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The Effect Of A PETTLEP Imagery Intervention-Based Pre-Performance Routine On Golfer's Short-Game Performance

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THE EFFECT OF A PETTLEP IMAGERY INTERVENTION-BASED PRE-PERFORMANCE ROUTINE ON GOLFERS' SHORT-GAME PERFORMANCE

by

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(Under the Direction of Brandonn Harris)

ABSTRACT

Studies have suggested that imagery has a positive effect on performance in a variety of sports. The PETTLEP model (Holmes & Collins, 2001) includes the seven minimum elements sport psychologists incorporate into their imagery scripts. The PETTLEP model is the most comprehensive imagery model, thus providing the most functional equivalence. Golf is the interest of this study, with research stating that imagery has a positive impact on golf performance (Nicholls & Polman, 2005). However, studies involving the PETTLEP model have not been investigated thoroughly. There are several shots that have not been studied with the PETTLEP model, therefore this investigation will aim to shrink the gap in literature by measuring the impact on a short 30-yard shot. Thus, it was hypothesized that the use of a PETTLEP imagery intervention will significantly increase golfer's short-shot accuracy to the pin. Additionally, it was hypothesized that imagery ability will increase across phases. The participants were 5 skilled (average score > 100) male golfers. A single-subject, ABA (baseline, intervention, return-to-baseline) design was implemented. The study occurred over a 5-week period at a local golf course. Each golfer attempted 20 shots from 30 yards away. Imagery ability was measured using the Movement Imagery Questionnaire-Revised (MIQ-R) and the Motivational Imagery Ability Measure for Sport (MIAMS). The effectiveness of the imagery intervention on short-shot accuracy was assessed using visual inspection and graphs. Results demonstrated improvements in accuracy to the pin for five out of five participants from baseline to intervention. Results evidenced that four out of five participants decreased in accuracy. Two out of five participants increased in imagery ability during the intervention. Changes in mean and variability were also evaluated using effect sizes, and suggested that two out of five participants varied less during the intervention phase. Implications of the present study include underlining the impact PETTLEP imagery has on golf performance, specifically when utilized in a pre-performance routine. Results suggest that practicing PETTLEP imagery aids in short-shot accuracy and assists in improving imagery ability.

INDEX WORDS: Imagery, Visualization, PETTLEP, Intervention, Routines, Golf

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by

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DEDICATION

This project is dedicated to my friends and family who have supported me every step of the way. Mom and Dad, you laid down the foundation of values for me to grow in. Your guidance and role-modeling is the reason I have made it this far. Haylie, thank you for the companionship and kindness over the past six years and for many, many more to come. You have inspired me to be a better person every single day. I am grateful to have so many great people in my life. Without all of you, none of this would have been possible.

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CHAPTER 1

INTRODUCTION

An estimated 55 to 80 million people worldwide participate in golf each year (Evans & Tuttle, 2015). Further, the number of rounds played increased in 2015 for the first time since 2012 (National Golf Foundation as cited in Schwartz, 2016). In 2011 alone, it is estimated that golf in the United States generated $68.8 billion of goods and services (The Golf Economy Report, 2011). Golf facility operations have increased by $9 billion over the past decade, producing nearly $30 billion in revenue, which includes lessons, schools, and camps (National Golf Foundation, 2011). With such a large amount of money coming from the cluster that includes lessons, schools, and camps, it could be assumed that reliable performance enhancement techniques would be welcomed.

Imagery is a performance enhancement technique that has been studied extensively in sport psychology research. Imagery oftentimes is included as a component to an athlete's pre-performance routine (PPR) to aid in enhancing sport performance and consistency (Murphy 1994; Singer, 1988). Pre-performance routines are a series of task-relevant thoughts and actions an athlete engages in before their performance (Moran, 1996, p. 177). A PPR can serve a variety of functions for an athlete, including: (a) improving concentration, (b) overcoming negative thoughts, (c) selecting appropriate motor movement, (d) preventing warm-up decline, and (e) overanalyzing mechanics (Boucher, 1992). Many, if not all, of those functions can be addressed with the incorporation of imagery (or visualization) in the PPR. Indeed, imagery is one of the many domains that can be found within an athlete's PPR.

With varying PPR models (Murphy, 1994; Singer, 1988), imagery has been used as a primary variable in the systematic approach to developing an effective PPR. Imagery is the ability to create or recreate an image in the mind using all the senses (Vealey & Greenleaf, 2006). Numerous studies have suggested that imagery has a positive effect on performance in a variety of sports including basketball (Kearns & Crossman, 1992), golf (Swainston et al., 2012), baseball (Nelson, Czech, Joyner, Munkasy, & Lachowetz, 2008), figure skating (Rodgers, Hall, & Buckolz, 1991) and tennis (Coelho, de Campos, da Silva, Okazaki, & Keller 2007). Within the sport of golf, for example, imagery has been noted to benefit golfers by allowing one's focus to go from internal to external stimuli. An internal focus is aimed at technique or body movements while an external focus is directed at the execution of the task or the impact of body movements of the environment (Bell & Hardy, 2009). When a golfer is chipping and utilizes an external focus, performance has shown to be significantly more accurate (Bell & Hardy, 2009).

Athletes have also been noted to use imagery for a variety of functions. In total, there are 6 types of imagery. The six types of imagery are Cognitive Specific (CS), Cognitive General (CG), Motivational Specific (MS), Motivational General (MG), which then can be split into Motivational-General Mastery (MG-M) and Motivational General-Arousal (MG-A). The learning and improvement of movement performance is considered cognitive specific (CS; Williams & Cumming, 2011). Cognitive general (CG) is categorized as images of strategies, game plans, and routines. Motivational specific (MS) includes images of process, performance, and outcome goals. Motivation general (Hall, Mack, Paivio, & Hausenblas, 1998) includes both motivational general-mastery and motivational general-arousal. Motivational general-mastery (MG-M) involves images of mastery cognitions. Motivational general-arousal (MG-A) includes images of affect, mood, and emotions (Williams & Cummings, 2011). Athletes have previously reported using imagery for all the above functions according to Cumming and Hall (2002).

Research utilizing imagery interventions within golf has indicated an overall positive impact on golf performance (Nicholls & Polman, 2005). For example, putting has been found to be more successful when paired with imagery (Ploszay, Gentner, Skinner, & Wrisberg, 2006). Woolfolk, Parrish, and Murphy (1985) also found that golfers who imaged the ball rolling into the cup immediately before putting improved made-putts by 30.4% and those who imaged the ball rolling by the cup missed 21.2% more often. The preceding studies underscore the importance of imagery and how visualizing can have a facilitative effect on an athlete's performance.

The use of a theoretical model to guide the integration of imagery in PPR may also enhance its impact on sport performance. One such model includes Holmes and Collins' (2001) PETTLEP framework. The PETTLEP model focuses on the incorporation of *physical*, *environmental*, *task*, *timing*, *learning*, *emotion*, and *perspective* components to imagery scripts. For the *physical and environmental* sections of PETTLEP, the person is present where the performance will take place, wearing competition-ready attire, and has the same equipment they will use to perform with. For the *task* portion, the person physically practices the performance while reviewing the script. The person images everything in sequence in real-time, which incorporates the *timing* section. For the *learning* portion, the person bases the image off their current performance standard and recalls past performances for adjustments. Any matching *emotion* that they would experience after completing a good performance is integrated. The person takes an internal (seen as if performer is producing image) or external *perspective* (seen as if onlooker is producing image).

Evaluations of PETTLEP imagery have suggested it to be superior to other imagery methods and compared to no imagery use at all. For example, Smith, Wright, Allsop, and Westhead (2007) evaluated the effectiveness of traditional imagery compared to that of PETTLEP-based imagery. Results suggested that PETTLEP-based imagery to be more effective than traditional, while the traditional was superior to the control group. Traditional imagery is typically done in a quiet setting away from the actual scene of the performance and without any implements that are used in the sport (e.g., Grouios, 1992). Within traditional imagery, a large portion of the focus is placed on the visual component, with less value placed on the kinesthetic piece (e.g., Tenenbaum et al.,1995). While traditional imagery does incorporate components of the PETTLEP model, the main difference involves lack of the *physical* and *environmental* elements within traditional imagery. Thus, the more comprehensive outline framework of the PETTLEP model allows for a more functionally equivalent intervention and likely a more effective intervention. Functional equivalence refers to the images one thinks of as being as close as possible to the physical objects or events (Finke, 1980). Further, PETTLEP imagery has been used specifically in golf and has shown to increase accuracy from bunker shots (Smith et. al, 2008). Swainston and colleagues (2012) used PETTLEP imagery and found it to increase accuracy when used in a PPR with full swing shots (Swainston et. al, 2012). Given the apparent effectiveness associated with the use of PETTLEP-based imagery interventions, future imagery-related studies might also consider using such a framework when implementing similar interventions among other shots in golf as well.

Whereas research has examined putting and full swings, studies investigating imagery's effect on shots closer to the green are scarce. Further, Wiseman and Chatterjee (2006) found that putting average and the number of greens hit in regulation account for the greatest proportion of variance of scoring average on the PGA Tour. Imagery interventions on putting average, in particular, have been researched, yet a remainder of shots considered part of the short game have not been examined. Such shots have the potential to have a large impact on the above-mentioned greens in regulation. The short approach-shot in particular, may require the most creative imagination, but has not been thoroughly researched (Swainston et. al, 2012). Results of previously discussed imagery interventions' impact on putting and full shots, it is possible that PETTLEP imagery to have a similar impact on approach shots. One of the few studies targeting pitch shots was conducted by Brouziyne and Molinaro (2005), whereby researchers explored how imagery and practice would affect beginner golfers' performance on pitch shots. The researchers found that imagery paired with practice was significantly better than a control group that utilized no imagery. The study demonstrated the positive affects imagery can have on performance with practice, but did not provide evidence that an imagery intervention alone can present performance improvement.

Thus, the primary purpose of the present study is to determine whether a PETTLEP imagery intervention will improve accuracy in pitch shots and imagery ability among participants. It is hypothesized that the use of a PETTLEP imagery intervention will significantly increase golfer's pitch shot accuracy to the pin. Moreover, it is expected that golf shot accuracy will decrease during the return-to-baseline phase. It is hypothesized that golf shot accuracy variability will decrease from baseline to intervention and then increase during the return-to-baseline phase. Additionally, it is expected that golfers' imagery ability will increase from the baseline to intervention and variability in ability scores decreasing from baseline to intervention.

CHAPTER 2

LITERATURE REVIEW

Fournier and MacIntyre (1997) state that imagery is a pillar of interventions in applied sport psychology. Imagery is the ability to create or recreate an image in the mind using all the senses (Vealey & Greenleaf, 2006). Hall, Mack Paivio, and Hausenblas (1998) discovered that imagery has five main functions: (1) cognitive specific (CS; specific sport skill), (2) cognitive general (CG; strategies associated with a competitive event), (3) motivational specific (MS; specific goals), (4) motivational general-arousal (MG-A; feelings of stress, relaxation, anxiety and arousal), (5) motivational general-mastery (MG-M; self-confidence, focus, and control). Imagery has been studied in a wide variety of contexts, including sport. Imagery can be utilized from an internal perspective (i.e. seeing from one's point of view) or an external perspective (i.e. seeing as if you were an onlooker or camera) or a combination of the two. Mumford and Hall (1985) found no significant difference between figure skating groups that visualized externally compared to groups that visualized with an internal perspective. Thus, participants will be able to choose which perspective they wish to take.

Although largely used with performance, imagery has a variety of functions, such as skill learning, stress management, performance preview and review, confidence, and injury recovery (Weinberg & Gould, 1999). Hall, Rodgers and Barr (1990) state that athletes do not have a strong understanding of how to use imagery. The unsystematic way in which imagery is utilized and its association with performance are a few of the mentioned examples. They found that athletes tend to use imagery more often in competition than in practice. Also, they discovered that the higher the competitive level of the athlete the more often imagery was used in practice, pre-game, and competition. Interestingly, it was found that imagery is not a part of regular structured training regimen, although it has been shown to greatly enhance performance (Hall et al., 1990). It can be suggested from these findings that imagery could be beneficial if introduced to amateur or beginner sport participants.

Imagery can be facilitated in the form of scripts, audio recordings, and video recordings. A unique study done by Nelson and colleagues (2008) investigated cognitive imagery and video imagery and the effects on throwing performance of baseball pitchers. Participants were divided into a cognitive and video group, receiving their respective form of imagery. It was found that the type of imagery did not effect baseball players' performance (Nelson et al., 2008). In golf, Smith and Holmes (2004) found that the method of imagery delivery could have an impact on putting green performance. They divided participants into four groups: (1) written script group, (2) a video group, (3) an audio group, and (4) a control group. They found that the audio and video groups performed significantly better than the written script and control groups. This result suggests that video and audio imagery could be useful and provide an extra dimension in preparing athletes for competition, although it would be extremely challenging to use during competition.

Imagery Measures

Since imagery has many uses, it is essential for researchers to have valid and reliable imagery ability assessments (Williams & Cumming, 2011). Imagery ability can be improved with the investment of practice (Hall, 2001). With that in mind, researchers often measure changes in imagery ability over the span of an intervention (Cumming &

Ste-Marie, 2001). Self-report measures are the most commonly used. The Vividness of Movement Imagery Questionnaire (VMIQ-2; Roberts et al., 2008) is a frequently chosen self-report measure. The VMIQ-2 exhibits good psychometric properties and assesses specific movements by the athletes (Roberts et al., 2008). The Movement Imagery Questionnaire (MIQ-R; Hall & Martin, 1997) is another one of the most used measures. The MIQ-R displays good psychometric properties and is quick and easy to administer. The MIQ-R assesses the athlete's ability to do specific movements, such as knee lifts or jumping off a high wall (Hall & Martin, 1997). The MIQ-R is a two-factor assessment that evaluates kinesthetic and visual imagery. The MIQ-R is a revised version of the Movement Imagery Questionnaire (MIQ) developed by Hall, Pongrac, and Buckholz (1985). It was designed as a two-factor assessment to measure visual and kinesthetic imagery (Hall, Pongrac, & Buckholz, 1985). Hall and Martin (1997) stated that the MIQ needed a revision to address its' weaknesses. According to Hall and Martin (1997), the MIQ-R is a satisfactory revision of the MIQ, showing a significant correlation between the MIQ-R and MIQ on both subscales. More recently the MIQ-R has been validated and revised by Williams and colleagues and termed the MIQ-3 (2012). The MIQ has also been adapted and validated to work with children, showing the effectiveness of the measure across age groups (MIQ-C; Martini et al., 2016). While the MIQ-R has been useful in motor skill scenarios (CS, CG; Hall, 1998), athletes have other uses for imagery, such as increasing motivation and confidence. Hall (1998) states that just because an athlete can easily image performing a skill (CS), they cannot necessarily vividly image receiving a medal (MS) or responding appropriately to difficult situations (MG-A, MG-M). Because of this, he suggested the development of new instruments to measure athletes' ability to generate images of their experiences (Hall, 1998). To fill the gap Gregg and Hall (2006) developed the Motivational Imagery Ability Measurement for Sport (MIAMS). The MIAMS measures participants' ease and level of emotion experienced following the generation of eight motivational general images. Another imagery measure, the Sport Imagery Questionnaire (SIQ; Hall et al., 1998), assesses the frequency in which athletes' use imagery. The SIQ covers all five domains of imagery, using 30-questions to discover why athletes image. In recent years, Williams and Cummings (2011) developed the Sport Imagery Ability Questionnaire. The SIAQ is a comprehensive measure that was developed off the SIQ, but measures imagery ability rather than frequency or function. The subsequent measures all uniquely measure important dimensions of imagery ability and depending on what the researcher is looking for, each can be highly valuable.

Accuracy Measures

Measuring accuracy in golf can be done in a variety of ways, mostly depending on what shot is being measured. The current study will look at shots closer around the green, with accuracy being measured by distance from the pin. One way to measure accuracy on the green is to break it up into grids. Brouziyne and Molinaro (2005) examined how mental imagery and physical practice effected approach shots for beginner golfers. To do this, the researchers broke the green up into four circular zones starting at the pin. Zone 1: ball within two meters of the pin (1 meter=3 feet), Zone 2: ball within four meters of the pin, Zone 3: ball within six meters of the pin, Zone 4: ball over 6 meters from the pin. Then, researchers counted each zone worth a different point total (Zone 1 = 4 points, Zone 2 = 3 points, Zone 3 = 2 points, and Zone 4 = 1 point). The zones were marked on the green before the golfers took their shot. Each shot was then summed together for a final score and then order from highest to lower in terms of point total (Brouziyne & Molinaro, 2005). Swainston and colleagues (2012) adapted the grid to be used for 120-yard full-shots. Each grid was expanded slightly, using 10-feet per section, rather than six feet. Point totals were accrued similarly to the Brouziyne and Molinaro study. Additionally, a Bushnell laser device was used to measure the distance to the target for the full-shot. For driving distance, Shivetts, Joyner, Czech, and Zwald (2007) measured accuracy using a sixty-yard wide grid at a driving range. They also marked the zones beforehand, having lines for the center and each zone on the range. The scores were measured based on where the ball stopped in each zone, not where they landed. It is also worth noting how big the disparities are in terms of relative distance for accuracy of each type of shot.

Open and Close Skilled Sports

Sport can be divided into two categories in terms of how imagery can be applied: open skilled sports and close skilled sports. An open skilled sport could be rugby, American football, soccer, or hockey, due to the environment changing and the movement constantly being altered (Arvinen-Barrow et al., 2007). The skills used for open skilled sport are perceptual (Knapp, 2002) and outwardly paced (i.e. a pass in football or soccer). Contrarily, closed skilled sports are self-paced, focused on a rather fixed environment (i.e. golf swing or tennis serve; Lerner, Ostrow, Yura, & Etzel, 1996).

Highlen and Bennett (1979) declared that finding a unique psychology for both open and close skilled sports would be beneficial, rather than searching for shared psychological attributes. They hypothesized that closed skill athletes would use imagery more often than their open skill counterparts. The idea was that close skilled athletes could more easily image their set routine, whereas an open skilled athlete would struggle due to variances in game plan, style, and tactics that they can not fully control (Highlen & Bennet, 1979). Coelho and colleagues (2007) supported the prediction, finding an imagery intervention to be significantly more impactful on a close skilled tennis performance than on an open skilled tennis performance. The results suggest the imagery intervention could strongly influence the performance of a closed skill task.

Some debate has circulated as to whether open skilled sport and close skilled sport use imagery for exclusive reasons. White and Hardy (1998) found that canoeists (open skill) used imagery to become “psyched-up” (i.e., MG-A imagery), while gymnasts (closed skill) used imagery to rehearse skills (i.e., CS imagery). Contrarily, Vadocz, Hall, and Moritz (1997) found that elite roller skaters (closed skill) use MG-A imagery to help combat competitive state anxiety and enhance self-confidence. Beauchamp et al. (2012) found that golfers (closed skill) use both cognitive and motivational imagery. Salmon, Hall, and Haslam (1994) found that soccer players (open skill) used imagery more for motivational purposes, rather than cognitive. Further, research seems to suggest that athletes in closed skill sports would use CG imagery more so than open skill sport athletes. However, Fenker and Lambiotte (1987) found that football players (open skill) are just as likely to use CG imagery to rehearse plays. Although some studies point to CS imagery being used more for closed skill sports and MG-A or MG-M imagery used for open skill sports, the overall findings are conflicting as to which type of imagery is used most with each open and closed skill sports.

Imagery in Sport

Imagery has been studied in a variety of sports and it is important to take a comprehensive view of the literature. Figure skating is one such area that has been studied with respects to imagery. Rodgers, Hall, and Buckolz (1991) investigated how imagery ability and imagery use affect figure skating performance. All participants were given a pre-test to assess imagery ability, imagery use, and figure skating performance. Participants engaged in a 16-week intervention, practicing the imagery script. The results showed that the figure skaters were more likely to use imagery after the intervention and improved performance in all aspects of imagery. Like figure skating, golf is a closed skill sport, thus the findings are encouraging that imagery could be beneficial for golfers.

Evans and colleagues (2004) looked at how an in-season imagery intervention may benefit elite rugby players. They found that the players used mostly cognitive specific (CS) and cognitive general (CG) imagery. They used diaries to track the athletes' progress and the participants reported greater clarity, detail, control, and structure to their imagery. Within basketball it has been found that imagery can be useful in enhancing free throw shooting percentage (Kearns & Crossman, 1992). All three university level basketball players who were tested increased free throw performance when using an imagery intervention. This is worth noting, because a free throw is like a golf swing in being considered a closed-skill.

Imagery has been shown to enhance the ability to narrow attention among softball players (Calmels, Berthoumieux, Christelle, d'Arripe-Longueville, Fabienne, 2004). The results show another dimension of the many benefits imagery can provide, which could further enhance a golfer's performance.

Imagery in Golf

Imagery has a variety of functions (e.g.: CS, CG, MS, MG-A, MG-M). It would be useful to know what type of imagery is used frequently in golf. Gregg and Hall (2006) correlated the use of imagery to skill level and age. They found a negative correlation between a golfer's handicap and imagery use, that is, as handicap decreases (higher skill level), their imagery use increased. All five types of imagery were significantly related to handicap, highlighting the importance of including a script and measures that are comprehensive (Gregg & Hall, 2006).

Putting is one area that has been studied extensively with golf in terms of imagery effectiveness. One such study took four division one golfers and had them hit several putts that varied in distance (Ploszay, Gentner, Skinner, Wrisberg, 2006). They began with a pre-test, then introduced an imagery intervention, then had a post-test. They found that the number of putts made increased from pre-test to post-test; additionally, the distance of the missed putts decrease. Going further from the green, in a study done by Brouziyne and Molinaro (2005), mental imagery and physical practice was combined to investigate how it would affect a 55-meter approach shot. The green was divided into four zones, each two meters in circumference going further away from the hole (i.e. Zone One = 2 meters, Zone Two = 4 meters, Zone Three = 6 meters, Zone Four = 8 meters). The participants were divided into three groups: (1) physical practice and mental imagery, (2) physical practice only, (3) control group who did not practice between pre-tests and post-tests. They found a significant difference between groups 1 and 3 and between 2 and 3 in terms of how many balls were hit into zone one (Brouziyne & Molinaro, 2005). This study is proportional to other studies that have found benefits to combing physical practice and imagery. Bell, Skinner, and Fisher (2009) used solution-focused guided imagery on three elite golfers with the putting yips. They found that the imagery significantly decreased the participant's yips with a moderate effect size. The study focuses on eliminating a negative action from golf, so conversely, it could be assumed that imagery could promote a positive action as well. Further, Woolfolk, Parish, and Murphy (1985) found that golfers who use positive imagery (i.e. imaged the ball rolling in the cup) increased by performance significantly, while the golfers who use negative imagery (i.e. imaged the ball missing the cup) performed significantly worse. Nicholls and Polman (2005) interviewed four golfers on what shots they wished to improve on. The golfers then played five rounds of golf and the researchers recorded those shots. An imagery intervention was then implemented with a performance element personalized to each golfer and then the script was practiced by the golfers. The golfer's pre-test shots and post-test shots were analyzed and they found the golfers shot accuracy significantly increased (Nicholls & Polman, 2005). Taken together, the findings of these studies show that imagery has immense real-world application.

Imagery has also been used in combination with other mental skills. Thomas and Fogarty (1997) examined amateur golfer's skills before and after psychological skills training, focusing on imagery and self-talk. They had the participants take the Sport Imagery Questionnaire (SIQ) and a Golf Performance Survey (GPS) before and after the intervention. The findings demonstrated a significant improvement in the five areas measured by the GPS. Performance, imagery use and self-talk all increased due to the intervention (Thomas & Fogarty, 1997).

Traditional Imagery

The same motor representation system that uses motor imagery is related to motor preparation and execution (Decety & Grezes, 1999). If that is true, the same events and objects should be present for mental practice that are present for physical practice (Holmes & Collins, 2001). This is supported by Finke (1980) who introduced the idea of functional equivalence, referring to one's images resembling physical events and objects. In this area is where traditional imagery lacks consistency. Traditional imagery is typically done in a quiet and controlled setting far from the scene of the performance and without any implements that are used in the sport (e.g., Grouios, 1992). Within traditional imagery, a large portion of the focus is placed on the visual component, with less value placed on the kinesthetic piece (e.g., Tenenbaum et al.,1995). Compared to more progressive models, traditional imagery does have some use. In the case of the golf shot, a more comprehensive perspective is needed.

PETTLEP Imagery

The PETTLEP framework was developed by Holmes and Collins (2001) and includes: *physical*, *environmental*, *task*, *timing*, *learning*, *emotion*, and *perspective*. The 7 elements in the PETTLEP model were determined to be the minimum required factors of imagery in which sport psychology professionals incorporate into their scripts (Holmes & Collins, 2001). While traditional imagery does incorporate components of the PETTLEP model, the main difference is the fact that the PETTLEP includes *physical* and *environmental* elements within traditional imagery. Thus, the more comprehensive outline framework of the PETTLEP model allows for a more functionally equivalent intervention and likely a more effective intervention. Each section below highlights different aspects of the PETTLEP framework.

Physical. Most traditional imagery has the subjects lay down comfortably in a quiet room. While research has advocated for imagery to use relaxation (Miller, 1991) before imagery to clear distractions, it is not a critical element. While relaxation could be beneficial in some scenarios, it would not be advantageous for situations that require a high level of arousal (Holmes & Collins, 2001). With functional equivalence influencing the imagery performance, the physical nature of the imagery should mirror the execution of the task. Holmes and Collins (2001) suggest the performers should be actively involved in the imagery experience, containing implements and creating movements. Gould and Damarjian (1996) assert that dynamic kinesthetic imagery helps athletes recall sensations associated with their performance.

Environmental. Syer and Connolly (1987) suggest that “as if” situations that are novel to the person may not be effective for mental training. Holmes and Collins (2001) contend that including videotaped recordings of performance ought to successfully access the accurate motor representation. Additionally, they state that every attempt should be made to provide the athlete with environmental cues in new locations to increase the validity of the imagery process, including: photographs, video, discussions with individuals who have familiarity with the site. The environment component of the PETTLEP model suggests that, if possible, the athlete performs the imagery in a similar or equivalent environment to the performance.

Task. Hardy (1997) advises that the task characteristics should determine the perspective of the imagery, although it should not outweigh the preference of the imager.

In tasks where technique is important, external visual imagery and kinesthetic imagery lead to enhanced performance (Callow & Hardy, 1997). The task component of the PETTLEP model incorporates the technique and functional movements that are required for the performance (Holmes & Collins, 2001). In a golf swing, for instance, the setup, grip and execution are all vital to create a realistic image of the process.

Timing. Holmes and Collins (2001) state that if motor imagery and motor preparation and execution access the same motor representation, the temporal qualities should remain the same. Vogt (1995) has shown consistency of relative timing between mental practice and physical practice. Realistic timing is crucial to achieving optimal performance, even more so than correct body positions (Collins, Morriss, Bellamy, & Hooper, 1997). Many performers involved in sports that require sequential steps in performance have identified timing as an important quality of their imagery. One elite field athlete has identified his timing-based rhythm of his run-up as essential for top performance (Backley & Stafford, 1995). The timing portion of the PETTLEP model focuses on the temporal qualities of the event being as close to actual performance as possible (Holmes & Collins, 2001).

Learning. The substance of the imagery script must change as learning takes place. As ability to image develops, the person may have to alter some components to accommodate and keep functional equivalence (Holmes & Collins, 2001). Researchers found that imagery of finger movements increased with repetition of the finger movements (Pascual-Leone et al., 1995). This displays that in environments where the task is repeated, the imagery script should be able to adapt to the growth during the learning process. The learning section of the PETTLEP model focuses on the dynamic ability of a script to improve with the performer (Holmes & Collins, 2001).

Emotion. Loehr (1997) identified emotion as the main principal of mental training. Further, Moritz, Hall, Martin, and Vadocz (1996) discovered that roller-skaters who are highly confident used more motivation-mastery and motivational-arousal imagery. This supports that emotion is an important mediator of imagery. Including emotion into imagery contrasts past research that incorporates relaxation into imagery (Miller, 1991). To keep functional equivalence, it should be noted that performance is not in a relaxed state, nor should imagery be encouraging relaxation. The emotion segment of the PETTLEP model allows the imager to individualize the script with emotions they feel with performance (Holmes & Collins, 2001).

Perspective. Recent research has challenged the past-accepted view that an internal perspective was the best for performance (Lang, 1979). Hardy and Callow (1999) say that being able to see the execution of certain movements promotes an external perspective. With both sides providing evidence that each perspective can be effective, it is concluded that the perspective chosen is largely dependent on the task being performed and the preference of the person imaging. The perspective section of the PETTLEP model focuses on whether an individual chooses an internal or external (or both) perspective (Holmes & Collins, 2001).

Some of the components interact with one another, a few interactions are unidirectional, and several interactions are greater in certain individuals. Some two-way interactions that exist are learning and task, perspective and task, physical and timing, and perspective and learning (Holmes & Collins, 2001). Many of the model's components can be included in motor imagery's alternative explanations. For example, the emotion component includes affective states linked with confidence with imagery as an intermediary (Callery & Morris, 1993). Further, activation and/or arousal set (Schmidt, 1982; Vealey & Walter, 1993) could be paired with the physical component, since both match the physiological stimulation during imagery amongst the ideal fit for the task. It has been argued that imagery helps direct appropriate attentional focus and the task component tackles this issue (Loze, Holmes, Collins, & Bellamy, 1998).

Evaluations of PETTLEP imagery have suggested it to be superior to other imagery methods and compared to no imagery at all. For example, Smith, Wright, Allsop, and Westhead (2007) evaluated the effectiveness of traditional imagery compared to that of PETTLEP-based imagery with two studies. The first study consisted of field hockey athletes. They randomly assigned participants into groups of: (1) sport-specific imagery (physical and environmental), (2) clothing imagery (physical), (3) traditional imagery, (4) control group with no imagery. The sport-specific imagery took place in their uniform on the hockey field. The clothing imagery wore their jerseys, but performed at home. The traditional imagery group performed in street clothes, sitting down at home. The sport-specific imagery scored the highest of all the groups, followed by the clothing imagery group (Smith, Wright, Allsop, 2007). Results suggested that PETTLEP-based imagery to be more effective than traditional, while the traditional was superior to the control group. These findings suggest that the physical and environmental sections that the PETTLEP framework contains, provides an added boost that traditional imagery doesn't have. The second study looked at gymnasts, comparing the PETTLEP model to traditional imagery (Smith et al., 2007). The participants were divided into four groups: (1) physical practice, (2) PETTLEP imagery, (3) stimulus imagery, and (4) control group with no imagery. The PETTLEP group had all seven components of the framework in their scripts, the stimulus imagery group had details such as the sight of the beam and smells of the arena. It was found that the PETTLEP imagery group improved significantly, while the stimulus group did not improve significantly (Smith et al., 2007). The subsequent studies further the point that a PETTLEP imagery script can be more effective than a traditional script.

Smith and colleagues (2008) investigated the effects of a PETTLEP imagery intervention on golf bunker shot performance. They had a control group with no imagery, physical practice with PETTLEP imagery, PETTLEP imagery, and physical practice. All groups significantly improved, while the imagery and practice group improved the most. This provides evidence that multiple shots can be enhanced through imagery use.

Pre-Performance Routines

Singer (1988) suggests a five-step model in learning closed skill sports. As stated previously, closed skills involve self-paced sports where the environment is static (i.e. golf swing, tennis serve, free throw). The Five-step strategy involves *readying, imaging, focusing, executing,* and *evaluating. Readying* involves thinking positively about the situation, approaching it with an optimal attitude. *Imaging* is developing a mental picture of performing the act, how it should be done, visualizing the positive results, and feeling the movement. *Focusing* involves concentrating intensely on the relevant cues and not on irrelevant cues. *Executing* is performing the act exactly when you ready without thinking of other things. *Evaluating* is learning and getting feedback from the outcome to adjust, if necessary (Singer, 1988). This is a strong systematic approach to developing a PPR. Specifically, for this study, the imaging portion is of interest. This model displays the importance of using imagery within a PPR by including it as one of the five steps to creating a advantageous PPR.

A PPR can serve a variety of functions for an athlete, including: (a) improving concentration, (b) overcoming negative thoughts, (c) selecting appropriate motor movement, (d) preventing warm-up decline, and (e) overanalyzing mechanics (Boucher, 1992). Lee, Lee, and Kwon (2015) developed PPR's for tenpin bowlers and found that overall they provide improved mental states and performance in competition, furthering the point that a PPR can be beneficial to an athlete. The study suggests that the PPR provides a stabilization of the mental state, giving them a competitive advantage (Lee, Lee, & Kwon, 2015). PPR's have been studied considerably across sports such as archery, basketball, golf, and tennis (Moran, 1996; Predebon & Docker, 1992). Free throw shooting in basketball has been a dominant focus of pre-performance routine literature. Wrisberg and Anshel (1989) looked at pre-shot routines within basketball free throw shooting. Results from this study showed that participants who were in the cognitive strategy groups that used imagery with arousal adjustment performed the best overall. This is significant, showing that imagery is an integral part of a successful pre-performance routine. Further, Lonsdale and Tam (2007) found that athletes who followed a sequence performed significantly better (83%) at free throw shooting than those who strayed from a specific pattern (71%). Additionally, elite performers take longer shooting a free throw (Wrisberg & Pein, 1992).

Among golfers, the timing of the PPR may vary from shot to shot. Van der Lei, Tenenbaum, and Land (2016) found idiosyncratic differences in routine patterns. Moreover, the routine varied with under different arousal-related performance zones. Studies have been conducted that have combined the PETTLEP imagery framework with PPR's in golf. Swainston and colleagues (2012) examined the effects of a PETTLEP imagery intervention on golfer's full-swing accuracy (120 yards). They found that the imagery group increased significantly from pre-test to intervention, while the control group did not improve. The results suggest that the PETTLEP imagery had positive affect on full-swing golf shot accuracy. Those findings support the idea that a similar PETTLEP imagery intervention in a pre-performance routine could be beneficial in short shots. McCann and colleagues (2001) looked at the effect of a pre-shot routine on golf wedge shot performance. They divided their 68 participants into two groups: golfer (had a registered handicap and non-golfer (little to no experience). Next, the groups were subdivided into no practice, physical practice only, and a physical practice with pre-performance routine. The study found that the non-golfers significantly improved from pre-test to post-test and the golfers improved, but it was not significant. This demonstrates that imagery may be more beneficial in beginners than intermediate or elite golfers in a pre-performance routine.

Based on the overall work discussed in imagery literature, there is sufficient evidence to propose that utilizing imagery in pre-performance routines within closed-skill sport (i.e. golf). However, there needs to be further examination on different types of golf shots and different distances. Little investigation has been done with the most comprehensive and functionally equivalent imagery model to date, PETTLEP, on short shots around the green. Further, imagery ability measures should be implemented alongside the shot accuracy measurements, which were suggested by previous research that examined the area.

CHAPTER 3

METHODS

Participants

Six participants were originally recruited to participate in the present study. One participant dropped out partway through the imagery intervention, thus the final data analysis was conducted with five participants. The present study included 5 skilled (average score > 100 for 18 holes) male golfers with an average handicap of 13.4 and mean age of 19.8 years old in the southeastern United States. This cutoff was chosen as is reflects the typical golfers' 18-hole average across the past 50 years (National Golf Foundation, 2015). This was assumed to be a good indication of players who have played significantly and can consistently hit on and around the green. Brouziyne and Molinaro (2005) had no cap on skill level, yet found a significant difference with an imagery intervention on approach shots. Swainston (2012) set a skill level cap of 90 after consulting a panel of expert golfers and found a significant improvement with their PETTLEP imagery intervention on full-swing golf shots. The skill level cap of 100 in this study was used to assist variance in baseline shots from being too high, but also was not set too extreme as to limit prospective participants. Participants who reported using imagery beforehand were excluded; this will be based on the participant's word. Participants were found using advertising at local golf courses and Universities via posters. Due to the study being held in the colder part of the year, there was a possibility that a limited number of prospects would see the posters at the course; thus, the researcher recruited at a local college as well. The researcher went to golf physical activity classes taught by the University and discussed the study, with posters in hand for those who were interested or knew someone who was, could follow up. The posters included what the research study involved and what participants we were looking for. The only cutoff for skill level was having an 18-hole average of 100. Participants must have been at least 18 years old and own their own set of golf clubs.

The participants were asked to sign an informed consent form. Each participant used his/her own equipment and not be provided feedback regarding swing technique or anything else instructional. The participants used the same golf club throughout the study that they chose on day one of the baseline phase.

Instrumentation

Shot accuracy. To measure shot accuracy from the hole, a standard tape measure was used for shots under 12 feet, rounded to the nearest quarter inch and a measuring wheel was used for shots that finished further than 12 feet from the hole, rounded to the nearest inch. Accuracy was based off an established center point, the hole and flagstick. Each shot was measured from the cup to the outside edge of the golf-ball. When using the measuring-wheel, the researcher would start at the golf-ball and measure towards the hole, due to a hill in the back of the green that made it hard to see where the ball came to rest, but when starting at the ball, the researcher could clearly see the flagstick and walk a direct line for accurate measurement.

Imagery ability. In past research, it has been shown that higher-level athletes have better abilities of imaging than their counterparts (Vadocz et al., 1997). It is also established that imagery can improve with practice (Rodgers et al., 1991). With that subsequent research being noted, it is possible that participants who practice the imagery will improve imaging ability, thus potentially improving short-shot performance. Given the variation in function of why athletes use imagery (e.g., CS, CG, MS, MG-A, MG-M) Gregg, Hall, McGowan and Hall (2011) recommend that to measure imagery ability accurately, multiple methods of assessment must be used. Thus, imagery ability will be assessed using the Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1997) and the Motivational Imagery Ability Measure for Sport (MIAMS; Gregg & Hall, 2006) to examine the various functions of imagery use among participants.

The MIQ-R is a two-factor assessment that evaluates imagery ability on the dimensions of kinesthetic and visual imagery and is a revised version of the Movement Imagery Questionnaire (MIQ). The MIQ (Hall, Pongrac, & Buckholz, 1985) was designed to measure visual and kinesthetic imagery. Cronbach's alpha was calculated as an index for internal consistency. The coefficients were acceptable being 0.87 for visual subscale and 0.91 for the kinesthetic subscale. A correlation analysis of the subscales attained on the visual with those for the kinesthetic produced a coefficient of 0.58, indicating the subscales are related, but separate constructs, supporting concurrent and discriminant validity. Reliability coefficients were the same for both subscales (0.83) and considered acceptable. The researchers concluded that the MIQ has been shown to have a steady internal structure and suitable reliabilities (Hall et al., 1985). More recently, Atienza, Belaguer and Garcia-Merita (1994) reported similar internal consistencies (visual subscale α = 0.89; kinesthetic subscale α =0.88). The authors also provided support for the bi-factorial structure, finding all the visual items loading on one factor and all the kinesthetic items loading on a second factor. Per Hall and Martin (1997), the MIQ required a revision to address the weaknesses of the questionnaire. More specifically, items were removed that were often not answered, as were redundant questions to reduce the length, while rewording enhanced clarity. A significant correlation (r = -0.77, p < .001) was found between the MIQ-R and MIQ on both visual and kinesthetic and an overall imaging ability (r = -0.87). The negative direction is due to reverse scoring; in the original MIQ, a low rating indicated the item was easy to image. The results suggest that the MIQ-R is an acceptable revision of the MIQ (Hall & Martin, 1997). The MIQ-R has adequate content validity, with standardized factor loadings ranging between 0.70 and 0.84 (Williams et al., 2012). The MIQ-R showed invariance across males and females (Williams et al., 2012). The MIQ-R has shown adequate predictive validity between kinesthetic imagery ability and CS (r = 0.30, p < .05), and kinesthetic imagery ability and MG-Arousal (r = 0.37, p < .01). The MIQ-R has also demonstrated adequate predictive validity between visual imagery ability and MG-Mastery (r = 0.27, p < .05; Vadocz, 1997).

The participants were required to read a description of a movement, perform the movement, image that movement and then rate their image on a 7-point Likert-type scale. The MIQ-R is an 8-item questionnaire (four visual items and four kinesthetic items) rated on a Likert-type scale (1= *very hard to image*, 2= *hard to image*, 3= *somewhat hard to image*, 4= neutral *(not easy or hard)*, 5= *somewhat easy to image*, 6=*easy to image*, 7= *very ease to image*). Each item on the scale involves executing a specifically described movement. A variety of arm, leg, and whole body movements are explained. Completing the MIQ-R requires a several steps. First, the participant must assume a starting neutral position. Next, the movement is described and produced. Then, the participant reassumes starting position and finally the movement is visualized. Participants will complete the MIQ-R before the baseline phase and after all nine intervention sessions, but will not during the return to baseline phase due to no imagery being present. While the MIQ-R and its predecessor, the MIQ, were developed to examine how effective an individual is at imaging specific movements (i.e. CS, CG), researchers developed another measure to specifically evaluate the motivational components of imagery.

In addition to the MIQ-R, participants will complete the Motivational Imagery Ability Measure for Sport (MIAMS; Gregg & Hall, 2006). The MIAMS is a two-factor model that evaluates the imaging ability of Motivation General-Mastery (MG-M) and Motivational General-Arousal (MG-A). Motivational Specific (MS) Imagery will not be specifically measured with the study at hand. According to Beauchamp, Bray and Albinson (2002) motivational functions of imagery are the most commonly used by athletes. When completing the MIAMS, participants must read a description of various sport-related MG-M and MG-A scenes. There are four scenarios for each of the functions. They then imagine the scenes and rate their imaging ability on both emotion and the ease of forming the image on a Likert-type scale from 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)*. The internal consistencies for the MIAMS are all acceptable ($\alpha > 0.70$). Athletes performing in elite settings had overall higher emotion ($p < 0.01$) and ease ($p < 0.01$) scores on the MG-M subscale than athletes performing in recreational settings. Regarding the MG-A subscale, competitive athletes scored higher than recreational athletes on emotion ($p < 0.01$), but no significant difference was present with ease. Although the study at hand is not looking at comparing skill levels, it still supports the notion that higher-level skilled athletes can be better MG-M and MG-A imagers. The results also support the measure to be used with athletes of various competitive levels (Gregg & Hall, 2006), which may be the case with varying handicaps.

Procedures

An ABA, single-subject (baseline, intervention, return-to-baseline) design was implemented in the study at hand. The investigation was conducted over a 5-week period at a local golf course and the practice-chipping green was determined the most appropriate location by the researcher and golf-course head professional . Pin placement was not changed during the entirety of the study to maintain consistency. The green had limited break to minimize its effect on shot accuracy, but was a smaller-sized green. Across all sessions, shot length, shot type, and weather conditions were kept as consistent as possible. If a drastic change in conditions occurred, the intervention was rescheduled. Shot length was from 30 yards with a club of the participants' choosing. All participants chose a club within 50 to 60 degrees of loft. Conditions such as temperature, precipitation, and wind remained as similar across sessions as possible to eliminate confounding variables. The researcher evaluated external conditions including wind and temperature, while also consulting the PGA professionals, and rescheduled if it was deemed that such conditions could alter performance.

The participants signed an informed consent and the physical activity readiness questionnaire before the baseline phase began. Participants met at the golf course with the researcher individually. The baseline assessment phase was done until participants' scores were deemed stable (varies <10%). If the shot stopped within 12 feet of the hole, a standard-tape measure was used, rounded to the nearest quarter inch. If the shot stopped further than 12-feet from the hole a measuring-wheel was used, rounded to the nearest inch. The distance of 12-feet was used as the maximum for the tape-measure due to the shortest edge of the green from the hole being slightly over 12-feet.

To begin the baseline phase, the researcher explained the process of the study to each participant. First, the researcher had the participants complete baseline scale measure for imagery ability (MIQ-R and MIAMS). Next, the participant had the opportunity to warm up with 25 range balls on the chipping green. No imagery PPR intervention was presented during the baseline phase. After that, the researcher measured the shots for data collection. Each shot was recorded and then the ball was removed to not conflict with subsequent shots. That was done until scores for each individual varied no more than 10% (Kearns & Crossman, 1992).

Following the conclusion of the baseline phase, the intervention phase began and lasted nine sessions over a three-week period. Wakefield and Smith (2009) suggested that three meetings per week serve as the most effective administration of PETTLEP imagery. Similar timelines have been used successfully in past research (Brouziyne & Molinaro, 2005; Nelson et al., 2008; Shivetts et al., 2007; Woolfork et al., 1985). Week one of the intervention involved three sessions that cover the uses and importance of imagery and review of the PETTLEP imagery script. The participant was also instructed to practice the script on non-intervention days, at least once a day. During session one, the researcher reviewed imagery and the script. Session two involved review of the script and then allowed the participants to practice on their own. Session three had the participants practice their imagery script and the researcher assisted integrating it into their PPR, answering any questions the participant may have. The following two weeks of the testing portion consisted of six sessions for testing. The participants took the MIQ-R and MIAMS before each session of testing, as done in similar studies (e.g. Arvinen-Barrow, Weigand, Thomas, Hemmings, & Walley, 2007; Beauchamp, Bray, & Albinson, 2002).The participant reviewed the script with the researcher at the start of each testing session, and then each participant had a brief warm-up session of 25 range balls at the chipping green. The participants then attempted 20 approach shots while using the imagery they practiced in their PPR before each of the 20 shots. The shots were scored the same as the baseline condition.

The imagery script for the present study was modified from Swainston and colleagues (2012; see Appendix A). This imagery script was chosen due to all the aspects of PETTLEP imagery being present and detailed as it pertains to golf. This imagery script was used in a previous study (Swainston et. al, 2012) with a similar methodology and found significant improvements when applying a PETTLEP imagery intervention on full swing accuracy. Each participant was given a copy of the imagery script and it was reviewed each day before the testing occurred during the intervention phase. All participants were present at a local golf course when the imagery script is introduced (*physical* and *environmental*). The participants performed the swing (*task*). The participants were asked to take an internal or external perspective (*perspective*) and image everything from their swing to the ball flight to it landing in real time (*timing*). Each participant based the image off their current performance standard and recall of past performances (*learning*). Any compatible emotion that they would experience after completing a satisfactory shot was integrated into each individual's script, all of which were positive emotions such as joy or excitement (*emotion*).

Following the intervention phase, there will be sessions for the return-to-baseline phase with no imagery script present, which will last until the scores are stable. All other procedures from the baseline and testing phase will remain the same during the return-to-baseline phase.

Data Analysis

The effectiveness of the imagery intervention on short-shot accuracy will be assessed using visual inspection and graphs. Visual inspection examines the magnitude and rate of change across phases of data collection. The two characteristics that comprise magnitude of change include changes in mean and changes in level. Changes in means allude to shifts in the average rate of performance across intervention phases. Changes in level refer to the shift or discontinuity of performance from the end of one intervention phase to the beginning of the next intervention phase. The level characteristic illustrates the effect directly following the introduction or withdrawal of an intervention. The two characteristics that are related to rate of change are trend and latency of the change. Changes in trend are indicated through systematic increases or decreases over time, which shows the direction of performance change. Lastly, latency of change is related to the period between the onset of termination of a condition (baseline, intervention, and return to baseline) and changes in performance (Kazdin, 1982).

An effect size is a number that describes the extent to which an effect is present in a sample of date (Kromrey & Foster-Johnson, 1997). The larger the value of the effect size, the stronger the relationship between the two variables. Effect size is not equal to clinical significance, but the subjects are indeed related.

The first type of effect described is that in which the treatment is linked with a change in the level of behavior only. The *d* index is used for describing the magnitude of treatment effects, and is valuable for single-subject data when the data do not display trends. When understanding the *d* index, values of 0.2, 0.5, and 0.8 denote small, medium, and large treatment effects (Kromley & Johnson, 1997). The next type of effect is the change in variability. An intervention may not alter the level or the trend in a target behavior, but might increase or decrease the stability of the behavior. The *f* statistic will be used to assess the variability of the effect size. When interpreting the *f* statistic, values of 0.02, 0.15, and 0.35 indicate small, medium, and large changes in variability (Kromrey & Foster-Johnson, 1997).

CHAPTER 4

RESULTS

Shot Accuracy

Visual inspection of data was completed by plotting and graphing all data points. Figures 1A through 1E display the shot accuracy data. Figures 2A through 2E display the MIAMS and the MIQ-R imagery data. Regarding visual inspection of the shot accuracy data, all five participants demonstrated improvements in average accuracy from the baseline to intervention phase. Upon removal of imagery in the participant's pre-performance routine, all five participants mean accuracy decreased from the intervention to the return-to-baseline phase. These observations were supported by the *d* index of the five participants mean shift. Four out of five participants exhibited an observable shift in level from baseline to intervention. Additionally, four out five participants displayed a shift in level from intervention to return-to-baseline. Three out of five participants demonstrate a significant change in trend from baseline to intervention. Two out of five indicated a change in trend from intervention to return-to-baseline. Four out of five participants displayed a short latency period upon initiation of the imagery intervention. One participant showed an initial decrease in accuracy and then improved accuracy after day two of the imagery intervention. Further, four out of five participants indicated a short latency period from intervention to return-to-baseline.

With respect to effect sizes, a negative direction of the *d* index indicates accuracy improving across phases, while a positive direction indicates a decrease in accuracy. Four out of five participants demonstrated a large mean shift from baseline to the imagery intervention ($d_1 \geq 0.8$). Participant two (d_1 = -2.09), Participant three (d_1 = -1.18), Participant four (d_1 = -2.73), and Participant five (d_1 = -1.95) improved substantially regarding their shot accuracy; Participant one (d_1 = -0.47) evidenced a small mean shift from baseline to the imagery intervention. Four out of five participants exhibited a large mean shift from the imagery intervention to the return-to-baseline phase (d_1 > 0.8). Participant one (d_1 = 0.96), Participant two (2.24), Participant four (d_1 = 1.13), and Participant five (d_1 = 1.05) significantly decreased in accuracy from intervention to return-to-baseline. Participant three's (d_1 = 0.06) accuracy remained relatively similar from intervention to return-to-baseline.

Two out of five participants evidenced decreased variability from baseline to the imagery intervention ($f^2 \geq 0.35$). Participant two (f^2 = 0.85) and Participant five (f^2 = 2.34) varied less from the baseline phase to the intervention phase. Three out of five participants displayed a large increase in variability from baseline to the imagery intervention (f^2 = 0.35). Participant one (f^2 = 20.25), Participant three (f^2 = 0.77), and Participant four (f^2 = 11.63) varied more from the baseline to the intervention phase. Two out of five participants demonstrated a large increase in variability from the imagery intervention to the return-to-baseline phase ($f^2 \geq 0.35$). More specifically, Participant three (f^2 = 0.69) and Participant four (f^2 = 0.83) varied more during the return-to-baseline phase from than the imagery intervention phase. Three out of five participants exhibited a large decrease in variability from the imagery intervention to the return-to-baseline phase ($f^2 \geq 0.35$). Participant one (f^2 = 1.13), Participant two (f^2 = 10.45), and Participant five (f^2

= 3.22) varied less during the return-to-baseline phase than the imagery intervention phase.

Imagery Ability

Imagery ability was assessed by the MIQ-R and the MIAMS imagery scales. Each scale was filled out prior to imagery training and/or shot recording. The MIQ-R assesses kinesthetic and visual imagery (Cognitive General, CS; Cognitive Specific, CS). Upon visual inspection of the imagery ability data, three of the five participants had observable improvements in mean from baseline to intervention on the MIAMS. Four of the five participants displayed improvements in mean from baseline to intervention on the MIQ-R. None of the participants had significant differences between intervention and return-to-baseline on either measure. One participant demonstrated a change in trend from downward in baseline to upward in intervention on the MIAMS. One of the five participants displayed a slight change in trend from baseline to intervention on the MIQ-R. One participant presented a change in trend from intervention to the return-to-baseline phase on both the MIAMS and the MIQ-R. One participant demonstrated a change in level from baseline to intervention on the MIQ-R. The latency of change across all measures observable at the onset or termination of the intervention. Rather, improvement in imagery ability was consistent for three out of five participants from start of baseline to the end of the intervention phase.

Regarding effect sizes, two out of five participants displayed a large imagery ability mean shift ($d_1 \geq .8$) on the MIQ-R from baseline to the imagery intervention phase. Participant two ($d_1 = 2.03$) and Participant three ($d_1 = 1.82$) improved significantly from the baseline to imagery phase. One out of five exhibited a medium mean shift ($d_1 \geq$ .5). Participant five (d_1 = .52) evidenced a medium mean shift from baseline to intervention. Two out of five demonstrated no significant difference in mean imagery ability from baseline to intervention ($d_1 < .2$). Participant one ($d_1 = 0$) and Participant four ($d_1 = .17$) evidenced no significant difference. Two out of five participants exhibited a large change in imagery ability mean shift from intervention to return-to-baseline ($d_1 \geq$ .8), meaning that they kept improving after the termination of the imagery phase. Participant two ($d_1 = .98$), Participant three ($d_1 = 1.24$) improved from intervention to the return-to-baseline phase. One out of five participants decreased in imagery ability from intervention to return-to-baseline. Participant five had a medium effect size ($d_1 = -.79$) from intervention to return-to-baseline. Participant one had no significant difference across all phases in visual or kinesthetic imagery. It should be noted here that the researcher observed that participant one had a response style where they answered the same throughout the study, regardless of context. Four out of five participants indicated large decreases in variability ($f^2 \geq .35$) from baseline to intervention. Participant two (f^2 = 2.26), Participant three ($f^2 = .83$), Participant four ($f^2 = 1.67$), Participant five ($f^2 = 11.08$) varied significantly less during the intervention phase than the baseline phase. Three out of five also largely decreased in variability ($f^2 \geq .35$) from intervention to return-to-baseline. Participant two ($f^2 = 2.40$), Participant three ($f^2 = 2.67$), Participant four ($f^2 = .8$) varied significantly less during return-to-baseline than during the intervention phase. One out of five largely increased in variability ($f^2 \geq .35$) from intervention to return-to-baseline. Participant five ($f^2 = 1.23$) varied significantly more during return-to-baseline than the intervention phase.

The MIAMS scale examines both motivational general-mastery (MG-M) and motivational general-arousal (MG-A) imagery. Two out of five participants demonstrated large effect sizes in imagery ability mean shift ($d_1 \geq .8$). Participant two ($d_1 = 6.47$) and Participant three ($d_1 = 1.21$) largely improved from baseline to intervention. Participant five displayed no significant difference between baseline and intervention ($d_1 = -.13$). Participant one evidenced a medium effect size that was negative from baseline to intervention ($d_1 = -.50$). Participant four demonstrated a large negative effect size ($d_1 = -1.53$) from baseline to intervention. From intervention to return-to-baseline, two out of five participants exhibited large mean shifts ($d_1 \geq .8$), meaning they kept improving one imagery was terminated. Participant two ($d_1 = 1.15$) and Participant three ($d_1 = 2.00$) both improved from intervention to return-to-baseline. Two out of five participants displayed no notable change ($d_1 < .2$) from intervention to return-to-baseline. Participant four ($d_1 = .04$) and Participant five ($d_1 = 0$) evidenced no change. Four out of five participants had large increases in variability ($f^2 \geq .35$) from baseline to intervention. Participant two ($f^2 = 6.67$), Participant three ($f^2 = 8.00$), Participant four ($f^2 = 1.56$), and Participant five ($f^2 = 1.23$) varied more during the intervention phase than the baseline phase. Three out of five demonstrated large decreases in variability from intervention to return-to-baseline. Participant two ($f^2 = 5.00$), Participant four ($f^2 = 4.67$), and Participant five ($f^2 = 1.23$) varied less during the return-to-baseline phase than the intervention phase. Two out of five evidenced no changes between the intervention and return-to-baseline phases. Participant one ($f^2 = 0$) and Participant three ($f^2 = 0$) displayed no change.

CHAPTER 5

DISCUSSION

The purpose of the present study was to assess the effectiveness of a PETTLEP imagery intervention on short shot golf accuracy and golfers' imagery ability. The hypothesis of the investigation was fourfold: (a) It was hypothesized that the introduction of a PETTLEP imagery intervention in a PPR would increase golfer's average short shot accuracy to the pin from baseline and accuracy would decrease during return-to-baseline; (b) it was expected golfer's shot variability would decrease from baseline to intervention and increase during the return-to-baseline phase; (c) imagery ability would increase from baseline to intervention; (d) imagery ability variability would decrease from baseline to intervention.

All participants displayed increases in shot accuracy from baseline to intervention, providing support for hypothesis *a*; four out of five participants illustrated decreases in shot accuracy from intervention to return-to-baseline, providing additional support for hypothesis *a*. The improvement could be due to the positive functions of imagery, such as increased focus and concentration. Two out of the five participants demonstrated decreases in variability from baseline to intervention, while three out of five participants displayed increases in variability from baseline to intervention. Additionally, two out of five participants increased in variability from intervention to return-to-baseline, while three out of five decreased in variability. These mixed results provided partial support for hypothesis *b* and are most likely a result of the short baseline phase and substantial increases in performance during the intervention phase. Two out of the five participants illustrated increases in imagery ability from baseline to intervention, providing partial support for hypothesis *c* as well. Four out of the five participants displayed increases in imagery ability variability from baseline to intervention, while three out of five decreased in imagery ability variability from intervention to return-to-baseline, which is the opposite of what was predicted, thus hypothesis *d* was not supported.

The findings of the current study are consistent with past literature on imagery in sport and golf. The present investigation supports research done by Nichols and Pollman (2005) who examined imagery's impact on putting and found that imagery positively impacts accuracy. The better golfers in this study showed the most improvement, particularly participant number two who was an 8 handicap and participant four who was a 13 handicap. Vealey and Greenleaf (1988) suggested that elite performers possess a clearer image of what a specific skill should look like, while more novice performers are still trying to make the mental representation in their mind. Due to the short nature of the intervention, the participants who were more experienced at golf took to the imagery quicker, while the more novice players may need more time to see equal drastic improvements with the implementation of imagery. Further, it partially backs Woolfolk, Parrish, and Murphy's (1985) research that found positive imagery impacted putting performance accuracy by 30.4% when the script involved a made-putt, but decreased by 21.2% when the script involved missing the putt. The current study involved performing the skill successfully, but did not incorporate a negative imagery script. Specifically, the current study reinforces findings on the positive impact imagery has on pitch shot accuracy (Brouziyne & Molinaro, 2005), which was the shot investigated. Swainston and colleagues (2012) performed one of the few existing studies with the PETTLEP model in golf. Their findings on full-shot accuracy are consistent with the results of the present investigation. Smith and colleagues (2007) evaluated both traditional and PETTLEP imagery interventions and found the PETTLEP model to be more effective. The current investigation did not compare the two, but does provide support for the idea that PETTLEP imagery model is an effective model.

PETTLEP imagery was developed to create the most realistic, functional equivalent imagery procedure possible. PETTLEP imagery has been tested in golf, but as Swainston and colleagues (2012) suggested, not all distances and shots have been examined yet and further examination was needed. Further, imaging ability was suggested as a future direction to investigate (Swainston & colleagues, 2012). Studies that test any model of imagery and its impact on short chip or pitch shots around the green are scarce (Brouziyne and Molinaro, 2005). Further, the studies that have been conducted around the green using the PETTLEP model have come from the bunker (Smith et. al, 2008). The current study was able to demonstrate that the introduction of a PETTLEP imagery script into a golfer's PPR can increase short shot accuracy to the pin.

There are many reasons why some of the participants may not have experienced results in the expected directions, namely with variability in shot accuracy and imagery ability. First, the baseline and return-to-baseline phases were only three or four sessions as opposed to the length of nine sessions for the intervention phase. Notably, Participant four was the best overall golfer in the group and experienced drastic increases in variability from baseline to intervention. The variability, however, was due to two great performance days, nearly five and a half feet better than baseline, while the poor days were just inches above his baseline measurements. Swainston and colleagues (2012) discovered that better golfers that shot in the 70s improved mostly with the number of shots hit in the closest target grid to the hole, compared to golfers who shot around 90 that were unlikely to hit many within 10 feet of the hole. This evidence aides in explaining why Participant four had a substantial rise in variability.

Limitations

There are several limitations of this study that could have influenced the results. First, and probably the most influential, were the weather conditions. Changes in temperature from day to day and fluctuations during each testing session could have influenced how the ball flew and landed. The wind changed constantly throughout the duration of the study and that could have impacted ball flight and rollout. However, participants did not ever change club selection. Changes in the green's softness were observed by both the researcher and participants during each session. If the change was thought to be too drastic, the researcher would consult the acting PGA professionals and then decide whether to reschedule. Additionally, bad weather caused a few cancellations of testing sessions for participants.

An additional limitation of the study was the participants' and researcher's schedule. The researcher and participants agreed on certain meeting times at the start of the study, but cancellations and unforeseen conflicts altered a few of the meeting days and times. The different times and days could have influenced performance, due to the participants or green conditions. On certain days, the golf course was much busier than others, potentially providing distractions for participants'. Additionally, the participants' daily routine and golf practice could not be controlled. Some were enrolled in a golf physical activity class, so their skill could have changed throughout the study, although they were asked not to practice short-shots outside of the study. The baseline phase was limited to three sessions of four participants and four sessions for one participant, which was much shorter than the intervention phase. Further, the return-to-baseline phase occurred during finals week, so participants could have been stressed or anxious, which may have impacted results.

Another limitation was participant's effort in the study. The researcher observed that Participant one had a consistent response style, marking the same number throughout the study on the imagery measures, regardless of context. Also, participants were asked to give their best effort during each phase of shot recording, but could have underperformed deliberately during certain days or played to performance expectations based on what they knew of the study and what phase they were in.

Despite the limitations mentioned above, the results of this study suggest that PETTLEP imagery in a PPR has the potential to increase short shot accuracy and while simultaneously increasing imagery ability. Noting these results, studies should continue to examine how imagery and other psychological skills could influence golf and sport performance. Future studies should consider ways to control for weather conditions on a more scientific basis. Additionally, a longer-term intervention or adding another intervention phase after the return-to-baseline is recommended in order to establish a replication phase within these designs. More specifically, adding a longer baseline phase and return-to-baseline phase to further test variability differences across phases. Also, future imagery interventions should examine a variety of shot types and distances, namely a variety of shots around the green that require different lofted clubs or that vary in degree of difficulty.

Implications and Future Directions

Implications of the study apply directly to the golfing population. Many are looking for ways to improve technically, mechanically, and through equipment, but some may overlook training their mind. The above-mentioned findings back the idea that golfers can improve substantially with mental training and more specifically with the use of imagery. Some participants improved on average by more than five feet from baseline to intervention. On the PGA tour in 2016, the best putting average from five feet away was 92.31% (PGA Tour, 2017). From ten-feet away the best putting average was 60.98% (PGA Tour, 2017). Based on that information from the most elite population of golfers in the world, there is roughly a 30% higher likelihood to sink a five-foot shorter putt. While none of the participant's golf at the level of a PGA tour player, the importance of hitting closer approach shots is clearly apparent with the aforementioned data. Additionally, golfers will hit less poor shots that could be a result of mishits or lack of concentration. Thus, golfers who practice imagery in their pre-performance routines could reduce strokes on and around the greens. One benefit of imagery in particular is that it doesn't require a golf-course to practice. Golfers could take time to visualize their swing, shot results, and round during winter or other down-time.

A strength of the current investigation is its applicability to golfers who are searching for ways to improve. There are many practical applications for this study. First, it illustrates that golfers with an average score of 100 or better can benefit from the practice of PETTLEP imagery in their PPR. The shot that was examined in the study is one that occurs during a round of golf and with other studies demonstrating PETTLEP imagery's effectiveness, all average to intermediate golfers could reap the benefits on the course. The handicaps of the participants ranged from 8 to 23, so a diverse field of talent could benefit from PETTLEP imagery. The benefits are both hitting more shots closer to the hole and hitting less poor shots that end up far off the green.

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APPENDIX A

MOVEMENT IMAGERY QUESTIONNAIRE-REVISED

Instructions

This questionnaire concerns two ways of *mentally* performing movements which are used by some people more than by others, and are more applicable to some types of movements than others. The first is attempting to form a visual image or picture of a movement in your mind. The second is attempting to feel what performing a movement is like without actually doing the movement. You are requested to do both of these mental tasks for a variety of movements in this questionnaire, and then rate how easy/difficult you found the tasks to be. The ratings that you give are not designed to assess the goodness or badness of the way you perform these mental tasks. They are attempts to discover the capacity individuals show for performing tasks for different movements. There are no right or wrong ratings or some ratings that are better than others.

Each of the following statements describes a particular action or movement. Read each statement carefully and then actually perform the movement as described. Only perform the movement at a single time. Return to the starting position for the movement just as if you were going to perform the action a second time. Then depending on which of the following you are asked to do, either (1) form as clear and vivid a visual image as possible of the movement just performed, or (2) attempt to feel yourself making the movement just performed without actually doing it.

After you have completed the mental task required, rate the ease/difficulty with which you were able to do the task. Take your rating from the following scale. Be as accurate as possible and take as long as you feel necessary to arrive at the proper rating for each movement. You may choose the same rating for any number of movements "seen" or "felt" and it is not necessary to utilize the entire length of the scale.

Rating Scales

Visual Imagery Scale

7	6	5	4	3	2	1
Very easy to see	Easy to see	Somewhat easy to see	Neutral (not easy nor hard)	Somewhat hard to see	Hard to see	Very hard to see

Kinesthetic Imagery Scale

7	6	5	4	3	2	1
Very easy to feel	Easy to feel	Somewhat easy to feel	Neutral (not easy nor hard)	Somewhat hard to feel	Hard to feel	Very hard to feel

1. Starting Position: Stand with your feet and legs together and your arms at your sides.

Action: Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.

Mental Task: Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: __________

2. Starting Position: Stand with your feet slightly apart and your hands at your sides.

Action: Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.

Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: __________

3. Starting Position: Extend the arm of your non-dominant hand straight out to you side so that it is parallel to the ground, palm down.

Action: Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.

Mental Task: Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: ___________

4. Starting Position: Stand with your feet slightly apart and your arms fully extended above your head.

Action: Slowly bend forward at the waist and try and touch your toes with your fingertips (or if possible, touch the floor with your fingertips and hands). Now return to the starting position, standing erect with your arms extended above your head.

Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: __________

5. Starting Position: Stand with your feet slightly apart and your hands at your sides.

Action: Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.

Mental Task: Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: __________

6. Starting Position: Stand with your feet and legs together and your arms at your sides.

Action: Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.

Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: __________

7. Starting Position: Stand with your feet slightly apart and your arms fully extended above your head.

Action: Slowly bend forward at the waist and try and touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head.

Mental Task: Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

Rating: __________

8. Starting Position: Extend the arm of your non-dominant hand straight out to your side so that it is parallel to the ground, palm down.

Action: Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.

Mental Task: Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you are able to do this mental task.

Rating: __________

APPENDIX B

MOTIVATIONAL IMAGERY ABILITY MEASURE FOR SPORT

Age: _________ Gender: _________ Primary Sport: (indicate one only) _________

Current Level of Participation in Primary Sport: (tick appropriate box)

Recreational/Club ¤ Varsity/Provincial ¤
National ¤ International ¤

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: **emotiona**l – emotions experienced while imaging the scene ease – the **ease** of forming the image

Scene 1 (MG-M)

STEP 1 (read): Imagine you are participating in an important competition for your sport, you feel very fatigued physically and mentally, but 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.

1. How strong was your emotional experience created by the image?

No emotion						Very strong emotion
1	2	3	4	5	6	7

2. 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 (MG-A)

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 the feeling of 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.

1. How strong was your emotional experience created by the image?

No emotion | Very strong emotion

1 2 3 4 5 6 7

2. 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 (MG-M)

STEP 1 (read): Imagine that following a break in the competition you are having a difficult time ‘‘getting back into it’’, 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 then 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.

1. How strong was your emotional experience created by the image?

   No emotion | Very strong emotion

1 2 3 4 5 6 7

2. 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 (MG-M)

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.

1. How strong was your emotional experience created by the image?

No emotion Very strong emotion

1 2 3 4 5 6 7

2. 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 (MG-A)

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.

1. How strong was your emotional experience created by the image?

No emotion Very strong emotion

1 2 3 4 5 6 7

2. 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 (MG-A)

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.

1. How strong was your emotional experience created by the image?

No emotion Very strong emotion

1 2 3 4 5 6 7

2. 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 (MG-A)

STEP 1 (read): Imagine yourself participating in an important competition for your sport. You feel as though your arousal is at 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.

1. How strong was your emotional experience created by the image?

No emotion Very strong emotion

1 2 3 4 5 6 7

2. 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 (MG-M)

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.

1. How strong was your emotional experience created by the image?

No emotion Very strong emotion

1 2 3 4 5 6 7

2. 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 C

PETTLEP IMAGERY SCRIPT

Start by standing on the course where you would hit from with the proper club in hand. Close your eyes and take several deep breaths. The ball is 30 yards from the hole. Feel the club in your hands. Notice the texture of the grip and the weight of the club. Image setting up to the ball, take into account your natural stance, posture, weight distribution, and feel your arms hanging down holding onto the club. Sense the feeling of confidence of a solid golf shot about to be stuck. Now image the start to the backswing, feel the weight of the club, the sensation of your arms moving and your body starting to turn. (Individualize the rest of the golf swing, backswing, position at the top, downswing, feeling of impact, and follow through). Visualize the ball leaving the ground and flying in the air, notice the trajectory of the ball, the curvature of the ball flight (all this will be individualized based on the participants' ball flight and natural curvature). Visualize the ball landing and rolling toward the flag. The ball comes to rest close to the pin. Notice the feeling or emotions that come with hitting a great golf shot (those specific emotions and feelings with be individualized). During the imaging process participants will be encouraged to use whichever perspective they feel comfortable with (internal or external). They will also be allowed throughout the intervention to make minor changes to the script as they learn and become more comfortable with the imaging process. Also changes might be made because the participants become more aware of movements or emotions felt during the golf swing and when good shots are hit.

APPENDIX

ASSUMPTIONS

The first assumption is that the participants were honest about their previous experience with imagery use and imagery training. Additionally, it was assumed that participants practiced the imagery script once per day on off-days and be honest with the researcher about doing so. Finally, the studies in the past have validated the psychometric properties of the measures that were used in this study. Due to the small sample size the measures cannot be deemed reliable or valid so it is assumed that the past studies are correct in their analysis.

APPENDIX E

LIMITATIONS

Within this study there are certainly some limitations that are noteworthy. First, the researcher has experience with imagery. During the meetings, the researcher may have expected to see certain results, which may impact the participants to respond to in a socially desirable manner. Another limitation present is the notion that researchers took the participant's word on whether they had used imagery before this study. There is no way to objectively assess whether or not a person had previously used imagery. Finally, there was the potential for participants to practice outside of the study on the specific shot we examined, which could have been a variable that could have influenced accuracy. A procedural limitation is the use of the ABA method. An ABAB methodology would have been ideal to further validate the results. The measures used in this study were deemed reliable and valid in other studies, but they cannot be checked due to our small sample size.

APPENDIX F

DELIMITATIONS

The sample of the study was all college-aged golfers in the Southeastern United States, due to the researcher recruiting at a University and a University golf course. Therefore, the study is generalizable to young adults that play golf. Additionally, the study at hand will only be applicable to short-shots in golf. Other shots around the golf course could not be assumed to have the same impact from an imagery intervention.

APPENDIX G

DEFINITIONS

PETTLEP imagery model: Created by Holmes and Collins (2001), this model incorporates seven elements that were deemed the minimum variables sport psychologists include in their imagery scripts.

Imagery ability: Kinesthetic and visual imagery will be assessed for the Movement Imagery Questionnaire-Revised; Emotion strength and ease of imaging will be assessed by the Motivational Imagery Ability Measure for Sport.

Imagery: the ability to create or recreate an image in the mind using all the senses (Vealey & Greenleaf, 2006).

Imagery type: broken up into five categories: Cognitive Specific (CS), Cognitive General (CG), Motivational Specific (MS), Motivational General-Arousal (MG-A), and Motivational General-Mastery (MG-M).

Pre-performance routines: A series of task-relevant thoughts and actions an athlete engages in before their performance (Moran, 1996)

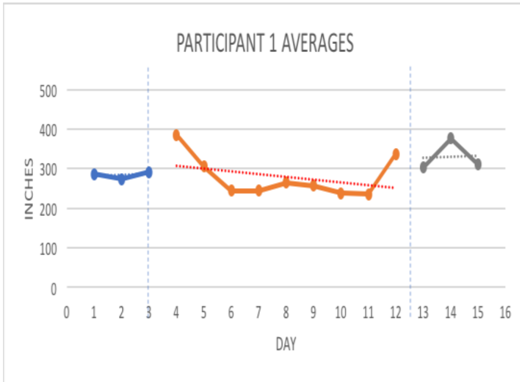


FIGURE 1A

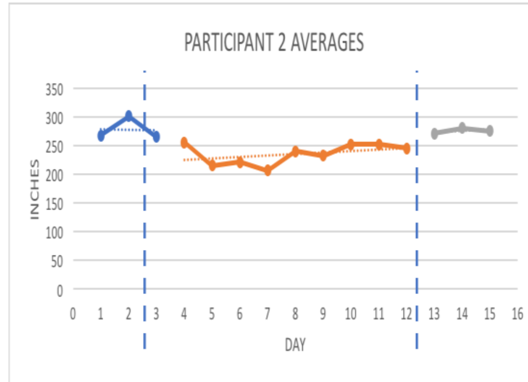


FIGURE 1B

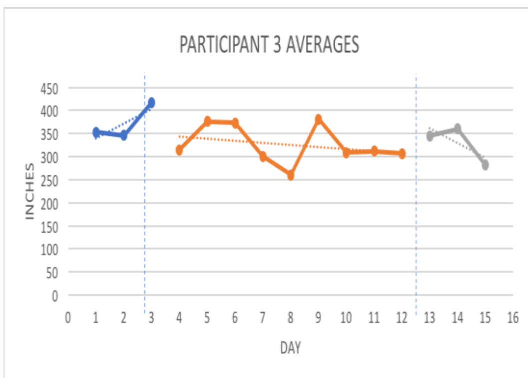


FIGURE 1C

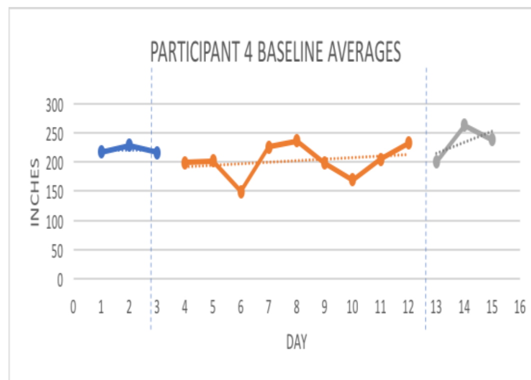
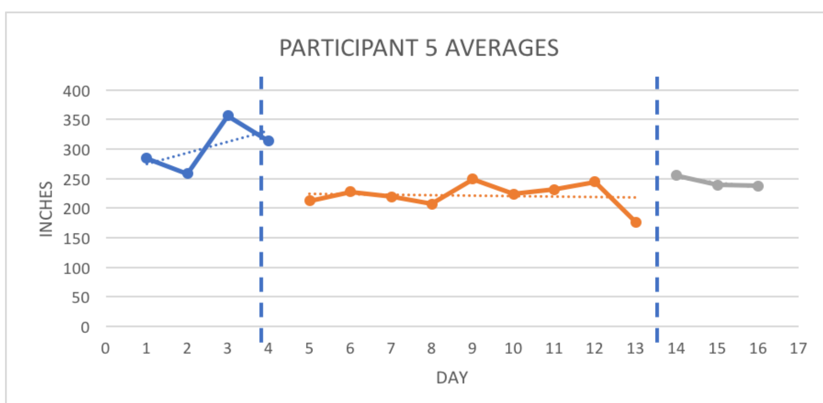


FIGURE 1D



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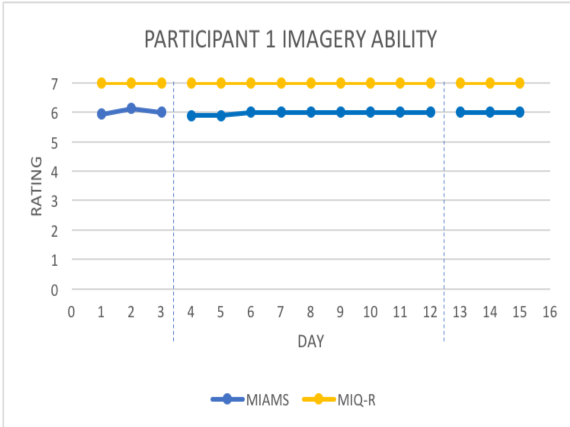
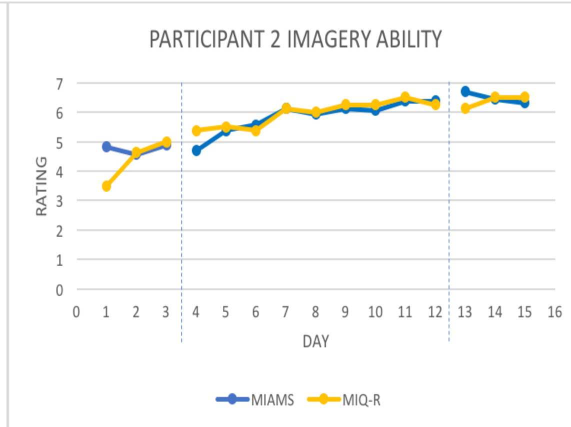


FIGURE 2A



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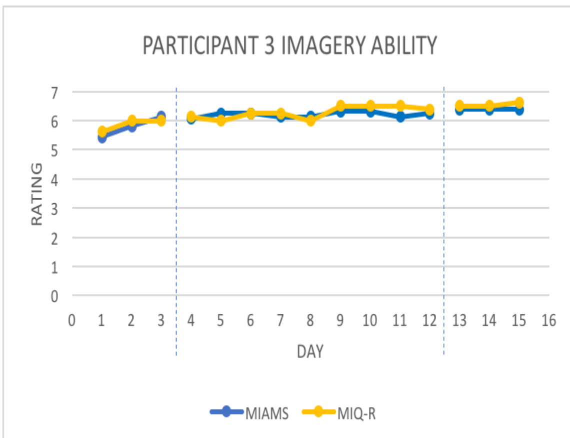

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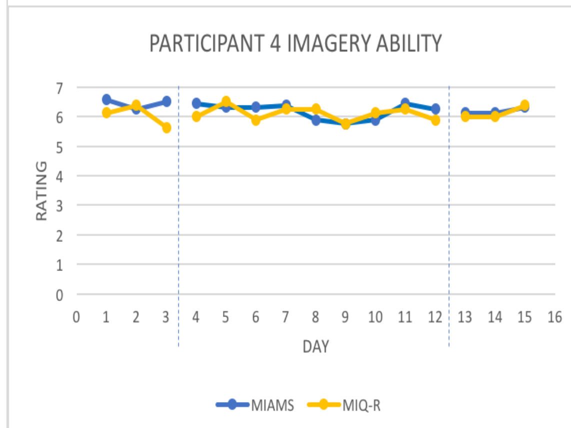

FIGURE 2D

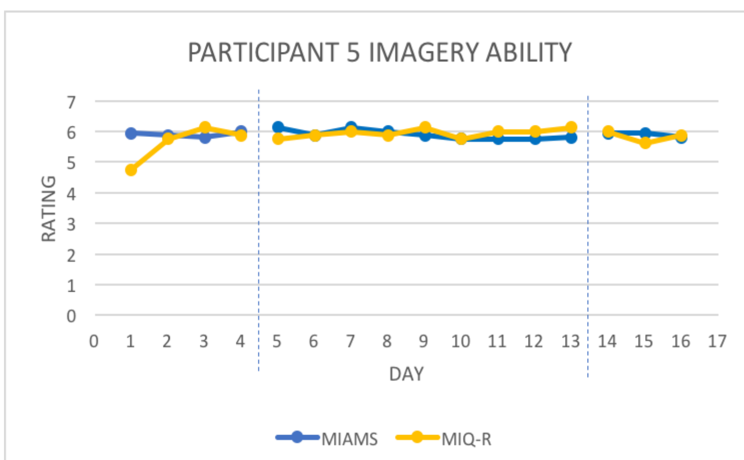

FIGURE 2E