THE EFFECTS OF A MOTIVATIONAL GENERAL-MASTERY IMAGERY INTERVENTION ON THE IMAGERY ABILITY AND SELF-EFFICACY OF INTER-COLLEGIATE GOLFERS

by

Thomas Gordon Hammond

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University of Manitoba

Winnipeg, Manitoba, Canada

ABSTRACT

Self-efficacy has consistently distinguished between highly successful and less successful athletes. Given this relationship there is demand in sport to have strategies to enhance self-efficacy. The use of motivational general-mastery (MG-M) imagery is an effective psychological technique to enhance self-efficacy. What moderates the effectiveness of this technique is the athlete's ability to use MG-M imagery. A single-subject multiple baseline design was employed where inter-collegiate golfers (n = 3; male) completed baseline and post-intervention measures: Motivational Imagery Ability Measure for Sport and the Golf Self-Efficacy Questionnaire. Participants completed the Competitive State Anxiety Inventory prior to each competition and the score recorded for each round of golf was used to evaluate performance. Participants engaged in six sessions of guided MG-M imagery training over a 3-week period. The results of the study demonstrated that the sport confidence and golf self-efficacy of Participants 2 and 3 improved, while Participant 1 remained at a relatively constant level. All participants showed improved imagery ability and Participants 1 and 3 demonstrated improved golf performance. Post-experimental interviews indicated all participants felt the imagery training program was effective and appropriate for their sport.

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The confidence of an athlete is essential to sport performance. Confidence has been consistently identified as a distinguishing factor between highly successful and less successful athletes (Gould, Weiss & Weinberg, 1981). In sport there are two main constructs of confidence: self-efficacy and self-confidence. Self-confidence is a general term referring to an athlete's certainty about their ability to be successful (Vealey, 1986). Bandura (1997) suggests self-efficacy refers to an individual's belief in their capacity to be successful in specific tasks or in specific conditions. A person's belief in their efficacy influences an individual's chosen pursuits, how much effort is devoted, perseverance, resilience to adversity, thought patterns and the level of accomplishment realized. The concept of self-efficacy differs from self-esteem where perceived self-efficacy is a judgement of personal capabilities and self-esteem is a judgement of self-worth. For example, individuals may perceive themselves to be inefficacious but not suffer any loss of self-worth or conversely, individuals may believe themselves to be highly efficacious but take no pride in that activity. To attain performance goals people need more than self-esteem, they need firm belief in their abilities to maintain the sustained effort required to succeed.

Self-Efficacy

Self-efficacy is constructed from four primary sources of information (Bandura, 1997): (a) enactive mastery experiences, the most influential source of efficacy where evidence is provided that a person has what it takes to successfully execute a specific behaviour; (b) vicarious experiences consisting of a person

watching or imaging an expert or themselves performing desired behaviours successfully, (c) verbal persuasion defined as strengthening a person's belief in their capabilities through verbal encouragement and reinforcement, and (d) physiological and affective states where information is gathered through somatic indicators such as level of arousal, stress reactions and mood states. This information becomes enlightening through cognitive processing of information and reflective thought (Bandura, 1997). Within the sport environment the use of vicarious experiences, specifically mental imagery, is one method to enhance self-efficacy (Munroe-Chandler, Hall & Fishburne, 2008). Using imagery to picture oneself confront and master increasingly more challenging and aversive situations enhances efficacy beliefs (Bandura, 1997).

Mental Imagery Use

Mental imagery is an internal psychological activity that elicits the physical characteristics of an absent object perceived in the past or that may occur in the future (Hall, 2001). Imagery can be defined as an experience that mimics a real experience, where we are consciously aware of forming and seeing an image and can involve the use of our senses (White & Hardy, 1998). Imagery activities evoke conscious peripheral and sensory experiences (Hall, 1998), that can be polysensory utilizing visual, auditory, olfactory, gustatory, tactile and kinesthetic stimuli (Vealey & Greenleaf, 2001). Over the years, a substantial body of literature has examined the relationship between mental imagery and sport performance; the results indicating that imagery can improve sport performance (Driskell, Copper & Moran, 1994; Rushall, 1988; Ryan & Simons, 1982). Hence, mental imagery is frequently included

in mental training packages for athletes. Sport psychologists encourage athletes to use imagery to influence their performance in many ways, such as enhancing motivation, self-confidence, coping with injury, regulating arousal, managing stress and anxiety (Martin, Moritz & Hall, 1999).

Imagery is employed by athletes of various ages and competitive levels, and is used in training, competition and away from the sport environment (Hall, 1998). Imagery is a mental skill that is frequently used by athletes to aid skill acquisition, manage emotional reactions and facilitate the attainment of goals (Gregg & Hall, 2006a). Ultimately the two primary purposes of imagery use in sport are: to prime athletes for peak performance and to enhance skill development (Salmon, Hall & Haslam, 1994).

The imagery used by athletes can serve various functions. Paivio (1985) developed a 2x2 classification framework for the functional analysis of imagery (see Figure 1). This framework described how imagery operates and what might be achieved through imagery rehearsal. Paivio's framework indicated that imagery serves two functions in mediating behaviour: cognitive and motivational, and these functions operate at both general and specific levels. The cognitive function entailed the rehearsal of motor skills (cognitive specific [CS]) and the rehearsal of strategies of play (cognitive general [CG]). The motivational specific (MS) function consisted of athletes imaging their goals and the activities required to achieve them. The motivational general function consisted of images related to physiological arousal and the emotions experienced during sport performance (Paivio, 1985). Hall, Mack, Paivio and Hausenblas (1998) further divided the motivational general function into

motivational general-mastery (MG-M) and motivational general-arousal (MG-A). Motivational general-mastery imagery is used to imagine oneself in difficult situations and seeing oneself overcoming the difficulty, remaining in control and being mentally tough. Motivational general-arousal imagery is used to manage arousal, emotions and stress. The distinction between motivational general uses of imagery led to the extension of Paivio's (1985) framework (Hall et al., 1998).

	Imagery Function	
	Motivation	Cognition
General	Arousal & Mastery	Strategies
Specific	Goal- Orientated Responses	Skills

Figure 1. Imagery Functions. Adapted from Hall et al., 1998. Used with permission, 3/5/2010.

For imagery to be most effective, the function of imagery used should match the desired outcome (Martin et al., 1999). For example, if the goal is to improve an athlete's self-efficacy, then the athlete should use MG-M imagery consisting of images associated with confidence and mental toughness in difficult situations. To effectively describe the appropriate application of imagery, Martin and colleagues

developed an applied model of mental imagery use in sport (Figure 2). This model indicates that in diverse sport situations the function of imagery should match the desired outcome. Individual differences, specifically imagery ability, moderate the link between imagery use and outcome (Martin et al., 1999).

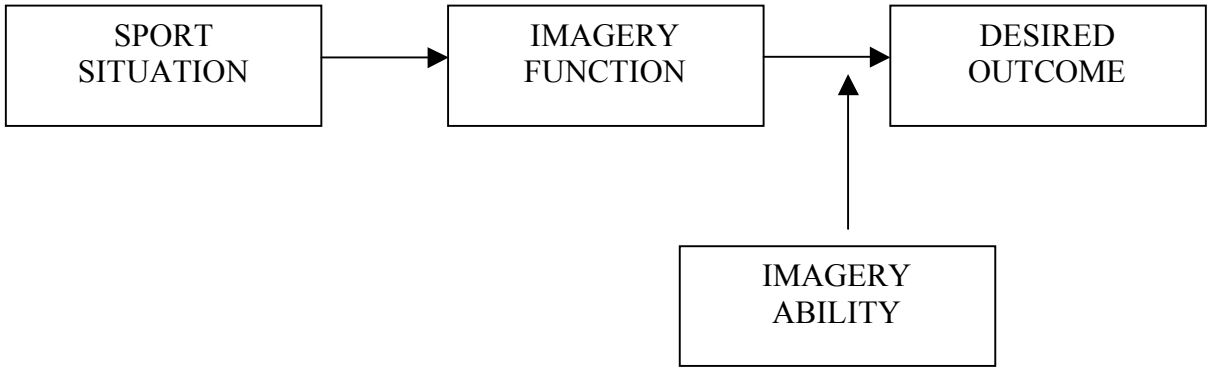

Figure 2. An applied model of mental imagery use in sport. Adapted from Martin et al.,1999. Used with permission, 3/5/2010.

Mental Imagery Ability

All athletes have the ability to generate and use imagery but not to the same extent (Paivio, 1986). Like many other facets of life, individuals differ in their ability to use imagery and these differences are a product of experience interacting with genetic variability (Rodgers, Hall & Buckolz, 1991). Imagery ability refers to the quality of visual and kinesthetic images an individual mentally pictures (Gregg, Hall & Nederhof, 2005). These individual differences in imagery ability moderate the relationship between imagery use and intended outcomes (Gregg & Hall, 2006b). It is reasonable to suggest that an athlete who is a better imager will be more effective at using imagery to aid their performance (Hall, 1998). A study by Goss, Hall, Buckolz, and Fishburne (1986) demonstrated that individuals with high visual and kinesthetic imagery ability learnt and recalled movement patterns with the least number of trials

when compared to individuals with lower imagery ability. Similar findings reported by Hall, Buckolz and Fishburne (1986) indicated that individuals with high imagery ability were able to recall movements with more accuracy than those with low ability. Further research suggests that imagery ability plays a key role in aiding an athlete's performance or attaining their desired outcome. It has been documented that athletes with higher imagery ability have higher levels of sport confidence (Mortiz, Hall, Martin & Vadocz, 1996) and imagery ability predicts cognitive and somatic anxiety. These results suggest that better imagers are able to control their images to reduce anxiety (Vadocz, Hall, & Moritz, 1997).

Not only do individuals with high imagery ability use imagery more effectively but they also use it more frequently and by using it more frequently they improve their ability (Vadocz et al., 1997). With practice, athletes can improve their imagery ability and these improvements may have to occur initially, to significantly affect performance (Rodgers et al., 1991). Rodgers and associates (1991) investigated the effects of an imagery training program on imagery ability, imagery use and figure skating performance. The variables were measured before and after 16-weeks of imagery training. The skaters receiving the training showed improvements in skating performance and their visual movement imagery ability. Additionally it was observed that compared to skaters with lower imagery ability, the skaters with higher imagery ability used it more often and in a structured manner. Similarly, Vadocz and collaborators (1997) analyzed the relationship between imagery use and imagery ability. Athletes with higher kinesthetic and visual imagery ability used more imagery than those athletes with lower ability. These results suggest a circular relationship

where higher ability leads to increased use and increased use leads to higher ability (Gregg et al., 2005). It is through this deliberate practice and training that athletes can improve their imagery ability suggesting that imagery is both ability and skill (Gregg & Hall, 2006b).

Within the literature there has been substantial interest in measuring imagery ability (Hall, 1998). In today's highly competitive world of athletics, athletes need to utilize every opportunity and skill to enhance performance (Mills, Munroe & Hall, 2001). Therefore the primary reason to assess imagery ability is to determine if individuals with higher ability have an advantage over other athletes (Hall, 1998). A variety of tools have been developed to measure individual differences in imagery ability associated with the five functions of imagery use in sport (Gregg & Hall, 2006b). The Vividness of Movement Imagery Questionnaire assesses visual imagery ability for movements and actions from an internal (doing it yourself) perspective and an external (seeing someone else do it) perspective (Hall, 1998). The Movement Imagery Questionnaire (MIQ) was developed to assess visual and kinesthetic movement imagery and was revised into a shortened version, the MIQ-R (Hall, 1998). To assess motivational imagery ability Gregg and Hall (2006b) developed the Motivational Imagery Ability Measure for Sport (MIAMS) that assesses the ease and emotions experienced with MG-M and MG-A imagery. To evaluate these individual differences in imagery ability validly the measurement instrument needs to match the function of imagery being utilized (Hall, 1998). Prior to the development of the MIAMS (Gregg & Hall, 2006b), research assessed MG-M imagery ability using tools designed for cognitive functions of imagery (Abma, Fry, Li, & Relyea, 2002; Gregg

et al., 2005; Rodgers et al., 1991). To appropriately assess athletes' ability to use the motivational functions of imagery, future studies should employ the MIAMS, or a similar tool, as the method of assessment to identify individual differences in imagery ability (Gregg & Hall, 2006b).

Mental Imagery, Self-Efficacy, Confidence and Performance

Given the relationship between confidence and sport performance, there is demand in sport to have strategies to enhance confidence. The use of mental imagery is one type of confidence enhancing strategy (Moritz, et al., 1996). To effectively use imagery as a confidence enhancing strategy, the function of imagery used must match the desired outcome (Martin et al., 1999). Therefore, if the athlete wishes to improve their self-efficacy, then the motivational general-mastery function of imagery should be employed (Beauchamp, Bray & Albinson, 2002; Mills, et al., 2001; Munroe-Chandler et al., 2008). The effectiveness of this intervention will be moderated by the athlete's imagery ability (Martin et al., 1999).

Previous research has examined the interaction between MG-M imagery use, self-efficacy and performance (Beauchamp et al., 2002, Mills et al., 2001; Munroe-Chandler et al., 2008; Rodgers et al., 1991; Vadocz et al., 1997). Beauchamp and co-investigators (2002) examined the relationship between self-efficacy, pre-competition imagery use and performance of inter-collegiate golf athletes. They determined that pre-competition MG-M imagery use accounted for significant variance in self-efficacy and performance, meaning that MG-M imagery was a significant predictor of self-efficacy and golf performance. The results also indicated that motivational general-mastery imagery use mediated the relationship between self-efficacy and

performance. Recently Munroe-Chandler and colleagues (2008) assessed the interaction between imagery use, self-confidence and self-efficacy of 122 youth soccer athletes. Their results indicated that athletes who frequently used MG-M imagery possessed a higher sense of self-efficacy and self-confidence.

To enhance the self-confidence and self-efficacy of athletes, the implementation of MG-M imagery interventions have demonstrated to be an effective psychological technique. Callow, Hardy and Hall (2001) investigated the effects of a MG-M intervention on sport confidence levels. Athletes engaged in imagery training for two weeks and sport confidence was measured using the State Sport Confidence Inventory (SSCI). A significant increase in confidence was demonstrated in two of three players, indicating MG-M imagery could improve confidence (Callow et al., 2001). Munroe-Chandler and Hall (2005) implemented a MG-M imagery intervention to increase the self-efficacy of 15 female soccer players 10-12 years in age. The results indicated that the forwards and midfielders increased their self-efficacy for training and competition and the defense/goal keeper showed no change, possibly due to the already high levels of self-efficacy and/or the implementation of the intervention late in the season.

There has been some investigation into the link between imagery ability and outcome or performance. Research by Rodgers and associates (1991) examined whether imagery ability of roller skaters could be improved through training and if it affected performance. They determined that the skaters improved their cognitive imagery ability through training and those skaters with the higher imagery ability became more consistent with their performance (Rodgers et al., 1991). Abma et al.

(2002) assessed trait sport confidence, imagery content and imagery ability of track and field athletes. Imagery ability was assessed by the MIQ and confidence was assessed by the Trait Sport Confidence Inventory. Their results showed no significant differences in imagery ability but highly confident athletes used more imagery (Abma et al., 2002). More recently, Gregg et al. (2005) examined the moderating effect of imagery ability on track and field performance. Cognitive specific imagery ability and sport performance were assessed but CS imagery failed to predict performance and imagery ability did not interact to moderate the CS imagery and outcome relationship.

Past research has investigated MG-M use and MG-M interventions concluding that MG-M imagery is an effective technique to improve self-efficacy (Abma et al., 2002; Beauchamp et al., 2002; Callow et al., 2002; Mills et al., 2001; Munroe-Chandler et al., 2008; Rodgers et al., 1991). To date, no known published studies have investigated the effect of MG-M imagery ability on self-efficacy and subsequently performance. Callow and investigators (2001) demonstrated that engaging in a MG-M imagery training program enhanced the sport confidence of badminton athletes. Although imagery ability was assessed, the study did not measure the motivation function of imagery, which was employed by the athletes. To evaluate individual differences in imagery ability validly the instrument employed needs to match the function of imagery being utilized (Hall, 1998). Furthermore, the study did not examine the effects of the intervention on imagery ability. Research conducted by Beauchamp and colleagues (2002) specifically examined the interaction between MG-M imagery use, golf self-efficacy and performance. The results indicated that athletes who use MG-M imagery display higher levels of self-efficacy and

performance. What this study did not account for was the individual differences in the athlete's ability to use MG-M imagery. Within Martin and associates' (1999) applied model of mental imagery, the athlete's ability to utilize imagery moderates the link between use and intended outcome.

Statement of Purpose

Therefore, the purpose of the present study was to explore the effects of a MG-M intervention on imagery ability within Martin et al.'s (1999) applied model of mental imagery. Individual differences in MG-M imagery ability were specifically assessed in concert with the desired outcome. This study implemented a MG-M imagery intervention designed to improve MG-M imagery ability, leading to an increase in self-efficacy, self-confidence and subsequently improved performance of inter-collegiate golf athletes. Thus, it was hypothesized that through a systematic MG-M training program, the imagery ability of inter-collegiate golf athletes would improve. This increased ability to utilize MG-M imagery would result in improved self-efficacy, self-confidence and ultimately improved golf performance.

METHOD

Participants

The participants consisted of three male inter-collegiate golfers between the ages of 18 and 20 years old, who indicated that they had never before engaged in a systematic imagery training program. Initially eight members of the University of Manitoba's Golf Team expressed an interest to participate in the study and were then asked to complete the Motivational Imagery Ability Measure for Sport (Gregg & Hall, 2006b) and the Golf Self-Efficacy Questionnaire (Beauchamp et al., 2002).

These assessments were completed to determine which athletes would benefit the most from the study as someone who already possessed high imagery ability or golf self-efficacy would receive little benefit from the intervention. Following the initial assessments five athletes were identified as suitable candidates, only two were able to commit for the duration of the study and a third was selected as the next best candidate. The sport of golf was selected for two reasons; one being that performance improvements can be objectively measured (i.e., stroke average). The second reason was that previous research has demonstrated that self-efficacy is predictive of golf performance (higher self-efficacy was related to better performance) and motivational general-mastery imagery use mediated the relationship between self-efficacy and performance (Beauchamp et al., 2002).

Measures

Motivational Imagery Ability Measure for Sport (MIAMS; Gregg & Hall, 2006b; see Appendix A). The MIAMS was designed to assess athletes' ability to use the MG-M and MG-A functions of imagery. There are four scenarios for each of the functions; athletes read the scenario, image the scenario and then rate their image on an ease subscale (1 = *not at all easy to form* to 7 = *very easy to form*) and an emotion subscale (1 = *no emotion* to 7 = *very strong emotion*). Therefore, the maximum possible score of 7 for each subscale can be obtained when utilizing this instrument. Analyses of the psychometric properties of the questionnaire have proved favourable, with an acceptable model fit for the confirmatory factor analysis and sufficient internal consistencies for the subscales (Gregg & Hall, 2006b). The two factors (i.e., emotion and ease) have been supported by confirmatory factor analysis. The fit

indices suggested a good model fit (root mean square error of approximation = .07; comparative fit index = 1.0; relative fit index = .99) and Cronbach's alphas for the subscales were acceptable (>.70).

Golf Self-Efficacy Questionnaire (GSEQ; see Appendix B)**.** The golf self-efficacy measure developed and employed by Beauchamp et al. (2002) was used to assess the strength of the self-efficacy for behaviours related to performance in golf. The measure was developed in accordance with Bandura's (1997) recommendations and is comprised of eight golf specific items that are rated on an 11-point scale (0 = *I am certain I cannot*, 5 = *I am moderately certain I can*, and 10 = *I am certain I can*). The golf self-efficacy scale was found to have an acceptable internal consistency (>.70).

The Revised Competitive State Anxiety Inventory-2 (CSAI-2R; Cox, Martens & Russell, 2003; see Appendix C). Athletes' pre-performance cognitive anxiety, somatic anxiety, and self-confidence were assessed using the CSAI-2R. The CSAI-2R is a 17-item inventory, with five items in each of the self-confidence and cognitive anxiety subscales and seven items in the somatic anxiety subscale. Participants rated each statement on a scale of 1 (*not at all*) to 4 (*very much so*), scores range from 10 to 40 for each subscale. The subscale scores were calculated by summing the responses to each question, dividing by the number of items and multiplying by ten. Only responses from the state self-confidence subscale were included in the present study to evaluate the effects of the intervention on self-confidence, however, all subscales were assessed to maintain the integrity of the inventory. Confirmatory factor analysis of the CSAI-2 showed support for the three-factor model (CFI = .97, RMSEA = .042;

Raudsepp & Kais, 2008; Cox et al., 2003; Lundqvist & Hassmen, 2005) and internal reliability coefficients were acceptable (>.70; Raudsepp & Kais, 2008). Two questions were added to the inventory to determine: (a) the perceived importance of the competition and, (b) level of performance by indicating the final score of the competition.

Golf Performance. Performance was measured by stroke average where stroke average represented the average number of strokes or shots taken during a round of golf. Stroke average was calculated by adding together the athlete's gross score for each round and then dividing by the total number of rounds. An athlete's stroke average provides a good indicator of an average performance on a given day. Baseline and intervention performance levels were calculated and assessed using this method.

Procedures

Participants were recruited from the University of Manitoba Bison's Golf Team. University ethics approval and athlete's informed consent were obtained prior to any data collection (see Appendices D and E). Once the athletes agreed to participate, they were asked to complete the MIAMS and the golf self-efficacy questionnaire. Participants who would benefit the most from the intervention were selected to engage in the study. The athletes were instructed to complete the CSAI-2R within an hour prior to their next round of golf to assess pre-competition self-confidence. The study included three phases: baseline, intervention and post intervention spanning 14 weeks (see Appendix F for overview of procedures).

A single-subject multiple-baseline design across individuals was used to examine the effects of the MG-M intervention on imagery ability, self-efficacy, state confidence and athletic performance. State confidence data (CSAI-2R) were collected during the baseline and post intervention phases. Barlow, Nock and Hersen (2009) have recommended a minimum of three data points in a baseline, and these baseline measures were taken at the beginning of the inter-collegiate competitive season. The criteria to select the order of athletes to receive the intervention was determined by when the independent variable (state confidence scores of the CSAI-2R) was relatively stable (consistent over time) or demonstrated a trend in the opposite direction from the change expected following the introduction of the intervention (Martin & Pear, 2007).

Participants 1, 2 and 3 received the treatment program at approximately weeks 2, 4 and 6, respectively. Callow et al. (2001) have proposed that the number of data points should be kept constant within the post intervention phase. Thus data were collected on each participant a minimum of thirteen times in the post intervention phase. Combined with the baseline phase a total of 20-23 data points were collected per participant, depending on the point of intervention. One week following the last state confidence data collection point, participants completed a post-experimental interview designed to assess the social validity of the intervention. At this time the participants again completed the MIAMS to assess changes in their motivational general imagery ability and the golf self-efficacy questionnaire to assess changes in their golf specific self-efficacy.

Intervention and Imagery Scripts

The imagery training program consisted of six different sessions implemented every third day over the course of an 18-day period. Each guided imagery session lasted approximately 10-15 minutes. As Weiss (1991) suggested, it is important to keep the sessions short and interesting. The imagery sessions took place at the golf course or at the Health, Leisure, Human Performance Research Institute. To ensure procedural reliability across participants a procedural checklist was followed for each imagery session. When it was not possible to meet in person the imagery scripts and instructions were administered via email (see Appendix G for procedural checklists). The imagery scripts were uniquely constructed for the present study and were based on Lang's (1979) Bio-informational Theory of emotional imagery, that includes stimulus (scene content), response (how and what the person feels responding to the scene), and meaning (perceived importance of the imagined scene) propositions. These three components are essential for evoking emotion within the scripts (Moran, 2004). The imagery scripts were also constructed in conjunction with the athletes to ensure they were individualized and meaningful to each athlete. The scripts focused on motivational general-mastery imagery, with an emphasis on including emotion, as it is an important dimension of motivational imagery ability (see Appendix H for a sample imagery script).

In addition to reading the script, each athlete was given a paper copy of the script as well as a digital recording of the script to listen to on their i-Pod or MP3 player, and asked to practice imagery on their own. Using the written script and the recorded script the athletes were instructed to image a minimum of three times daily.

A logbook was provided to each participant at the beginning of their intervention phase to monitor imagery practice and identify when and where the athlete engaged in their imagery training. The athletes were then requested to complete a form in their logbook at the end of each training day during the course of the intervention (see Appendix I; Vealey & Greenleaf, 2001) and the logbooks were monitored periodically to check for adherence and understanding. Self-monitoring, through the use of a diary, encourages and promotes adherence to imagery practice (Shambrook & Bull, 1996).

Social Validity

The clinical assessment of the treatment effects based on social validation was conducted through a post-experimental face to face interview (see Appendix J) following the completion of the study. This interview was designed to describe the practical significance of the intervention and the importance of behaviour change to the participant. The post-experimental interview was constructed based on three questions: (a) to what extent are the target behaviours identified for treatment important to the participants, (b) are the particular procedures used acceptable to the participants, and (c) are the participants satisfied with the results of the intervention (Hrycaiko & Martin, 1996). Additionally the participants were asked to comment on anything they found to be interesting or felt needed further explanation. Hrycaiko and Martin (1996) have argued that these judgements should be made when assessing interventions in sport psychology because social validation helps ensure practitioners provide the best service possible to their clients.

Data analysis

To assess the effects of the applied intervention on imagery ability, self-efficacy and golf performance, baseline levels were calculated and then compared to levels observed during the intervention phase of the study. Differences were determined by the percent change from baseline to intervention phases. In addition to quantitative analysis, participants' verbal responses obtained from the post-experimental interview were utilized to describe the effectiveness and the social validity of the imagery intervention.

The traditional method of analyzing single subject data, visual inspection, as well as the split-middle technique (Shambrook & Bull, 1996) were used to assess changes in state self-confidence. Hrycaiko and Martin's (1996) guidelines for visual inspection of graphed data were employed: comparing the baseline and treatment phases for immediacy of effect, size of the effect, and the number of overlapping data points between adjacent phases. Kazdin (1982) argued visual inspection can be subjective and insensitive to behavioural change and suggested the split middle technique is a more rigorous method for single-subject design. In addition to visual inspection, the split middle technique was used in the present study to determine trend lines and describe the rate of behaviour change over time. Furthermore, this technique allows for the examination of level and slope within a phase (i.e., baseline) and comparisons across phases (Kazdin, 1982). Level refers to the value of the dependant variable when the trend line passes the last data point of the baseline phase and the first data point of the intervention phase (Callow et al., 2001). The slope represents the rate of change within each phase and the change in slope represents the rate of

change across phases. A multiplication sign is allocated to the value if it is increasing and a division sign if it is decreasing. Additionally Kazdin (1982) has recommended using a Binomial test to evaluate the significance of changes between phases. This method involved extending the baseline trend through the intervention phase to determine whether significantly more data points were above (confidence levels increased) or below (confidence levels decreased) the projected trend line.

RESULTS

To effectively evaluate the efficacy of the intervention, both quantitative data and interview responses were collected. The information obtained from the participants' logbooks indicated that the athletes actively engaged in the imagery training program and completed all training sessions as prescribed. Quantitative criteria were used to ascertain if the intervention was responsible for producing a change in the dependant variables; state self-confidence, imagery ability, golf self-efficacy and performance. Figure 3 illustrates the structure of the multiple baseline design, illustrating the point where the imagery intervention for each participant began. Data measuring imagery ability, golf self-efficacy and performance were compared by percent change from baseline to post-intervention phases. Following this evaluation, each participant's state self-confidence data were analyzed using visual inspection and the split middle technique. Additionally, the Binomial test was employed to assess if significant changes occurred between baseline and intervention phases. Finally, responses to interview questions were assessed to describe the effectiveness and social validity of the imagery intervention.

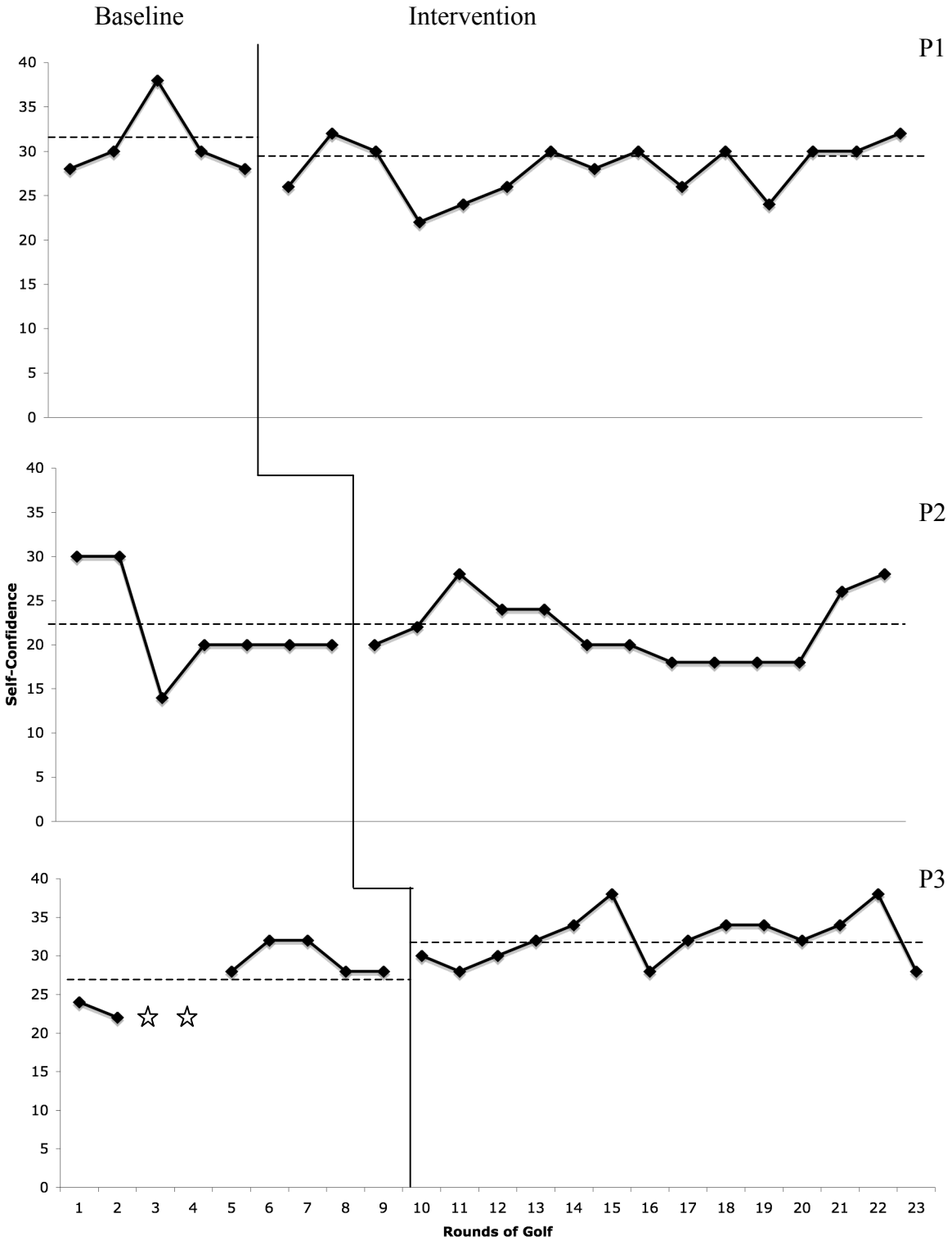

Figure 3. Graph illustrates the multiple baseline design across individuals. Solid lines indicated staggered implementation of imagery intervention. Dashed lines represent the mean scores for performance pre and post intervention.

Imagery Ability

The imagery training journals for each participant indicated that the imagery training program had been adhered to for the prescribed number of sessions after implementation of the intervention. Motivational general-mastery imagery ability was assessed using the MIAMS. The questions specifically assessing motivational general-mastery were used to calculate imagery ability (i.e., questions 1, 3, 4, 8). Imagery ability data are presented in Table 1 where it was observed that all participants demonstrated an increase in imagery ability as a result of the intervention.

Table 1

Imagery Ability Scores

	Baseline		Post-Intervention		
Participant	Ease	Emotion	Ease	Emotion	% Change
P1	4.75	4.75	5.75	4.25	+5.26 %
P2	6.00	5.50	6.50	6.25	+10.87 %
P3	4.25	4.75	6.50	6.25	+41.67 %

Golf Self-Efficacy

Golf self-efficacy was assessed by the GSEQ, which assessed specific behaviours executed while playing golf at an inter-collegiate level. Self-efficacy scores were then determined, where a score of 10 is the maximum a participant can receive. Participants 2 and 3 experienced an increase in golf self-efficacy by 17.55 %

and 14.53 % respectively. Participant 1 demonstrated a decrease of 1.86 % in golf self-efficacy. These results indicate that the imagery intervention was successful in improving the golf self-efficacy of Participants 2 and 3, while Participant 1 remained relatively unchanged. Table 2 displays the self-efficacy data collected during the baseline and intervention phases.

Table 2

Golf Self-Efficacy Scores

Participant	Baseline	Post-Intervention	Percent Change
P1	7.12	7.00	-1.75 %
P2	6.38	7.50	+17.55 %
P3	6.88	7.88	+14.53 %

Golf Performance

Performance was measured by stroke average where stroke average represents the average number of strokes or shots taken during a round of golf. Baseline performance was determined by summing the gross scores collected for each round of golf and then dividing by the total number of rounds played during this phase. Due to the fewer rounds of golf played during the baseline phase, each participant was instructed to provide the scores from their most recent rounds of golf just prior to data collection. Enough rounds were collected to establish the same number of scores in the baseline and intervention phases. For example, Participant 1 played five rounds of golf during the baseline phase and fifteen rounds of golf during the intervention phase. The ten most recent scores just prior to the commencement of data collection

were gathered and added to the five rounds of golf in the baseline phase for a total of fifteen rounds. This was done to ensure there were an equal number of scores collected in the baseline and intervention to make an acceptable performance comparison. Intervention performance was calculated by summing the gross scores collected for each round of golf and then dividing by the total number of rounds played during this phase. The results illustrate that Participants 1 and 3 experienced an increase in performance of 1.33 and 2.46 strokes per round respectively. Participant 2 experienced a decrease in performance by 0.62 strokes per round. These results indicate that the imagery intervention was effective in aiding the performance of Participants 1 and 3, while Participant 2 experienced a slight decrease in performance. Golf performance data is displayed in Table 3.

Table 3

Golf Performance Scores

	Baseline		Intervention		
Participant	M	SD	M	SD	Stroke Difference
P1	75.87	± 3.36	74.53	± 4.72	-1.33
P2	72.39	± 2.18	73.00	± 2.68	+0.62
P3	77.43	± 3.59	74.79	± 4.00	-2.46

Note. A decrease in stroke average indicates an improvement in golf performance.

Participant 1

Mean self-confidence for participant 1 decreased from 30.80 ± 4.15 in the baseline phase to 28.00 ± 3.12 in the intervention phase (Figure 4). This represents a relative decrease of 9.09% in self-confidence. The baseline level of 29.00 decreased

to 26.60 at the start of the intervention phase; thus there was an 8.27% decrease in level. The stable baseline slope of 1.00 increased to 1.06 during the intervention, indicating an increase in slope by a factor of x1.06. These data demonstrate an

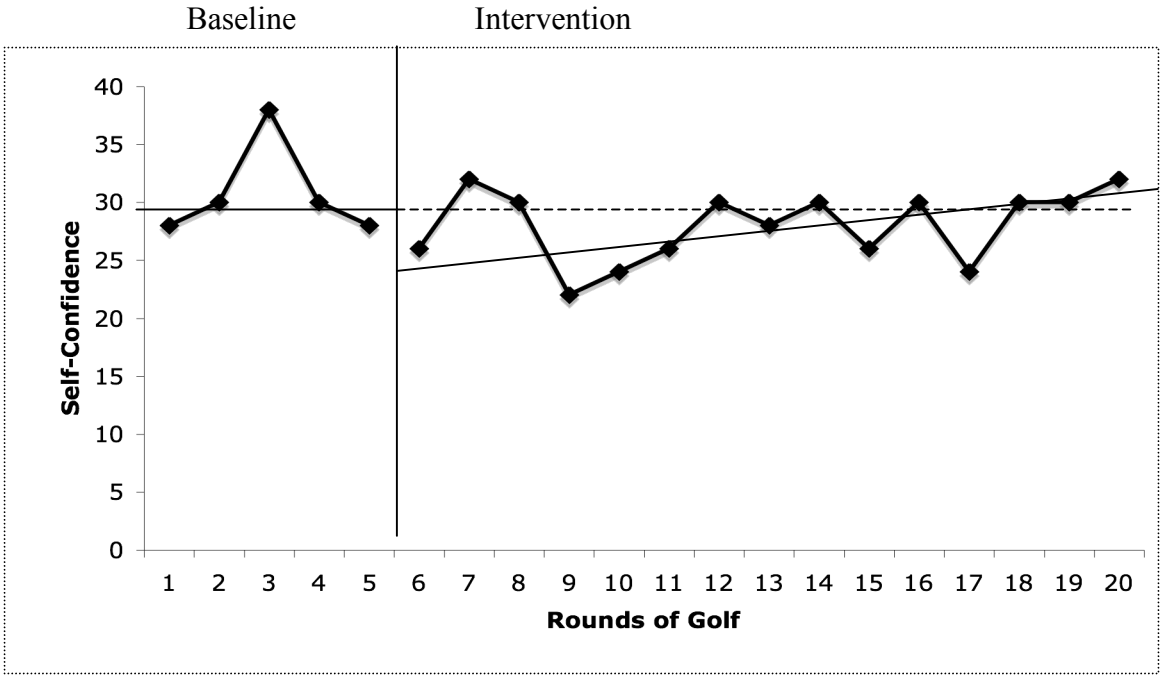

Figure 4. Results for Participant 1 using the Split Middle Technique. Solid vertical line represents the point of intervention. Trend lines are also shown for each phase of the data. Dotted trend lines represent projected levels of performance.

improvement in self-confidence as a result of the imagery-training program. The Binomial test did not reach significance when comparing the baseline data to the intervention data with projected self-confidence, $p > 0.196$. Visual inspection of the graphed data in the intervention phase indicated there was a delay in the improvement of self-confidence. It was also observed that there was less variability in data during the intervention phase, indicating a more stable level of self-confidence. Although the binomial test did not indicate a significant increase in self-confidence and there was a

slight decrease in mean, the positive change in slope represents an improvement in self-confidence for this participant.

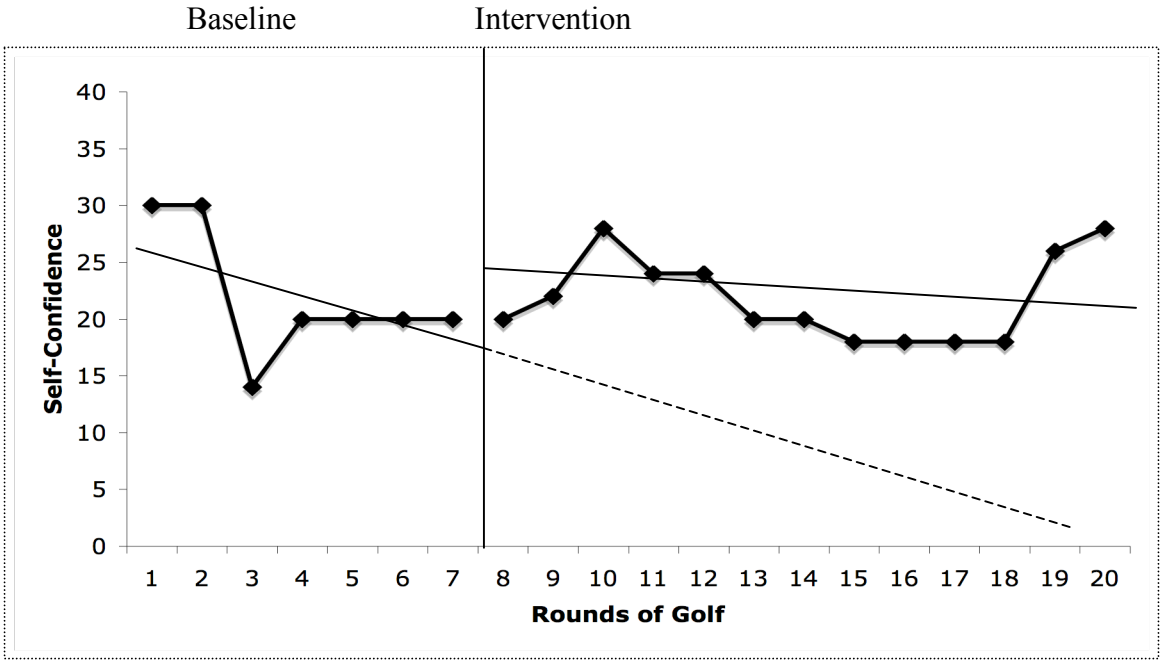

Figure 5. Results for Participant 2 using the Split Middle Technique. Solid vertical line represents the point of intervention. Trend lines are also shown for each phase of the data. Dotted trend lines represent projected levels of performance.

Participant 2

The participant's mean self-confidence decreased from 22 ± 5.89 in the baseline phase to 21.85 ± 3.78 (Figure 5) after the implementation of the imagery training program. This represented a 0.68% decrease in self-confidence across phases. The participant demonstrated a baseline level of 19.00, which increased by 25.79% to 23.90 at the beginning of the intervention phase. Upon visual inspection of the graphed data in the intervention phase, it is observed that there is a delay in the positive effect of the imagery-training program on self-confidence. Following the first data point in the intervention phase, self-confidence began to increase. Furthermore, less than 24% (3 of 13) of the data points in the baseline phase overlapped with the

data points in the intervention phase. Beginning at a baseline slope of ÷1.22, there was a change in level of the slope by a factor of x1.12 to ÷1.09. The slope values reported represent the rate of change between phases and this change represents an improvement in self-confidence. The Binomial test indicated a significant improvement in self-confidence in the intervention phase ($p < 0.001$). In summary, the statistically significant Binomial test, the rate of change in self-confidence and increased intervention level indicated an improvement in self-confidence following the imagery-training program for this participant.

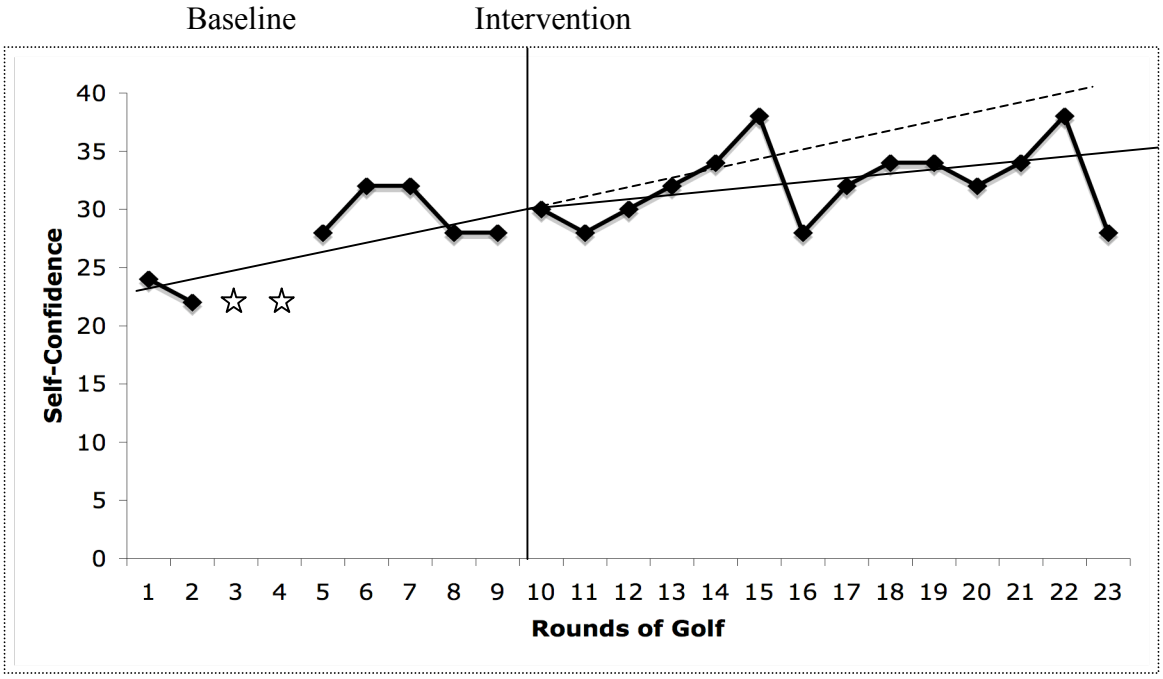

Figure 6. Results for Participant 3 using the Split Middle Technique. Solid vertical line represents the point of intervention. Trend lines are also shown for each phase of the data. Dotted trend lines represent projected levels of performance. The star symbol indicates rounds not played due to injury.

Participant 3

For this participant there was an increase in self-confidence of 16.53% across the experimental phases. Self-confidence increased from 27.71 ± 3.73 in the baseline

phase, to 32.29 ± 3.31 in the intervention phase (Figure 6). The baseline level of 29.80 increased to 30.70 at the start of the intervention phase; thus, there was a 3.02% increase in level. Across the two baseline and intervention phases, the slope of the trend changed from x1.19 to x1.05 respectively, where the slope decreased by a factor of ÷1.13. The Binomial test revealed that the participant's self-confidence during the intervention phase was significantly less than the level of self-confidence predicted by the baseline for the intervention phase ($p < 0.0056$). Although the Binomial test does not support the efficacy of the imagery training to improve self-confidence, the graphed data denotes an increase in level and mean self-confidence upon implementation of the intervention. Furthermore, visual inspection of the graphed data revealed an immediate improvement in self-confidence at the onset of the intervention. Additionally, less than 43% (6 of 14) of the data points in the baseline phase overlapped with the data points in the intervention phase. Despite the results of the Binomial test it appears the imagery intervention improved the participant's self-confidence.

Post-Experimental Interview

The following data reflects the clinical assessment of the intervention effects based on social validity evaluation. Table 4 provides a summary of the participants' responses to the post-experimental interview.

Table 4

Social Validation Summary

	Social Validation Questions			
Participant	Importance of Imagery	Importance of Self-Efficacy	Appropriateness of Intervention	Satisfied with Results
P1	"Important"	"A lot"	"Really neat"	"Definitely"
P2	"Very"	"Very"	"Loved it"	"Very"
P3	"Always"	"Huge"	"Purely applies to golf"	"Yeah"

Note. Table 4 provides a summary of responses from the participants.

Responses to questions assessing perceptions of mental imagery indicated that both Participants 1 and 3 believed that mental imagery was an important skill in the sport of golf. When Participant 2 was asked to assess the importance of mental imagery he commented:

> Prior to this [imagery program], I didn't think [imagery] was as important as I do now. I guess it put a new value on it, as far as trying to put it into place and seeing it work really, so yeah, I think [imagery is] very important.

All participants stated that self-efficacy and self-confidence were essential to successful performance in the sport of golf.

Participants were also asked to comment on whether the imagery training program and the procedures used were acceptable to each individual and the sport of

golf. Each of the participants agreed that the imagery program easily applied to golf and engaging in the training was a valuable experience. As Participant 2 indicated:

> I loved [the imagery training program], to be honest. I'm not saying that for your benefit…I just loved how much I learned from it and how it was very personalized to me, as far as you made the imagery scripts based on me and things we had discussed.

Furthermore, Participant 3 commented on the use of technology to practice the imagery scripts, "I liked the idea of having the scripts available to me on my iPod, it made it a lot easier to do it".

All of the participants indicated perceiving an increase in their self-confidence as a result of the motivational general-mastery imagery intervention. Moreover, the participants suggested that the imagery intervention also improved their golf performance. Upon reflection Participant 3 offered: "Yeah, it shows in my scores how much more consistent I've gotten…This imagery gives you the ability to take your game to the next level…in my golf game and how I handle myself, it was just night and day".

Additionally Participants 1 and 2 believed that if they were to continue with the training program further improvements in self-confidence and performance would occur. For example, Participant 1 stated: "I think if I were to do this more and more, I think I would see confidence levels going up". Participant 2 also indicated:

> I've only been doing this for two and a half months and I've already seen very good results…I can only imagine that if I stick to the imagery scripts and just keep working at it, it can only get better, right?

In summary, the results of the post-experimental interview provide evidence to support the social validity and the effectiveness of the imagery intervention employed.

DISCUSSION

Given the relationship between confidence and sport performance, there is demand in sport to have strategies to enhance confidence (Moritz, et al., 1996). To effectively improve confidence and self-efficacy an athlete should employ the motivational general-mastery function of imagery (Beauchamp et al., 2002; Mills et al., 2001; Munroe-Chandler et al., 2008). Previous research investigating the MG-M function of imagery has predominantly focused on the interaction of MG-M imagery use, self-efficacy and performance (Abma et al., 2002; Beauchamp et al., 2002; Mills et al., 2001; Munroe-Chandler et al., 2008; Rodgers et al., 1991; Vadocz et al., 1997) and a limited number of studies have examined the effects of a MG-M imagery intervention on athlete self-efficacy (Callow et al., 2001; Munroe-Chandler & Hall, 2005). The results of these analyses conclude that MG-M imagery is an effective technique to improve self-efficacy. There has been some research conducted examining the relationship between imagery ability and performance. Rodgers and colleagues (1991) determined that with higher imagery ability figure skaters became more consistent during training and performance, while Gregg and collaborators (2005) concluded that imagery ability did not moderate the imagery use and outcome relationship. Consequently more research is needed to investigate the imagery ability and performance relationship. Therefore, the purpose of the present study was to analyze the effects of a motivational-general mastery intervention on imagery ability,

golf self-efficacy and sport performance of three inter-collegiate golf athletes. It was hypothesized that the MG-M imagery intervention would improve the imagery ability of inter-collegiate golf athletes. As predicted by Martin et al.'s (1999) applied model of imagery use in sport this enhanced imagery ability would result in heightened self-efficacy and ultimately improved performance. Imagery ability and golf self-efficacy were measured during the baseline and post-intervention to assess changes across phases. A multiple-baseline across-individuals design was employed to evaluate changes in self-confidence throughout the baseline and intervention phases. Additionally, a post-experimental interview was conducted to assess the social validity of the imagery intervention.

Mental Imagery Ability

With regard to imagery ability, the MG-M imagery intervention effectively enhanced each participant's motivational imagery ability. This is consistent with previous research that suggests imagery ability can be improved through imagery training programs (Rodgers et al., 1991). Rodgers and associates (1991) demonstrated that figure skaters who received the imagery training program showed improvements in imagery ability when compared to skaters who did not receive the training program. These findings suggest that with deliberate practice, utilizing the training protocol in the present study, athletes can improve their imagery ability.

Additionally, Rodgers et al. (1991) observed individual differences in the imagery ability of athletes who completed the imagery training program. Specifically, some athletes were better able to utilize imagery than others who completed the training. Similar results were found in the present study where all participants

displayed varied levels of improvement and imagery ability throughout the study. Differences in imagery ability can be expected as all athletes have the ability to generate and use imagery but not to the same extent (Paivio, 1986). Like many other domains of life, individuals differ in their ability to use imagery and these differences are likely a product of experience interacting with genetics (Rodgers et al., 1991). Taken together the present findings suggest imagery can be improved though deliberate practice; meaning imagery is both an ability and a skill (Gregg & Hall, 2006b).

While all participants experienced an increase in imagery ability following the training program, Participant 3 began the study with the lowest level of imagery ability and showed the greatest improvement following the intervention. This result suggests that the imagery intervention is most effective for athletes who possess less developed imagery abilities. Comparatively, Participant 1 experienced a less extensive improvement in imagery ability, while Participant 2 displayed the highest level of ability in both the baseline and intervention phases. Due to the enhanced imagery ability of Participant 2, it is logical to suggest that he would possess a higher level of imagery ability after completion of the training program. Athletes who are better imagers use imagery more effectively in sport and when they increase their use of imagery, their imagery ability improves (Rodgers et al., 1991).

Golf Self-Efficacy

The effects of the imagery intervention on self-efficacy were also assessed in the current study. The outcome indicates that the intervention was successful in enhancing self-efficacy for Participants 2 and 3, while Participant 1 remained

relatively constant. These findings are reasonable given the relationship between imagery use, imagery ability and the intended outcome. Martin and colleagues' (1999) model of applied imagery use in sport suggests that for imagery to be most effective the function of imagery should match the desired outcome. Individual differences in capacity to utilize imagery moderate the relationship between use and intended outcomes. Participants 2 and 3 demonstrated higher levels of imagery ability and improvement following the imagery intervention, while Participant 1 experienced a slight decrease. Consequently, Participants 2 and 3 experienced higher levels of self-efficacy when compared to Participant 1. Additionally, Participant 2 displayed the highest level of imagery ability and, as one would predict based on the applied model of imagery use in sport (Martin et al., 1999), displayed the greatest improvement in self-efficacy. These findings are consistent with previous studies where athletes with higher imagery ability have higher levels of sport confidence (Mortiz et al., 1996) and were able to attain higher levels of a desired outcome when compared to athletes with lower imagery ability (Goss et al., 1986; Hall et al., 1986). Although the level of self-efficacy for Participant 1 remained relatively unchanged, it is plausible to suggest that the imagery intervention enabled the athlete to cope with difficulties throughout the season, thus maintaining a steady state of self-efficacy. During the post-experimental interview Participant 1 stated experiencing "… seeing a lot more difficult situations…". Therefore it is possible that the modest gains in imagery ability facilitated the participant's ability to utilize mental imagery and manage the difficult situations encountered during the program.

State Self-Confidence

Throughout the course of the study, the athletes' self-confidence was assessed to identify any potential changes upon implementation of the imagery intervention. The results of the multiple baseline design across individuals demonstrates that the MG-M intervention effectively increased the self-confidence of Participants 2 and 3 while Participant 1 remained relatively stable. Visual inspection of the self-confidence data points demonstrates reduced variability in the confidence scores of Participant 1 following implementation of the intervention. Additionally the Binomial test did not reach significance but the positive change in slope suggests that support is given to the imagery training program by the changes that occurred across phases. This demonstrates that as the imagery intervention was introduced, the self-confidence of Participant 1 began to increase.

Data obtained from Participant 1 illustrates a decrease in mean from baseline to intervention phase, which may be due to an aberrant confidence score collected in the baseline phase. The confidence score for the third round reflects a situation where Participant 1 held a large lead going into the final round of a tournament, which he eventually won. Bandura (1997) has stated that enactive mastery experiences are the most powerful source of efficacy, where a person engages in a specific behaviour and is successful in its execution. Participant 1 did not achieve this performance level again during the course of the study; therefore, subsequent confidence scores never reached a similar level and thus influenced the calculation of the mean during the intervention phase.

The data obtained for Participant 2 demonstrates that the MG-M imagery intervention significantly increased the participant's confidence. Visual inspection and the split middle analysis clearly indicate a sharp downward trend during the baseline phase. Once the intervention was introduced a significant positive change occurred, reducing the severity and almost reversing the direction of the downward trend. While this positive change in trend provides evidence to support the efficacy of the imagery intervention, state self-confidence continued to decline. It may be reasonable to suggest that had the intervention not been implemented, the negative trend may have continued or worsened over time.

Given that Participant 2 presented a high level of imagery ability and self-efficacy, it is interesting that he then displayed a low mean score for state self-confidence. Garza and Feltz (1998) stated that it is entirely possible for an athlete to possess high self-efficacy and low self-confidence as both measures provide valuable information regarding the athlete's cognitive states. Self-efficacy can be described as the degree athletes' believe they can execute specific behaviours to produce a certain outcome (Bandura, 1997). State self-confidence is concerned with a broader judgment about one's capability to be successful in that moment (Feltz & Chase, 1998). Therefore, an athlete may possess the belief that they are capable of successfully executing specific behaviours, but in that moment prior to competition they may experience feelings of uncertainty and self-doubt. Many factors such as prior practice sessions, course conditions, weather, opponents and level of anxiety experienced; may all potentially affect an athlete's state self-confidence, without affecting

perceived self-efficacy. In the moments prior to competition such factors have the potential to create feelings of self-doubt regardless of perceived self-efficacy.

The results of the visual inspection and split middle analysis indicate that the imagery intervention increased the confidence of Participant 3. This finding is supported by research conducted by Munroe-Chandler and Hall (2005) and Callow and investigators (2001), that found the implementation of MG-M imagery training programs effectively increased the confidence and self-efficacy of soccer and badminton athletes, respectively. Although visual inspection and the split middle technique indicate that the intervention successfully improved the participant's confidence, the Binomial test indicates that the intervention may have had a negative effect on confidence. The slope of the observed trend during the baseline was reduced upon implementation of the imagery intervention. It should be noted, while the slope of the trend may have reduced slightly, it continued to display an increasing trend, but at a protracted rate of change. A possible explanation for this reduction in rate of change may be attributed to fewer scores collected during the baseline phase because the athlete was unable to compete due to injury. During the baseline phase seven data points were collected out of an expected nine. Furthermore, the confidence scores for rounds one and two were somewhat divergent from other data collected during the baseline. Taken together, the divergent scores and fewer data points collected during the baseline phase may have affected the slope of the trend lines. If more data had been available to collect during the baseline phase, there may have been an observed change in trend.

It was observed for all participants that the positive effects of the imagery intervention did not have an immediate effect on athlete confidence, but improvements appeared to occur at a delayed rate. This finding seems logical when considering the use of mental imagery as a psychological skill. Imagery, like a physical skill, requires deliberate practice to be able to perform effectively. It has been demonstrated that athletes who use imagery frequently use imagery more effectively (Vadocz et al., 1997). Therefore a delayed improvement in confidence may be anticipated, as the athletes would require time to become accustomed with and practice the MG-M imagery scripts to receive any potential improvements of self-confidence. Rodgers and colleagues (1991) suggested that with practice athletes can improve their ability to use imagery and these improvements may have to occur initially to significantly affect performance. Results of previous studies have also displayed a temporal lag between implementation of the imagery intervention and appearance of positive effects (Callow et al., 2001; Shambrook & Bull, 1996). Considering the delayed response to the intervention, it is logical to suggest that with further imagery training, additional increases in confidence would be likely to occur.

Golf Performance

The effects of the imagery training program on golf performance were also assessed in the present study. Overall the results demonstrated that the intervention was effective in aiding the performance of Participants 1 and 3, while Participant 2 experienced a decrease in performance. It should be noted, although these performance improvements may appear modest, understanding these changes within the appropriate context provides valuable information. It was denoted among the top

golf athletes in the world who compete on the PGA Tour that a two stroke difference separates an athlete ranked number one and an athlete ranked in the top seventy on tour (PGA Tour, 2010). Therefore, even modest changes have magnified effects on golf performance. This observation was supported by comments provided by Participant 1:

> I think it's definitely going to give you a step up over your competition, and if [the imagery program] can save you one or two shots per round, if you add that up in a four-round tournament, that's eight shots you've saved. It might not seem like much in an amateur competition, but it definitely is. And especially when you relate it to pro competition, that could be a couple thousand bucks.

Examination of the performance results indicated that Participant 3 experienced a large improvement in performance by 2.46 strokes and Participant 1 experienced an improvement of 1.33 strokes. Given the relationship between self-efficacy, self-confidence and performance these findings are supported by previous studies. It has been observed that athletes who possess an elevated sense of self-efficacy and self-confidence achieve higher levels of performance (Beauchamp et al., 2002, Mills et al., 2001; Munroe-Chandler et al., 2008; Rodgers et al., 1991; Vadocz et al., 1997). Participants 1 and 3 displayed relatively constant or improved levels of self-efficacy as well as self-confidence, that improved over time. It appears that possessing a stable or improved sense of self-efficacy and improving state self-confidence facilitates an athlete's ability to achieve higher performance levels.

The golf scores collected from Participant 2 denoted a slight decrease in performance from baseline to intervention. The decline in performance may be attributed to the continued negative trend observed in self-confidence following the intervention. As levels of confidence declined, there was an adverse affect on performance. Gould and colleagues (1981) observed that athletes who are not confident will not achieve their maximum potential and will be less successful than athletes who are confident. Woodman and Hardy (2003) indicated that confidence significantly related to sport performance and further analysis indicated that high sport confidence facilitates performance (Hays, Thomas, Mynard & Bawden, 2009). Although Participant 2 demonstrated improved self-efficacy, the declining levels of confidence experienced in the moments prior to competition may have been most influential. The present findings suggest that state self-confidence plays a very important role in golf performance. Furthermore, the decrease in performance may have been greater had the intervention not been implemented. Upon implementation of the imagery training program it was observed that confidence levels significantly improved from baseline to intervention phases.

It is also logical to suggest that psychological factors other than self-efficacy and confidence may have contributed to golf performance. A review completed by Hellstrom (2009) examining the psychological hallmarks of skilled golfers identified over fifteen different variables required for skilled performance. While confidence was identified among these variables, the work completed by Hellstrom (2009) suggested there are other important psychological factors involved in contributing to

golf performance that require further exploration, such as: moods, emotions, focus and consistency of routines.

Social Validity

The post-experimental interview designed to assess the social validity of the intervention indicated that the imagery intervention satisfied all of the criteria suggested by Hrycaiko and Martin (1996). Upon the conclusion of the study the participants indicated they felt the imagery intervention applied in the present study was appropriate for the sport of golf and was effective in enhancing their self-efficacy and performance. Callow and investigators (2001) uncovered similar results where athletes perceived that the MG-M intervention enhanced their confidence; this finding may be as important as demonstrating significant results. If athletes believe the behaviours they are engaging in are beneficial then they will continue to utilize them, as they will improve self-confidence and eventually performance (Ziegler, 1980).

The post-experimental interview also revealed the athletes' preference for having the MG-M imagery scripts recorded electronically and then uploaded onto a personal listening device, which they would then use to practice the prescribed scenarios. The participants also indicated in their imagery logbooks that they practiced the imagery scripts in a variety of locations such as: during training sessions, while travelling to competitions, during breaks at work and at home. By having the imagery scripts available electronically on a listening device the participants were able to practice them at any time and in any location. These responses provide support for incorporating the use of technology when administering an imagery intervention, allowing the athlete to easily focus on creating and

experiencing the images rather than trying to recall and execute an imagery script. The use of technology may also promote the use of imagery in a variety of situations when it may have been difficult to do so otherwise. Had this option not been available the participants in the present study may not have as readily adhered to the intervention or found it as beneficial.

Limitations

The applied nature of the present research study provides valuable information to researchers and practitioners in the area of sport psychology. While an applied approach is important, conducting this type of investigation presented notable challenges in the field. One such difficulty occurred during participant recruitment and selection. Initially all members of the University of Manitoba Bison Golf Team were invited to participate in the study. Athletes then expressed interest to participate in the study and were asked to complete the MIAMS and CSAI-2R to determine who would be best suited to receive the imagery intervention. Upon completion of the measures five participants were identified as suitable candidates and were then contacted to officially begin the study. Unfortunately, three participants withdrew from the study and as a result the next best candidate was selected to participate in the study. The withdrawal of three athletes potentially affected the outcome of the study and reduced the number of participants included in the design. The participants were selected on the basis of who would most benefit from the intervention designed to enhance imagery ability and self-efficacy. If an athlete already possessed a heightened level of imagery ability or self-efficacy, there would be minimal benefit for them to participate in the current program. The effects of the intervention would

likely not be as pronounced as there is less room for improvement, suggesting the intervention is not effective. Therefore, the effects of the present study may have been understated given that several of the participants selected for the intervention were not available.

A minimum of three participants has been recommended for the multiple baseline design (Hrycaiko & Martin, 1996). Although the minimum participant requirement was met, additional suitable participants may have contributed to strengthening the present study. Determining that the intervention was responsible for the change in behaviour becomes clearer as the number of baselines increase (Kazdin, 1982). One or two additional participants may have provided important additional information regarding the effects of the intervention on imagery ability, self-efficacy, confidence or performance.

Another challenge facing the present study was the fact that only male participants were included in the investigation. A consequence of not including female participants in the present study affects the external validity of the findings. Although no differences were identified between the abilities of males and females to use motivational imagery (Gregg & Hall, 2006b), the effects of a MG-M intervention on imagery ability and self-efficacy has not been examined across genders. Further investigations should be conducted to determine if a similar response would occur with female athletes. The effects of such an intervention may be even more pronounced as female athletes generally have lower self-confidence (Woodman & Hardy, 2003).

Recommendations

The results of this study provide valuable information to athletes, coaches and practitioners, but also indicate the need for further research in this area of sport psychology. The present study provides further support for the use of the Motivational Imagery Ability Measure for Sport developed by Gregg and Hall (2006b) to assess the motivational general functions of imagery. This tool has effectively detected individual differences and changes in imagery ability among the participants. This represents the first time the effects of a MG-M imagery intervention on imagery ability were specifically assessed. Supplementary research should be conducted utilizing this assessment tool to further examine the effects of an imagery intervention on athlete's ability to use motivational general-arousal imagery or to explore the relationship between motivational general imagery ability and performance of athletes from various sports. Another possible line of inquiry would be to examine the effects of a motivational general intervention on imagery ability with youth athletes.

Further research should also be conducted to examine the sufficient number of sessions and the length of an imagery training program required to affect imagery ability and facilitate the intended outcome of the intervention. There seems to be little consistency or instruction as to how to conduct an effective imagery training program. The research literature provides limited guidance as to the length and number of imagery sessions required for an imagery intervention (Morris, Spittle & Watt, 2005). It appears that effective imagery training programs involve repeated training sessions over several weeks (Munroe-Chandler & Hall, 2005; Callow et al.,

2001; Rodgers et al., 1991). Sessions that last less than 1 minute or 10-25 minutes have been identified within the literature as the most effective (Hinshaw, 1991; Feltz & Landers, 1983). These findings do not provide researchers or practitioners with any concrete guidelines to follow when implementing an imagery intervention. The results of the present study demonstrate the usefulness of Martin et al.'s (1999) applied model for guiding the development of imagery interventions by sport psychology practitioners and coaches. Suinn (1989) argued for the need to provide standardized descriptions of sport psychology procedures to appropriately validate and train practitioners for such procedures. Therefore, to ensure the efficacy of imagery interventions and the practitioners who are implementing them, additional research should be undertaken.

Within the literature there has been considerable interest in measuring imagery ability (Hall, 1998). In the competitive world of sport, athletes need to maximize every skill to enhance performance (Mills et al., 2001). Therefore, the primary reason to assess imagery ability is to determine if individuals with higher ability have an advantage over other athletes (Hall, 1998). In the past MG-M imagery ability was measured using tools designed for cognitive functions of imagery (Abma et al., 2002; Gregg at al., 2005; Rodgers et al., 1991). To validly assess these individual differences in imagery ability the measurement instrument needs to match the function of imagery being utilized (Hall 1998). The results of the current study indicate that through motivational general-mastery imagery training, imagery ability will improve. As a result of an improved ability to utilize the motivational general function of imagery, athletes may experience enhanced self-efficacy and self-

confidence. This strengthened belief in oneself to be successful and work through difficulties seems to manifest itself in improved sport performance. The confidence an athlete possesses in the moments immediately before competition may be the most important contributing factor to performance.

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APPENDIX A

Motivational Imagery Ability Measure for Sport

Age:…….. **Gender:……..**

Primary Sport: (indicate one only)**……..**

Current Level of Participation in Primary Sport: (circle appropriate level)

Recreation **Provincial** **Varsity**

This questionnaire involves creating images of eight situations in sport. After you image each scene, you will rate the imagery on two scales. Your ratings will be made on a 7-point scale, where 1 indicates difficulty forming the image or no emotional experience, and 7 is an easily formed image or a very strong emotional experience. Images that fall between these two extremes should be rated accordingly along the scale. There are no right or wrong ratings. Be as accurate as possible and take as long as you feel necessary to arrive at the proper ratings for each scene.

The two scales are: **emotional** – emotions experiences while imaging the scene
ease – the ease of forming the image

Scene 1
Step 1 (read): Imagine you are participating in an important competition for your sport, you feel very fatigued physically and mentally, but you can imagine yourself overcoming these feelings and giving your full effort. Your muscles feel heavy and tired, but you feel yourself starting to become more energized. See yourself pick up the pace and perform with extra effort. Notice how your mood lifts and you observe more of your surroundings.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong
Emotion
1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form
1 2 3 4 5 6 7

Scene 2
Step 1 (read): Imagine yourself about to begin a competition in your sport. As you finish your preparations in the final few minutes before the competition begins you notice feeling some "butterflies in your stomach". You notice your palms are a bit sweaty and your heart is beating a little quickly. You know these symptoms indicate that you are a little bit excited, this is good, and that you are ready to compete.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong
Emotion
1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form
1 2 3 4 5 6 7

Scene 3
Step 1 (read): Imagine that following a break in the competition you are having a difficult time "getting back into it", and have made some errors and are having a difficult time overcoming these feelings. You clear your mind and let that mental tension leave you. You return your focus to the competition and feel more aware of your surroundings. You see your opponents and the competition setting and feel in control of the situation.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong
Emotion
1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form
1 2 3 4 5 6 7

Scene 4
Step 1 (read): Imagine you are performing a drill during practice in your sport that is very difficult. Notice your frustration as you attempt to do the drill properly. Now imagine yourself starting to complete the drill successfully. Notice your satisfaction as you see and feel yourself performing the entire drill correctly.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong Emotion

1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form

1 2 3 4 5 6 7

Scene 5
Step 1 (read): Imagine yourself performing your warm-up in preparation for a competition in your sport. As you notice the sites and sounds of the competition venue you feel yourself becoming excited. The anticipation of competing makes your muscles twitch. You're feeling "psyched up" and ready.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong Emotion

1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form

1 2 3 4 5 6 7

Scene 6
Step 1 (read): Imagine yourself competing in your sport. During a break in the competition you observe how loose and relaxed you feel. Your breathing is deep and rhythmical. Mentally you feel at ease and are focused only on what you have to do. See yourself re-entering the competition, relaxed and ready to go.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong Emotion
1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form
1 2 3 4 5 6 7

Scene 7
Step 1 (read): Imagine yourself participating in an important competition for your sport. You feel as though your arousal is a an optimal level. You sense excitement and anticipation within yourself, yet feel calm and in control.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Very Strong Emotion
1 2 3 4 5 6 7

How **easy** was it to form the image?

Not at all easy to form Very easy to form
1 2 3 4 5 6 7

Scene 8

Step 1 (read): Imagine yourself at a competition in your sport. Your opponents have been successful in the past and you will need to be "on" to beat them. As you look around the competition venue you see others that you have competed against in the past when you were successful. As you remind yourself that you deserve to be in the competition you feel your back straighten and your head being held high as you regain your confidence in yourself.

Step 2: Now create and experience your image of the scene in your mind.

Step 3: Next, complete the two scales below.

How strong was your **emotional** experience created by the image?

No emotion Emotion						Very Strong
1	2	3	4	5	6	7

How **easy** was it to form the image?

Not at all easy to form						Very easy to form
1	2	3	4	5	6	7

APPENDIX B

Golf Self-Efficacy Questionnaire

For the next section of the questionnaire rate how certain you are in your capabilities with regard to your forthcoming competition. Circle the vertical line (/) by the number on the continuum which best describes you:

0= I am certain **I cannot**.. 5= I am moderately certain… 10= I am certain **I can**

For example, for question number one, if you are certain that you cannot perform successfully, you would then circle the line by the 'zero' (0). However, if you were 100% certain of your capabilities to perform successfully you would circle the line by the 'ten' (10) and so forth.

With regard to the forthcoming competition:

1) How certain are you of your capabilities to perform successfully?

/	/	/	/	/	/	/	/	/	/	/
0					5					10
I am certain **I can not**					I am moderatelv certain					I am certain **I can**

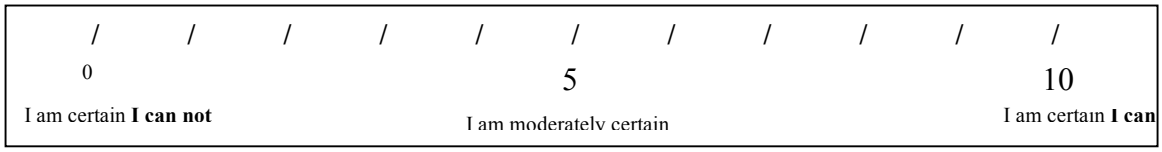
2) How certain are you of your capabilities to achieve your goals for this competition?

/	/	/	/	/	/	/	/	/	/	/
0					5					10
I am certain **I can not**					I am moderatelv certain					I am certain **I can**

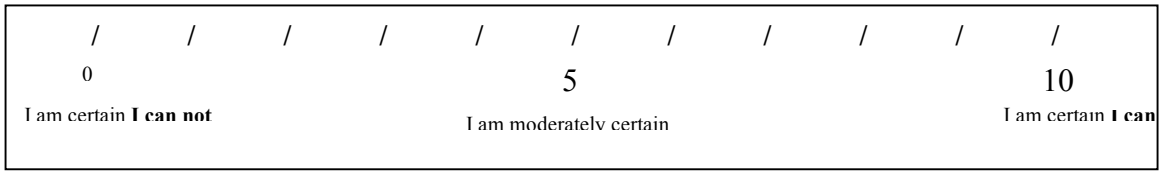
3) How certain are you of your capabilities to produce (optimal responses) in 25% (¼) of critical situations?

/	/	/	/	/	/	/	/	/	/	/
0					5					10
I am certain **I can not**					I am moderatelv certain					I am certain **I can**

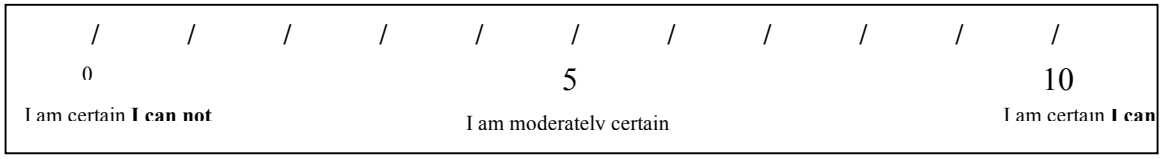
4) How certain are you of your capabilities to produce (optimal responses) in 50% (½) of critical situations?



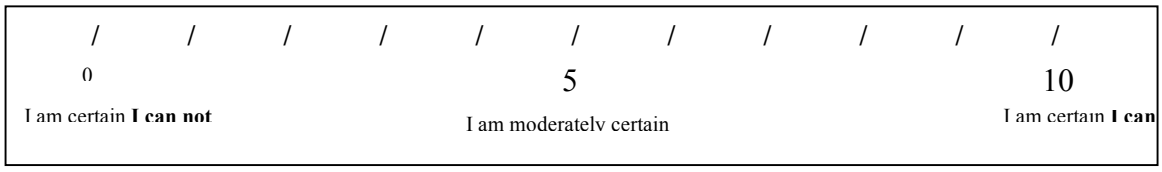
5) How certain are you of your capabilities to produce (optimal responses) in 100% of critical situations?



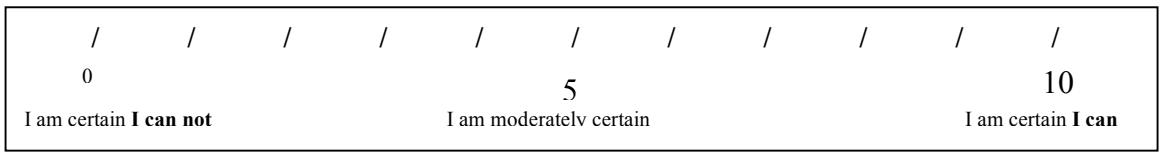
6) How certain are you of your capabilities to perform confidently?



7) How certain are you of your capabilities to manage your emotions/stress levels so that they don't impair performance?



8) How certain are you of your capabilities to work through any problems that you may encounter?



APPENDIX C

Competitive State Anxiety Inventory-2R

Name: _____ Sex: M F Date: _____

Directions: A number of statements that athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you feel right now* – at this moment. There are no right or wrong answers. Do *not* spend too much time on any one statement, but choose the answer which describes your feelings *right now*.

	Not At All	**Somewhat**	**Moderately So**	**Very Much So**
1. I feel jittery	1	2	3	4
2. I am concerned that I may not do as well in this competition as I could	1	2	3	4
3. I feel self-confident	1	2	3	4
4. My body feels tense	1	2	3	4
5. I am concerned about losing	1	2	3	4
6. I feel tense in my stomach	1	2	3	4
7. I'm confident I can meet the challenge	1	2	3	4
8. I am concerned about choking under pressure	1	2	3	4
9. My heart is racing	1	2	3	4
10. I'm confident about performing well	1	2	3	4
11. I'm concerned about performing poorly	1	2	3	4
12. I feel my stomach sinking	1	2	3	4
13. I'm confident because I mentally picture myself reaching my goal	1	2	3	4
14. I'm concerned that others will be disappointed with my performance	1	2	3	4
15. My hands are clammy	1	2	3	4
16. I'm confident of coming through under pressure	1	2	3	4
17. My body feels tight	1	2	3	4
18. How important is the upcoming round of golf	1	2	3	4
What was your final score of the round you played today? (Note: used as measure of performance)				

APPENDIX D

Letter of Information

Dear Bison Golf Athletes

You are invited to participate in a research project titled "The Effects of a Motivational General-Mastery Imagery Intervention on the Imagery Ability and Self-Efficacy of Inter-Collegiate Golfers". This project will examine the effects of an imagery-training program on the imagery ability and self-efficacy of inter-collegiate golfers. Your participation is completely voluntary and will not receive any incentives or disincentives for participating. Also, attached to this e-mail is an informed consent form for your information.

If you would like to participate you will be asked to complete the following questionnaires: the Motivational Imagery Ability Measure for Sport and the Golf Self-efficacy Questionnaire. These questionnaires evaluate imagery ability and sport specific self-efficacy. They will take approximately 15 minutes to complete the questionnaires. Based on this information 6 athletes will be selected to participate in the study. If selected you will be contacted by the researcher. Upon selection you will be asked to participate for the 18-week duration of the study. During the course of the study you will be asked:

1. Complete the Illinois Self-Evaluation Questionnaire prior to 12-16 rounds of golf. This assessment will take 5 minutes to complete each time.
2. Participate in a two-week imagery-training program specifically designed for you. Training will consist of six, 10-15 minute imagery sessions. In addition you will be asked to practice your imagery for 15 minutes daily during the training program.
3. Keep a training logbook provided by the researcher to document your training progress. This will take approximately 5-10 minutes to complete.
4. Complete the Motivational Imagery Measure for Sport and the Golf Self-Efficacy Questionnaire at the end of the study. This will take 15 minutes to complete.
5. Participate in a post experiment interview to assess your experience with the imagery-training program. The interview will last approximately 15-20 minutes.

If you are interested in participating please visit: http://myuminfo.umanitoba.ca/index.asp?sec=1129&too=600&eve=29&fid=1406. Or if you would like further information about this research project you are asked to contact the principal researcher, Thomas Hammond via email: t_hammond@umanitoba.ca

Thomas Hammond, B.A.4., M.Sc. Candidate
University of Manitoba

APPENDIX E

Informed Consent Form

IMAGERY ABILITY AND SELF-EFFICACY: INFORMED CONSENT & ASSENT FORM

Research Project Title*:*

The Effects of a Motivational General-Mastery Intervention on the Imagery Ability and Self-Efficacy of Inter-collegiate Golfers

Researcher(s): Thomas Hammond (University of Manitoba) Melanie Gregg (University of Winnipeg)

This consent form, a copy of which you can keep, is only part of the process of informed consent. It tells you the main idea of the research and what your participation will involve. Please take the time to read this letter and any other information that comes with it carefully. If you do not understand something, or you want to know about something not mentioned, please feel free to contact the researcher.

Purpose of the Research

The purpose of this study is to assess the effects of a motivational general-mastery imagery intervention on imagery ability and self-efficacy. The data collected will be used to evaluate the use of a motivational general mastery intervention as a performance enhancement technique.

1. **Research Procedure**

Participants are asked to complete the following questionnaires: the Motivational Imagery Ability Measure for Sport and the Golf Self-efficacy Questionnaire. These questionnaires evaluate imagery ability and sport specific self-efficacy. Read each question and record your answer with a check mark. It will take approximately 15 minutes to complete the questionnaires. Based on this information 6 athletes will be selected to participate in the study. If selected you will be contacted by the researcher.

Upon selection you will be asked to participate for the 18-week duration of the study. During the course of the study you will be asked to:

a. Complete the Revised State Anxiety Inventory-2 prior to 12-16 rounds of golf. This questionnaire is designed to evaluate an athlete's pre-performance anxiety. This assessment will take 5 minutes to complete each time.
b. Participate in a two-week imagery-training program specifically designed for you. Training will consist of six, 10-15 minute imagery sessions. In addition you will be asked to practice your imagery for 15 minutes daily during the training program.

c. Keep a training logbook provided by the researcher to document your training progress. This will take approximately 5-10 minutes to complete.
d. Complete the Motivational Imagery Measure for Sport and the Golf Self-Efficacy Questionnaire at the end of the study. This will take 15 minutes to complete.
e. Participate in a post experiment interview to assess your experience with the imagery-training program. The interview will last approximately 15-20 minutes.

3. Risk Assessment

There are no undue risks for participants in this study. This study offers potentially significant benefits to athletes by providing psychological skill training and the benefits of such training

4. Confidentiality

Complete confidentiality of all records will be maintained. No response will be connected to any individual participant by name. Only the research team will have access to the full transcriptions and notes, which will be kept in a locked filing cabinet in a secure office.

5. Participation and Compensation

Participation is completely voluntary, you are free to withdraw at any time for any reason, without consequences of any kind.

6. Feedback

There will also be an opportunity for those interested in the results of their participation in the study to receive feedback following the testing period. Athletes that are interested in the results of the study may contact the researchers at 204 474-8412 or by email at t.hammond@mts.net. The researcher will then provide the participants a summary of the results by mail or email.

The Effects of a Motivational General-Mastery Intervention on the Imagery Ability and Self Efficacy of Inter-collegiate Golfers

IMAGERY ABILITY AND SELF-EFFICACY: INFORMED CONSENT & ASSENT FORM

Signing your name on this form shows that you understand the information about the research, your role and rights as a participant, and that you agree to take part (be a participant). By signing you are not giving up your legal rights and not releasing the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free, without prejudice or consequence, to stop participating at any time, and you do not have to answer any questions you do not want to. Also, your participation during the project should be as informed as your initial consent, so if you have any questions, or would like further information, at any time, please feel free to contact:

Thomas Hammond, phone: 474-8412; e-mail: t.hammond@mts.net

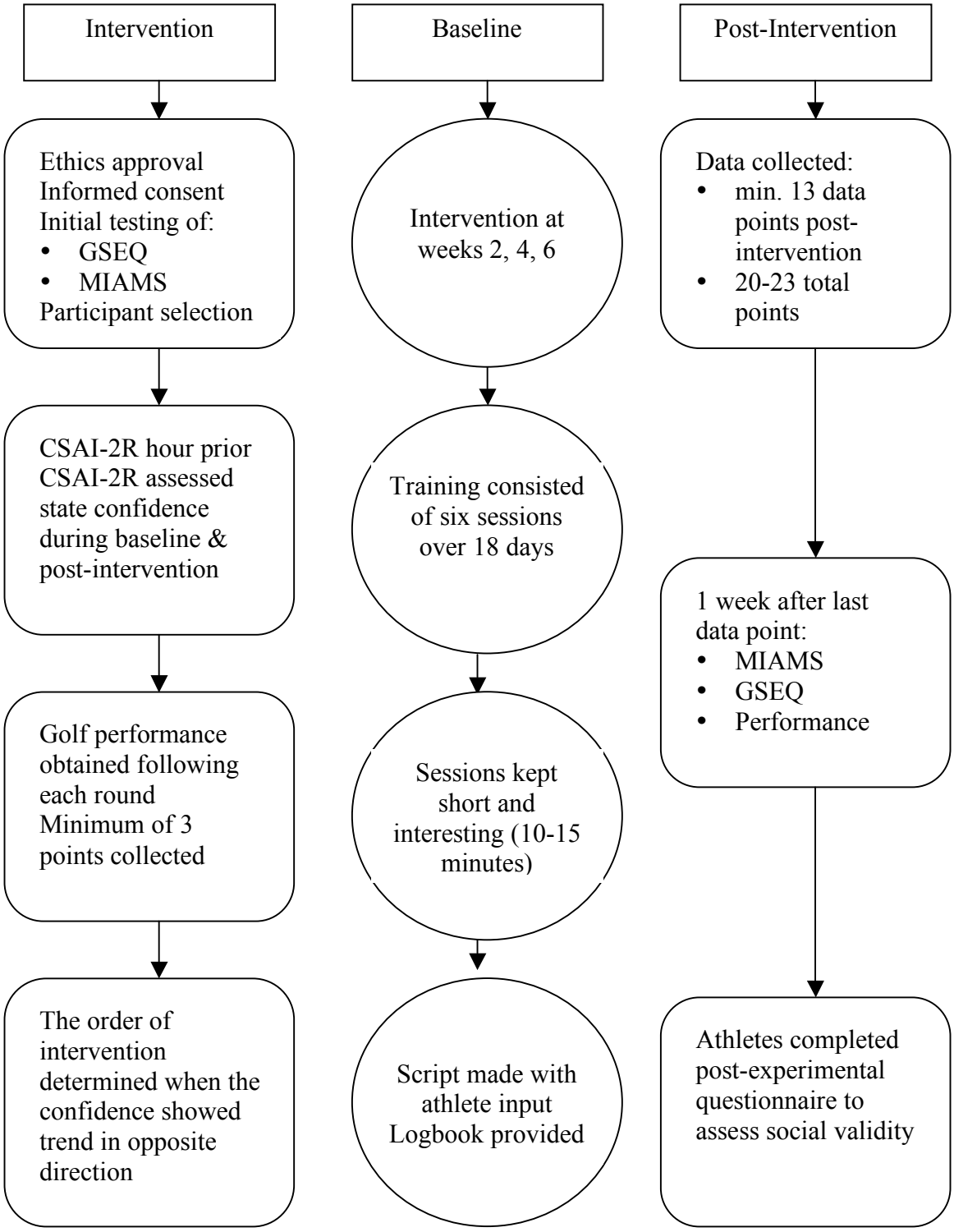
The Education Nursing Research Ethics Board at the University of Manitoba has approved this research. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122 (e-mail: margaret_bowman@umanitoba.ca). A copy of this consent form has been given to you to keep.

Participant's Signature Date

Researcher and/or Delegate's Signature Date

APPENDIX F

Overview of Procedures



APPENDIX G

Procedural Checklist

1. Greet athlete.
2. Move to a quiet area.
3. Load imagery script onto the athletes listening device.
4. Provide written copy of the imagery script to athlete.
5. Instruct athlete to read the imagery script to ensure they comprehend all of the information.
6. Once the script has been read ensure the athlete understands the written material and provide any clarification if necessary.
7. Ask the athlete to get into a comfortable position and begin listening to the imagery script, using their listening device.
8. Upon completion of the training session, remind the athlete to practice the imagery script three times per day for the next three days.
9. Remind the athlete to fill out their imagery logbook at the end of each day to keep track of their progress.
10. Arrange the next training session
11. Remind the athlete to complete their data sheet twice per week.
12. Conclude the imagery training session.

Electronic Procedural Checklist

1. Upload the current imagery script to be sent via email to the athlete.

2. Include the following information in the text box to be sent to the athlete.

Hello [participants name],

Please find the next imagery script to be practiced attached. Be sure to read and follow the instructions provided below.

STEP 1 - email me to confirm that you have received the imagery script and that you were able to load it onto your computer.

STEP 2 - read over the attached word document to ensure you understand everything. If you have any questions email me ASAP.

SETP 3 - listen to the imagery script 3 times per day for the next 3 days.

STEP 4 - be sure to fill in your imagery logbook at the end of each day.

STEP 5 - keep filling out your data sheets twice per week.

The next imagery script will arrive on [next scheduled day].

Thanks, Tom

APPENDIX H

Imagery Scripts

I would like you to find a comfortable position, either, standing, sitting or lying down. You are about to take yourself through a guided imagery script. You will be guided through each scenario one at a time. As you are listening, imagine yourself in each situation and fully experience the emotions created. To start off I would like you to close your eyes. Relax by taking a few deep breathes in; feel the tension release from your body as your relax.

1. You have played the first few holes of an important University tournament……..Imagine the situation……...What is the course like?……...What is your opponent like? Image a series of shots on a long par 4 that end in you sinking a 15 foot down hill putt to make a birdie……..With the situation that you are imaging you are under a lot of pressure but you stay focused and hit the shots cleanly and accurately.
2. See your self in a university tournament, playing very well……..As the round progresses, you are in a great position to finish well……..You only have three holes left to play……..As you are taking your strokes, your movements are flowing……..Being in control during this difficult situation increases your confidence……..Picture yourself being self-confident, walking to the next tee with great posture, your head held high, excited to hit the next shot.
3. Picture a situation at a university tournament where you are playing a round with a very good player from a very good school in the states…….You are feeling intimidated and anxious, you feel like you have to prove yourself to him…….See yourself remaining in control and confident during this situation……Remember you are a very good player and are capable of making great shots…….See yourself focus on competing for yourself, not anyone else…….Now see yourself playing the next two holes making great shots, not caring what this player thinks.

Alright, I'd like you to begin activating slowly. At your own pace, take a deep breath and when your ready, go ahead and open your eyes.

APPENDIX I

Imagery Logbook

Imagery Training Logbook Date:_____

What time did you practice your imagery script?

Where were you when you practiced your imagery script?

	Not At All	Somewhat	Moderately So	Very Much So
1. Rate how well you saw yourself in these situations.	1	2	3	4
2. Rate how well you heard the sounds in these situations.	1	2	3	4
3. Rate how well you felt yourself making the movements.	1	2	3	4
4. Rate how well you felt the emotions of the situations.	1	2	3	4
5. Rate how well you were able to see the image from inside your body.	1	2	3	4
6. Rate how well you were able to see the image from outside your body.	1	2	3	4
7. Rate how well you controlled the image.	1	2	3	4

APPENDIX J

Post-Experimental Interview Script

Post-Experiment Interview

1. How important do you think imagery is to your sport?
- Follow up – Why?

2. How important do you think and self-confidence/self-efficacy is to your sport?
- Follow up – Why?

3. What did you think of the imagery-training program?

4. Was the training program appropriate for your sport?

5. Are you satisfied with the results of the training program?

6. Now that you have had a chance to look at your results, what do you think about your results?

7. Can you try and explain your results?

8. Will you continue to use any aspect of the imagery program?

9. Is there anything you would like to comment on about your experience within this study?