are clear: imagery is not considered to be a very effective performance-enhancing strategy for those people who have low imagery abilities. In fact, in many recent imagery intervention studies, participants have been screened according to imagery ability scores: participants with low imagery ability have been excluded from participation (e.g. Short *et al.*, 2004). This is a sad message for many athletes because the positive effect of imagery on performance is well documented (e.g. Driskell *et al.*, 1994; Feltz & Landers, 1983).

The results of this study supported our hypothesis that the more efficacious a person was in her ability to use imagery, the more she used imagery. This was a consistent finding across subscales of the SIQ. The results also showed that efficacy in using imagery was a mediator of the relationship between imagery ability and cognitive imagery use. This finding should be of interest to both athletes and sport

psychologists because it shows that a reason athletes may not use imagery is because they may differ in their efficacy in using it. This finding is encouraging because it suggests that having a sport psychologist build an athlete's efficacy in using imagery may facilitate the athlete's use of imagery. An efficacy-building strategy would be better than trying to increase or improve an athlete's imagery ability. Increasing imagery abilities is possible, although it appears to be a difficult and time-consuming task (see Cumming & Ste-Marie, 2001; Rodgers *et al.*, 1991). Furthermore, there are several proven techniques that can be used to develop efficacy beliefs as outlined by Bandura's (1986, 1997) theory. For example, starting with easy images (i.e. having a swimmer see the pool, or feel the cold water) and progressing to harder images (i.e. imaging races) may provide performance accomplishments similar to those seen with the learning and development of physical skills. Performance accomplishments are just one source of efficacy information. One could also rely on vicarious experiences (i.e. watching other

athletes use imagery may increase an athlete's efficacy in their own ability to use it) and/or verbal persuasion (i.e. hearing the coach or other athletes talk about how easy imagery is to use and the benefits of it). The bottom line is that developing, maintaining or regaining athletes' efficacy beliefs in their ability to use imagery may be an easier intervention technique than trying to increase imagery abilities or designing non-imagery interventions. Researchers could then investigate the effects of such interventions on efficacy, imagery abilities and characteristics of imagery use such as frequency and effectiveness.

Interestingly, efficacy in using imagery did not mediate the relationship between imagery ability and the motivational subscales of the SIQ (MS, MG-M, MG-A). One of the criteria for establishing mediation is showing that the initial variable (imagery ability) is correlated with the outcome (imagery use) (Kenny, 2003). The correlations for visual and kinaesthetic imagery ability were not significantly correlated with any of the motivational subscales of the SIQ. This result is somewhat surprising, since researchers have reported significant positive correlations between these variables in other studies (e.g. Abma et al., 2002). However, other researchers (Gregg, Nederhof, & Hall, 2005) also failed to find a relationship between imagery ability (also measured by the MIQ-R) and the motivational subscales of the SIQ. Gregg et al. speculated that the lack of the relationship is due to the nature of the items on the MIQ-R, in that the MIQ-R is really a measure of *movement* imagery and the items appear primarily to coincide with the CS and to some extent the CG imagery functions. It would thus appear that the MIQ-R does not really measure one's ability to use imagery for the motivational function. Developing an imagery ability measure to assess one's ability to use imagery for motivational purposes would be an excellent idea for future researchers. It seems reasonable to hypothesize that more variance would have been accounted for in imagery use if we had assessed the participants' ability to see and feel each item on the SIQ, like we did for efficacy in using imagery.

Even though the relationship between imagery ability and cognitive imagery use was mediated by efficacy in using imagery, it is possible that the relationship between these variables is not that simple. Bandura (1997) has proposed that efficacy beliefs can be part of temporally recursive chains. Using the variables in the present study, an example of a temporally recursive chain would be where over time efficacy in using imagery leads to more imagery use, which, as time passes, leads to greater improvements in efficacy in using imagery, and so on. Based on what we know about the effect of imagery training programmes on imagery ability (Cumming & Ste-

Marie, 2001; Rodgers et al., 1991), it is likely that using imagery will also increase imagery ability scores. This sets the stage for additional intervention studies designed to examine if building an athlete's efficacy in using imagery will facilitate the athlete's imagery use and enhance imagery ability. Future researchers are encouraged to explore the dynamic interaction between efficacy in using imagery, imagery ability and imagery use.

Although the results of this study represent a promising start to the study of the dynamic relationship between efficacy and imagery, there are a couple of limitations that should be noted. First, even though the measure used to assess efficacy in using imagery was developed in the same way that Weinberg and colleagues' (2003) imagery effectiveness scales was, it was not evaluated for its psychometric properties (beyond reporting the alpha coefficients). If researchers are interested in using this measure in the future, a more rigorous check of its validity and reliability is warranted. Second, the participants used in this study were relatively homogeneous, consisting of women from mostly team sports. According to Hall (2001), only minor differences in imagery use have been noted between men and women. However, recent research has shown that male athletes use imagery more frequently than female athletes (Weinberg et al., 2003), and that male and female athletes respond differently to imagery interventions (Short et al., 2002). In addition, there is evidence that males and females differ in efficacy beliefs (Lenney, 1977; Lirgg, 1991; Lirgg, George, Chase, & Ferguson, 1996). For these reasons, future research should use samples of both males and females.

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