THE EFFECTS OF VISUALIZATION & GUIDED IMAGERY IN SPORTS PERFORMANCE

by

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LIST OF ABBREVIATIONS

Abbreviation	Description
GI	Guided Imagery
GIM	Guided Imagery and Music
VMBR	Visuo-Motor Behavior Rehearsal
MRI	Magnetic Resonance Imaging
NCAA	National Collegiate Athletic Association
ANOVA	Analysis of Variance
SPSS	Statistical Package for the Social Science

ABSTRACT

Do visualization and guided imagery enhance an athlete's performance? If so, how does this performance compare to that of an athlete who does not practice visualization and guided imagery? Past studies have shown proof of sports visualization exercises being beneficial to performance in sports. Though there is proof in these studies of positive effects, it is still not a common method implemented among athletes in training. Could this be because the effects are not reliable or valid? If the exercises are reliable, why are they not being implemented more among athletes? The purpose of this study is to provide more support that guided imagery and visualization are effective when used as a method to enhance sporting performance.

I. INTRODUCTION

As we know, a sport is a universal activity involving physical exertion and skill in which an individual or team competes against another or others for leisure. Not only are sports just a hobby, but they are a business or career once one reaches the professional level. Examples of sports include: football, basketball, baseball, soccer, track and field, tennis, golf, swimming, wrestling, hockey, boxing, volleyball, lacrosse, race car driving, bowling, hunting, fishing, ping pong, etc. To excel in any of these sports, just like anything one does, requires persistence in training and practice. But for some athletes, there is more to training than just the physical aspect. Some athletes strongly implement cognitive (mental) training methods in their preparation to enhance sports performance. Cognitive training is a broad term encompassing various techniques to help individuals alter their own stress reactions to environmental events (De Witt, 1980). The word "cognitive" means the techniques focus on an individual's thoughts and perceptions. For instance, sports visualization is a method essentially aimed at building up the athlete's confidence and self-belief to overcome performance anxiety. It is designed to remove negative triggers and replace them with positive thoughts, which can sharpen a person's focus and create more confidence. Some athletes, especially professional and collegiate athletes, have been known to use imagery and visualization techniques as an advantage during training and competition. Some other examples of techniques subsumed by cognitive training include: cognitive restructuring, mental rehearsal, rational-emotive therapy, cognitive appraisal, meditation, positive self-talk, and self-efficacy statements.

While several of these cognitive training techniques have played an important role in recent and past studies, the one that has heavily drawn attention in the world is

visualization and imagery (commonly referred to as guided imagery). Utay & Miller (2006) stated that the use of guided imagery dates back more than 2,000 years and has evolved significantly during the past century (as cited in Kress, Adamson, Demarco, Paylo, & Zoldan, 2013, p. 39). Guided imagery (GI) is a relaxation technique based on visualizing pleasant images and body awareness to help people to create sensory-rich images in their minds to promote relaxation, concentration and body awareness (Abdoli, Rahzani, Safaie, & Sattarie, 2011). This relaxed state can aid healing, learning, creativity, and performance, which may help one feel more in control of their emotions and thought processes. For instance, GI could be used to help people imagine themselves in a safe or relaxing place, with the goal that they will be able to reconnect with this experience at a forthcoming time when this connection could be useful. It could also be theorized as a form of distracting a person from unpleasant emotional experiences. To attain this state of relaxation most individuals start by being in an environment that feels the most comfortable and relaxing, such as, a comfortable chair, bed, or hot tub even. The individual also typically wears comfortable loose fitting clothes and restricts common distractions such as pets, cell phones, televisions, and computers. When the environment is at a desired setting, guided induction, breathing techniques, progressive muscle relaxation and music is repeatedly used to help nurture a state of deep calmness.

After the body and mind are in a state of deep calm, directives are then given to allow one's personal images and imagination to lead him or her toward the process of alleviating symptoms. This can help the discovery of images that have a specific message about the individual's symptoms or condition, which can give clear insight. When a person reaches the insight stage, typically, they begin to have a better understanding and

control of the physical concerns. Guided imagery techniques contain detailed and vivid images that are retained in the mind that produce healing and well-being. Furthermore, the consistent use of these techniques causes a learning or conditioning effect, so the negative triggers can diminish as the positive physical changes can ultimately become available at all times the individual chooses to use them.

Guided imagery is slowly being acknowledged in the world of sports and athletic competition. Not only can one learn fundamental guided imagery techniques from a licensed practitioner, but also today an individual can learn from coaches, physical trainers, books, CD's, DVD's, and online websites. Though there is more access to guided imagery information today compared to the past, the awareness of guided imagery is still not common in the world of sports. There is valuable information on previous history and case studies involving guided imagery and if people became more aware of that information it could increase the popularity of these exercises in future sports and athletic competition.

II. LITERATURE REVIEW

The purpose of this literature review is to examine previous and current guided imagery methods used to improve sports performance, results from past studies, possible benefits to using guided imagery, concerns with guided imagery, and to introduce the study at hand. As stated earlier in the introduction, guided imagery is a method based on visualizing images to help people create sensory-rich images in their minds to promote relaxation, concentration and body awareness. A major misconception with guided imagery is that it relies solely on the sense of sight. However, to capture the best results from guided imagery you will need to use more than just one of the five senses.

Guided imagery uses language that involves one or more of the senses, which may lead clients to be more mindful of their senses and environment not only in sessions, but in their daily lives as well (Kress et al., 2013). Imagery is currently defined as incorporating as many senses as possible to create and recreate an experience in one's mind (Vealy & Walter, 1993; Templin &Vernacchia, 1995, p. 42). Orlick (1986) argued that the theory behind these findings implies that the more stimuli present from the model or image, the more realistic the experience is to the observer's mind. Guided imagery involves a combination of multiple senses; such as visual (images and pictures), auditory (music or audience), and kinesthetic (how the body feels), along with emotions, to produce positive changes in participant responses. Researchers have found that the guided imagery technique that involved a combination of multiple senses and emotions was of greater benefit than to a person that only implemented visual images. An example regularly used to explain this guided imagery technique is to imagine eating a fruit in great detail. Take an orange for instance. Imagine not only the color of the orange, but the

texture, smell, and taste of the orange. While imagining the smell of the orange, see yourself taking a bite of the orange, feeling the juice squirting in your mouth, and leaving a citrus taste marinating into the taste buds on your tongue. Many people begin to salivate and crave an orange when they imagine that scenario. This exercise alone demonstrates how the mind and body are connected and how, to the body, images formed in the mind can be nearly as real as actual external events. Cognitive techniques are all based on the mind and body connection, so using multiple senses contributes more to facilitating feelings of empowerment to manage certain difficulties in a person's life.

The mind and body principle is a key principle but another important principle that helps with the process of GI is being in an the altered state of mind. In an alternate state of mind a person experiences temporary change from their normal state of mind without being considered unconscious (Naparstek, 2000). During altered consciousness a person is capable of prompt and intense learning, performance and healing (Naparstek, 2000). Brainwave activity and biochemistry change, which cause cognition and moods to alter (Naparstek, 2000). Here a person begins to become more creative, intuitive, and so confident that at times they feel invincible (Naparstek, 2000). He or she begins to do things they typically would not do in a normal state of mind such as: lifting heavy debris that fell on someone; writing an astonishing song or poem, running away from a wild animal to escape life-threatening danger; replacing anxiety and fear with a calmness and optimism during public speaking, subsiding a venomous histamine response to a snake bite (Naparstek, 2000). Research by Naparstek (2000) supports, at best, the altered state is a state of relaxed focus, a kind of calm but energized alertness, and a highly functional form of focused reverie. The altered state can be viewed as the heart and power cell of

guided imagery. When consciously applied, it becomes an awesome ally, a prodigious source of internal strength and skill (Naparstek, 2000). To have an altered state of mind a person must have a great sense of control.

Having a great sense of control can be measured by figuring out an individual's locus of control. Locus of control refers to the degree to which individuals believe they can control events affecting them (Rotter, 1966). People with an external locus of control believe that their own behavior does not matter much and that rewards in life are generally outside of their control (Rotter, 1966). Those with an internal locus of control believe that their own actions determine the rewards that they obtain (Rotter, 1966). Having a strong internal locus of control is a vital element to GI and when an individual has a strong sense of being in control, in and of itself, can help a person to feel better and do better Feeling in control is associated with higher optimism, self-esteem, and ability to tolerate pain, ambiguity, and stress (Naparstek, 2000). Not having any form of control can cause a person to have lower self-esteem, which could create the person to feel helpless. Decades of research in ego psychology informs us that we feel better about ourselves and perform better when we have a sense of mastery over the environment (Naparstek, 2000). GI is an entirely internal activity, and the individual can decide when, where, how and if it is applied, it has the beneficial effect of helping one feel they have control.

Past Research & Case Studies

In recent history, the contributions that guided imagery has made have helped people visualize improved life circumstances by connecting them to a better way of managing problematic situations. There is a large body of research that shows the

effectiveness of guided imagery in treating a wide range of issues. Guided Imagery has helped people lose large amounts of detrimental weight through dieting and exercising correctly. These techniques can even be considered to be is literally lifesaving, as it has been known to work so effectively that it has helped people fight off fatal diseases, such as cancer. For instance, León-Pizarro et al. (2007) studied 66 patients with gynecologic and breast cancer, and found that individuals who were trained in relaxation and guided imagery experienced a significant reduction in anxiety, depression, and bodily discomfort. Walker et al. (1999) explained that, in patients with cancer, relaxation skills combined with imagery were found to be more effective in managing pain compared with the use of just relaxation. Guided imagery has also helped treat patients' chronic pain and has proven to enhance psychological wellness within people. For example, in a study by Shapiro et al. (2008), 64 females with anorexia nervosa were placed in the following treatment groups: guided imagery, progressive muscle relaxation, self-directed relaxation, and control. A significant improvement in relaxation, feelings of fullness, and thoughts about weight and a reduction in anxiety were found in the guided imagery group (Kress et al., 2013). The participants also stated they liked the guided imagery based treatment, would recommend it to others, and would practice it again. The main target for GI is to promote relaxation, which can be used to reduce several stress related problems such as high blood pressure. It can even help chronic smokers to substitute cigarette smoking with GI exercises for soothing stress relief.

Imagery and visualization have been demonstrated to assist in improving wellness and overall functioning, but they can also be applied towards non-health issues as well. It simply can provide an opportunity for people to see themselves completing any difficult

task that may feel undefeatable or life challenging. For example, it has been demonstrated to be extremely useful in improving athletic ability. Thelwell & Greenless (2003) found that performance endurance, performance motivation, and pain management were enhanced in athletes through the use of imagery. In addition, Eddy & Mellalieu (2003) elaborated that the use of imagery techniques to imagine performing a specific sports skill has been shown to improve the physical performance of that. Using the mind, an athlete can register positive images over and over, enhancing the skill through repetition or rehearsal, similar to physical practice. Therefore, with mental rehearsal, minds and bodies become trained to actually perform the skill imagined. Imagery and visualization is the development of creating a mental image or goal of what he/she wants to happen or feel. Research by Newmark (2012) supports visualization was first applied to sports performance after the 1984 Olympics, when Russian researchers studying Olympic athletes found that Olympians who had employed visualization techniques experienced a positive impact on their biological outcomes and performance. Several studies with guided imagery and sports have been documented in the past decades. Since the 1984 study, the technique has been used extensively in the United States and has found acceptance by neuroscientists and sports psychologists who have found that subjective training can cause the body to respond more favorably to consciously desired outcomes (Newmark, 2012). Past studies have shown that internal visualization of specific movements forms neural patterns in the brain, which help advance neuromuscular coordination. Since the brain instructs the muscles how to move, stronger neural patterns result in clearer, stronger movement. Previous functional MRI brain research has also indicated it supports GI, since images in the brain have shown that during visualization, a

shift in activity from the left to the right hemisphere occurs (Newmark, 2012). In terms of functioning, the right hemisphere is correlated with creative imagination, while the left hemisphere is correlated with logical thinking. Using the creative part of the brain over the logical part has been shown to enhance the visual imagery and, therefore, performance. This is useful in the mental training of athletes because the imaginative skill of the right brain helps make imagery sessions more vivid (Newmark, 2012).

Past Guided Imagery & Sports Performance Case Studies

Individuals in practically all sports, at all levels of play, have extensively used the guided imagery exercise and several cases have proved that it benefits the athletes. For example, one case, as described by Newmark (2012), involved a seventeen year old, Caucasian female, high school gymnast. Her problem was she kept experiencing high anxiety prior to her competitive meets. She would perform excellent in practice, but never performed well during competition when it mattered the most. During competition her heart would race fast, she would sweat and tremble, and completely lose focus. To reverse this issue she had to gain control of her thoughts. So first, the patient had to specifically describe every detail in her warm up routine from beginning to end. This even included saluting the judges right before starting her routine. The guided imagery therapy began by using the progressive muscle relaxation technique. This technique helped because it focused on tightening and relaxing each group of muscles one at a time until her whole body was in a relaxed state. Once her muscles were relaxed, she was then ordered to engage her visual, auditory, and tactile senses to picture a competitive meet. She then specifically gave a description out loud in detail as she imagined herself going through the movements for each routine while in her team colors, and hearing the noise

of the fans screaming. Every detail was vital because when she saluted the judges during competition it was implied that gesture would cue her to feel focused and relaxed. This exercise was practiced several times during therapy sessions, and she was also instructed to practice at her house. After twelve weeks she felt less stress and more relaxed and focused. Her relaxation and focus was to the point to where she was having more fun during competition. With this happening, results were achieved and she improved her scores/performance during competition.

Another case, as described by Newmark (2012) involved a twenty-four year old, Caucasian male semiprofessional golfer who felt his golf skills was declining and particularly his putting. He was stressed, not because of anxiety, but from being stuck in a rut with his game play. Therefore, the patient was first asked to focus on letting go of any tension in his muscles from the top of his head to his feet. While doing so with his eyes closed, instantaneously it was recommended to the patient to control his breathing by allowing it to become deeper and slower. The expected outcome of this relaxation technique was to become calmer. While the muscles were relaxed, he was instructed to imagine and describe in detail what he would see if he were playing in a round of golf. By using visual, auditory, and tactile senses to picture this he imagined the golf clubs he could be holding, green golf course, and the sound of the breeze cutting through the air. At this point, it was proposed to him that when he putted, he would see the white golf ball following an imaginary dotted line into the hole. It was also proposed that as he putts the ball it would become "laser-like" in accuracy as it moved along in a straight line. After one month, during which time the golfer practiced visualizations at home, this intervention helped the golfer improve his focus and game (Newmark, 2012). The golfer

also conveyed that he was now capable of getting considerably closer to the hole on long or lag putts.

One case study that has been given a great deal of feedback involved the sport of basketball. Dr. Biasiotto, professor at the University of Chicago, conducted a study on sports visualization (Haefner, n.d.). His famous basketball experiment used free throws as a way to gage the effectiveness of visualization and guided imagery in sports. He first separated people into three different groups and tested each group on how many free throws they could make. He then had the first group practice every day for an hour, the second group only visualized themselves making free throws, and the third group did not practice or use visualization. After 30 days, he tested all three groups again. The first group improved by 24% and the second group increased by 23%, without even touching the basketball. The third group, as predicted, did not show any improvement. Besides wanting to prove the possible effectiveness of visualization in sports, it was stated that the goal of this study was to show individuals how much success could be achieved if they applied both guided imagery techniques and practice. Though it did show beneficial results of guided imagery, it did have a group that used both techniques.

Visuo-Motor Behavior Rehearsal

Visualization plays a vital role in guided imagery strategies and interventions. One of the most common visualization techniques is VMBR (Visuo-Motor Behavior Rehearsal), which was developed by Richard M. Suinn in 1976. VMBR involves (a) an initial relaxation phase, (b) visualizing performance (imagery) during a specific stressful situation, and (c) performing the skill during a simulated stressful situation (Weinberg, Seabourne & Jackson, 1981). The visual aids applied in VMBR techniques include:

photos, photo slides, and/or video-recorded visual information. These visual aids help locate where the faults are in the movements and help one understand the correct standards of performance. The aims of VMBR are to help with confidence and skill enhancement, preparation for competition, attention focus control, improvement in technique, error analysis and correction, and injury rehabilitation. The goal of VMBR is to recognize errors in motor performance and to adjust them with visualization practice and correction. Past studies have continued to provide valuable information on the effectiveness of VMBR within the society and how it has compared to other guided imagery techniques.

Research by Weinberg, Seabourne, and Jackson (1981) attempted to determine if imagery and relaxation combined (VMBR) was more effective in facilitating karate performance than either relaxation or imagery alone. There were four different groups that were tested: VMBR group, imagery group, relaxation group, and the placebo-control group. Measures of trait anxiety, state anxiety, and performance were all used to help determine the effectiveness of each of the four groups. Trait anxiety tests were administered at the start and the end of the 6-week test period. In addition, performance tests were run at the end of the testing period along with precompetitive state anxiety. Trait anxiety scores showed that all subjects, in all four groups, displayed a decrease in trait anxiety over the course of the testing period. State anxiety scores showed that the VMBR and relaxation groups demonstrated significantly lower levels of state anxiety than the imagery and attention-control groups. Performance was broken down into three subareas: skill, combinations, and sparring (actual competition). The results only indicated an effect for sparring, with VMBR group exhibiting better performance than all

other groups. However, the VMBR group did not perform better than the other three groups on the performance measures of combinations and skill.

The results of this investigation provided only partial support for the effectiveness of VMBR in enhancing karate performance (Weinberg, Seabourne & Jackson, 1981). In addition, because none of the experimental groups performed significantly better than the attention-placebo control group on skill and combinations it is possible that expectancy effects need to be considered in assessing the effects of cognitive strategies on motor performance (Weinberg, Seabourne & Jackson, 1981). Noel (1980) argued that future studies need to assess other variables besides anxiety, such as ability, which may mediate the relationship between cognitive strategies and motor performance. Though the results of the karate performance study did not have significantly high validity, it still showed signs of effectiveness during competition, which could be beneficial for other sports.

Recent technological developments in applied sport psychology that utilize videotaping and playback techniques to enhance athletic performance have become increasingly attractive to coaches, athletes, and sports psychologists. According to Suinn (1972), VMBR should be useful as a technique to practice an athletic skill or to manage the stress associated with an athletic event (Noel, 1980). The ability to manage high levels of acute stress is an important determinant of success performance in many occupations (Shipley & Baranski, 2002). In athletic competitions, for example, the ability to stay calm can mean the difference between winning and losing (Shipley & Baranski, 2002). For several years, studies have been implemented to determine how beneficial VMBR is to athletes. One woman who has a track record of evidence that VMBR can be highly effective is a psychologist, Barbara Kolonay. In her 1977 master's thesis at New

York's Hunter College, Kolonay showed that the success rate of eight New York area college basketball foul shooters had significantly improved—from 68.3 percent to 74.8 percent—after a six-week program of relaxation and imagery exercises (Bricker, 1982). She attempted to demonstrate that VMBR, which combined mental imagery and relaxation, was more effective than either mental imagery or relaxation alone in facilitating basketball free throw shooting (Noel, 1980). Basketball teams in the VMBR group listened to a 10-minute relaxation and free-throw imagery audiotape prior to each of 15 basketball practice sessions, while other teams listened to the relaxation tape alone, the imagery tape alone, or engaged in irrelevant activity, Kolonay (1977) concluded that the VMBR training led to an increase in free-throw percentage accuracy, since this group's pre- and posttest percentages differed significantly while the other groups did not. Due to the effectiveness of her study, she went on to work with professional teams and other NCAA division-1 collegiate teams. Years later, VMBR is now not only used with college athletes, pro athletes, and amateur athletes of all sports, but is used in other occupations as well.

In recent studies VMBR has also been implemented in other occupations, such as policing, as a method of reducing acute stress and improving police officer performance. In a study of fifty-four the Ontario Provincial Police Force training program, fifty-four trainees were randomly assigned to a treatment and non-treatment condition prior to undergoing a highly stressful, critical event-training scenario involving live-fire exercise (Shipley & Baranski, 2002). Shipley and Baranski's results from this study showed no differences between the VMBR and the control group in the physical manifestations of anxiety (blood pressure, heart rate, perspiration, muscle tension, breathing rate) or in

overall self-confidence, but the VMBR subjects did show lower levels of cognitive anxiety (i.e. their thought process were clearer, less negative, and less distractible), and—most importantly—they showed better actual performance on the critical event scenario; that is, they achieved significantly higher scores on "assailant hits" during the live-fire exercise (as cited in Miller, 2008, p. 72). VMBR is the art of practicing without practicing. All it takes is discipline, concentration, and imagination. It is a method that can be used anywhere and anytime.

Guided Imagery and Music

Besides visual images, music is another key factor that has been applied and associated with guided imagery. For instance, past studies have demonstrated how implementing music during guided imagery interventions has alleviated bio-psycho-social distress associated with ill health. Guided Imagery and Music (GIM) is a therapeutic practice that implements music to create an atmosphere in which one can experience personal insights that provide guidance and solutions for important life issues. Pickett (2002) stated that GIM refers to all forms of music-centered imaging in an altered state of consciousness and facilitates explorations of consciousness that can lead to transformation and wholeness (as cited in Lin et al., 2010, p. 1140). Applying music to guided imagery has been used as a problem-solving method for a wide range of issues. It has been found to be beneficial for people looking for help with health problems such as addictions, depression, relationship issues, career changes, sexual abuse, anxiety, stress-related problems, goal setting, and clarity about life experiences. Not only has it helped with health issues but it has proven to help with athletes in competitive competition that suffer from high levels of anxiety and stress.

Several athletes, from high school to the professional level, face a common issue of anxiety and stress before and/or during competitive competition. However, another common factor most athletes share is listening to music during training and/or during pregame warm ups. An athlete listening to music metaphorically gets an injection of adrenaline to the body that boosts drive and increases motivation. Past studies have shown that adding music with guided imagery can be useful to athletes because it helps promote recollection of physical relaxation and can be used as a vehicle for inner exploration and insight. It also can help with lowering cortisol levels, which play a role in the nervous system and stress response. When the cortisol levels are lowered that means stress levels are lowered. When stress levels are lowered that means anxiety reduces and the fear of failure diminishes. Music has not only been demonstrated to be useful as a relaxation technique but has also proven to work as a motivation technique. For any athlete, having the right mindset is a key to high-level performances. The highest level of basic motivation is known as flow. Csikszentmihalyi (2000) described optimal experiences as flow, a state of total immersion in the activity as well as a process that does not require conscious intervention for individuals to function at their best. This then forms a state in which the individual is basically rewarded by the movement patterns involved; it is the ultimate experience amongst sport participants generally known as being "in the zone". When a person is in the zone, that person is you are so intensely focused that self-consciousness is lost and nothing else matters but the task at hand. The individual typically feels enjoyment due to the feeling of overcoming challenges and accomplishing the goal targeted. The theory of flow suggests three conditions that have to be met to attain a flow state.

Nakamura and Csikszentmihalyi (2002) stated that the three proximal conditions conducive to flow are challenge-skills balance, clear goals, and unambiguous feedback. For instance, before training or competitive competition, clear goals are commonly set by an individual to meet a desired goal. During training or competitive competition immediate unambiguous feedback is needed to help the individual make any changing demands, which allows the person to fine-tune their performance to maintain the flow state. Farmer (2013) explained to help get into this optimal flow or zone, many athletes listen to music prior to competition to relax, mentally prepare, concentrate on the task at hand and to facilitate a state of flow. With the way music functions with the human body one could say it is a stimulant due to the fact it has physiological effects on heart rate and adrenalin levels. Farmer (2013) also stated that motivation from music can also extend endurance during an exercise session (for example during a marathon run), diverting attention from fatigue and altering perceptions of exertion during workouts, all of which can facilitate the attainment of flow. There is not an exclusive genre of music that is required for GIM, but in past studies Goldberg (1995) explained that specifically programmed classical music is used to generate a dynamic unfolding of inner experiences and trigger a person's spontaneous imagery. Though the genre of classical music was demonstrated to be favorably effective, some of the best results came from other genres (pop, hip-hop, alternative, rock, techno) that have lyrical affirmations and positive meaning to the individual. For instance, inspiring statements such as "You can go the distance, You can run the mile, You could walk straight through hell with a smile, You could be the hero, You could get the gold, Breaking all the records that thought never could be broke" ('Hall Of Fame' by The Script ft. Will. I. AM) or "I'm that star up in the

sky, I'm that mountain peak up high, Hey I made it, I'm the world's greatest " (from the movie 'Ali' soundtrack) can lead to positive motivational consequences, and trigger more successful performances. The act of reciting words to a song, either aloud or silently/mentally can have the same effects as positive self-talk. Self-talk is anything said to oneself, aloud or mentally, for inspiration or motivation, such as phrases or mantras. Past studies have showed that certain performance strategies influence the intensity and duration of someone's performance and one of the most generally used strategies is that of self-talk. Anderson (1997) suggested that self-talk refers to what athletes say to themselves in an attempt to think both more appropriately about their performance and to direct their actions in such a way to reach a desired outcome. It has been said that self-talk interventions and procedures are some of the utmost commonly applied and effective strategies used by athletes.

Talking to oneself has been viewed in society as something abnormal people do, but in reality inner speech, such as self-talk, is a common characteristic of the humankind. Overall, everyone generally participates in the act of speaking to himself or herself whether it's negative or positive. Thoughts in the form of inner conversation deluge our mind, and cognitive theorists have long emphasized the link between what people say to themselves and how they behave, suggesting that a person's thinking can affect emotional and behavioral outcomes (Ellis, 1994; Meichenbaum, 1977).

Problem Statement

Research has found, and is still finding, that both physical and psychological reactions in certain situations can be improved with guided imagery. Such repeated imagery can build both experience and confidence in an athlete's ability to perform certain skills under pressure or in a variety of possible situations. The most effective guided imagery techniques result in a very vivid sport experience in which the athlete has complete control over a successful performance and a belief in this new 'self.' Visualization, mental rehearsal, or other such techniques can maximize the efficiency and effectiveness of training. In a world where sports performance and success are measured in seconds, most athletes will use every possible training technique at hand. Visualization might be one way to gain that very slim margin. With that being said, does visualization and guided imagery enhance an athlete's performance, and if so, is it more effective compared to an athlete who does not practice guided imagery exercises? Does this method work empirically? Guided imagery has been known to work effectively within areas of dieting and curing diseases, such as cancer. For that reason, is it logical to say it would work with exercise and sports performance empirically?

Past research has exhibited clear-cut evidence of guided imagery exercises being beneficial with performance in sports and competitive competition. Though positive effects have been verified in past research, guided imagery is still not a common method implemented among athletes in everyday training. Could this be because the effects are not truly reliable or valid? If the exercises are reliable or valid, why are they not being implemented more often among high school, college, and professional athletes? The purpose of this research is to evaluate the effects of visualization and guided imagery in

sports performance by measuring free throw percentages during pre- and post-intervention phases. This present study is largely an extension and replication of previous studies on the effects of guided imagery on performance. However, one difference was noted: samples of highly skilled athletes (e.g., collegiate and professional players) were not the focus to this study, but instead, the emphasis was on the effects on a diverse selection of individuals. This study has two specific aims. First, to demonstrate how the use of guided imagery could produce a positive correlation with better-quality performance. Second, to show the effectiveness of both physical practice and guided imagery when implemented together.

Research Hypothesis

The cognitive training in this intervention will include relaxation, guided imagery, and music with guided imagery techniques. All subjects will be assigned to one of three different control groups: free throw practice only group; guided imagery only group; and free throw practice and guided imagery group. It is predicted that subjects in all 3 groups will see improvements in their free throw percentage. Another strong predication is that subjects in the free throw practice and guided imagery group will have the highest free throw percentage increase between baseline percentages and post-intervention percentages. Overall, the purpose of this study is to help validate whether guided imagery and visualization are effective when used as a method to enhance sporting performance.

III. METHOD

Participants

A total of 67 subjects ranging between the ages of 18-51(M=19.82 years) were recruited in the San Marcos area to participate in this study. A majority of the participants were between 18-23 years of age (79.1%), 13.4% ranged between 24-30 years of age, 5.9% ranged between the ages of 31-39, and 1.49% were over 40 years old. Of the 67 participants, 54% (36) were male and 46% (31) were female. Also, a majority of the participants was Caucasian (56.7%), 23.8% were African-American, l4.9% were Hispanic, 1.4% were Asian/Pacific Islander, and 2.9% reported "other" ethnicity. All participants were familiar with the sport of basketball and the concept of free throw shooting. Although some of the participants reported playing basketball competitively, none reported shooting free throws on a day-to-day basis. It is estimated that all participants graduated high school, and about 80% are current or former Texas State University students.

Table 1

Demographics

Age Mean	**Age Range**	**Gender**	**Race**
19.82	18-23 = 53	Male = 36	Caucasian = 38
	24-30 = 9	Female = 31	African American =16
	31-39 = 4		Hispanic/Latino =10
	40+ = 1		Asian/Pacific Islander = 1
			Other = 2

Equipment

All equipment and dimensions of the task were within the official guidelines for men's competitive basketball. A size seven Wilson rubber-covered basketball with a circumference of 29.5 inches (74.93 cm) and weighing 22oz was tossed to a target from a distance of 15ft (4.57 m). The target consisted of a goal set at a height of 10ft (3.05 m).

Procedure

Before being allowed to participate, each subject had to agree to the terms and conditions provided in the consent form. If the participants were not at least 18 years of age they were automatically ineligible to participate in the study. Once the consent form was signed the subjects were then instructed to filled out a form that asked for general and demographic information that included: name, email, gender, age, and race. Subjects were then instructed to pick dates and times that would allow them to participate in 3 phases of the study: the baseline phase, intervention phase, and post-intervention phase. The baseline phase entailed each participant's meeting at the Texas State Student Recreation Center or the Gary Job Corps Activity Center to shoot 25 free throws to gage their free throw shooting percentage. Participants were then later contacted via email with instructions informing them what exercises to do for the 2nd phase (intervention phase). The intervention phase consisted of each subject's practicing (on their own time) for five consecutive days. This should take 5-15 minutes depending on which practice group they were assigned to. The 3 practice groups included the free throw practice only group, guided imagery only group, and the free throw practice & guided imagery group. The free throw practice only group was instructed to shoot 25 free throws a day for 5 consecutive days. The guided imagery group was provided with, step by step, guided

imagery/visualization techniques that were implemented for 5 consecutive days. To see instructions on the guided imagery exercise, please see the Appendix on page 33. The free throw and guided imagery group shot 25 free throws a day and implemented guided imagery/visualization technique for 5 consecutive days. After the intervention phase followed the third and final phase, the post intervention phase. The post intervention phase required all participants to reshoot 25 free throws at the exact court and goal they shot their baseline free throws. After the post-intervention phase was complete, it was then time to compare pre-intervention percentages to post-intervention percentages, compare the scores between groups, and analyze other significant results.

IV. RESULTS

After the post-intervention phase, all data were put into digital format by transferring it to an Excel spreadsheet so the results could be evaluated. For an overall breakdown of all 67 participants, 34 (51%) showed improvements in their free throw percentage, 26 (39%) showed a decrease in their free throw percentage, and 7 (10%) remained the same. A more specific evaluation was done also between each individual group as well. In the guided imagery group, of the 25 subjects, 14 (56%) showed improvements in their free throw percentage, 6 (24%) showed a decrease in their free throw percentage, and 5 (20%) remained the same. In the free throw group, of the 21 subjects, 9 (43%) showed improvements in their free throw percentage, 12 (57%) showed a decrease in their free throw percentage, and 0 (0%) remained the same. Lastly, in the guided imagery and free throw groups, of the 21 subjects, 11 (52%) showed improvements in their free throw percentage, 8 (38%) showed a decrease in their free throw percentage, and 2 (10%) remained the same.

All three groups combined, as a whole, had a total average increase of 1.97% increase in free throw percentage. Of all three groups, the guided imagery group had the best results with an average of a 4.8 free throw percentage increase, but not enough to reach significance. The group that had the next best results was the free throw group with an average of a 1.9 free throw percentage increase. One thing to note about the free throw group is that, though it did not have the best percentage increase overall as a group, the top three subjects with the highest percentage increase were in this group. Lastly, the group with both guided imagery and free throw shooting had the poorest results with an average of a 1.33 free throw percentage decrease. While this group technically had the

lowest mean of all three groups, one factor that needs to be taken into consideration was the skewed scores in this group. For instance, the subjects in this group had minor increases in their free throw percentage; subjects that decreased in their free throw percentage had decreases that were so significant that it brought down the average for the whole group. So though there were 12 subjects in the free throw group that showed a decrease (in free throw percentage) compared to the 8 subjects in the guided imagery plus free throws group, the guided imagery plus free throws group had a lower mean due to the minor increases and major decreases in free throw percentage from the subjects in the group.

Afterward, the data from the Excel spreadsheet was then imported into SPSS (Statistical Package for the Social Science) software. Through the SPSS software, a one-way between groups ANOVA (analysis of variance) was run to determine if there were a statistically significant difference between each of the three control groups (guided imagery, free throws, and both guided imagery & free throws) and participants' final results.

A one-way ANOVA was conducted to evaluate the hypothesis that there will be an increase in free throw percentage in all three groups *(n* = 67). It was conducted also to evaluate the hypothesis that the group with both guided imagery and free throws would have the highest free throw percentage increase. The dependent variable in this study was the free throw percentage. The independent variable, practicing free throws, included three groups: Guided Imagery (*M* = .048, *SD* = .082, *n* = 25), Free Throws (*M* = .019, *SD* = .151, *n* = 21), and Both Guided Imagery and Free throws (*M* = -.013, *SD* = .140, *n* = 21). In order for the ANOVA to be significant it needs to be .05 or lower. Since the

significance scored .265, the groups are not significantly different from each other, meaning the ANOVA was not statistically significant, $F(2, 64) = 1.355$, $p = .265$. A possible reason that the difference is not significant is that the size of the sample was not large enough in size for reliable results. Overall, the mean change percentage for each group was in the predicted direction, but just not quite reaching significance.

Table 2

Descriptive Statistics

Intervention	**N**	**Mean**	**Standard Deviation**
GI	25	.0480	.08246
FT	21	.0190	.15106
GI+FT	21	-.0133	.14048
Total	67	.0197	.12656

Note. G.I.=Guided Imagery, FT=Free Throws, GI+FT=Guided Imagery & Free Throws, and N represents the number of subjects.

Table 3

Mean Percentages of Groups

Intervention	**N**	**Baseline FT %**	**Post FT %**
GI	25	28.48%	33.28%
FT	21	56.76%	59.04%
GI+FT	21	56.76%	55.42%

Note. G.I.=Guided Imagery, FT=Free Throws, GI+FT=Guided Imagery & Free Throws, and N represents the number of subjects.

V. DISCUSSION

This study aimed to evaluate and validate whether guided imagery and visualization are effective when used as a method to enhance free throw shooting percentage. It was predicted that the participants in all three groups would see improvements in their free throw percentages between pre- and post-intervention scores. Secondly, it was predicted that, of all three groups, the subjects in the free throw practice and guided imagery group would have the highest free throw percentage increase between baseline percentages and post-intervention percentages. The current results from this analysis indicate that guided imagery may not be as effective as previously published research insinuates. Previous research has shown empirical support of guided imagery's being significantly effective at enhancing free throw shooting percentage. While the results of this present study steer towards the predicted hypothesis, they cannot be considered significant. An explanation for this current study's not having similar results as previous studies might be due to the limitations that were presented in this study.

Possible Limitations & Cautions

While a safe technique, guided imagery can rarely elicit negative emotional reactions, as well as create situations of patient vulnerability and susceptibility (Cooper & Stollings, 2009). However, this is not an exercise that should be used if the person is uncomfortable with implementing it for his or her own personal reasons. As with every intervention, there are some people who do not benefit from this technique or who are not capable of visualizing a relaxing image in his or her mind. For instance, guided imagery may trigger flashbacks in patients with post-traumatic stress disorder, and it is relatively contraindicated in these patients (Cooper & Stollings, 2009). It is also

contraindicated in patients who have hallucinations or delusions, delirium, or severe obsessive-compulsive disorder (Cooper & Stollings, 2009). However, there was no peer-reviewed literature discovered supporting known contraindications connected with exercising guided imagery during sports training and athletic competition. Nonetheless, as with any intervention, there are some subjects whom do not benefit from this technique or who are unable to call to mind a relaxing image. Therefore, mind-body approaches should be used in conjunction with, and not in place of, indicated physical therapies (Weil, n.d.). Although visualization can help improve an athlete's performance, it does have its limitations and will not turn an average athlete into an elite superstar (Cooper & Stollings, 2009).

A significant limitation in the study was that there were no incentives being offered to the participants. The original proposal was that psychology instructors would be asked to provide extra credit in their courses in exchange for student participation. There were many sections of the Introduction to Psychology course that required research participation as part of the overall course grade. Therefore, participation in this study could count as one of the required research credits in the participants' Intro to Psychology course. Notice of this project would then be posted to those courses using the psychology department's SONA system.

As the semester went by, the SONA system did not provide an adequate number of participants as a result of the lack of students registering for studies. In an attempt to remedy this situation, reminders were sent out to all students via email who were listed in the SONA system (with Cc to instructors) urging them to sign up for studies. Students didn't register fast enough, or at all, for most of the listed studies in the SONA system. A

possible reason for the lack of student participation could be that it was still a fairly new system being implemented at Texas State University. Another reason could be that students were less worried about receiving extra credit due to the timing being at the start of the semester. An additional reason why there was a lack of students signing up for this particular study could be due to the time requirements that the student had to potentially put towards this study. For instance, if there were a study that required meeting only one time to fill out a 15 minute survey vs. a 60 minute three phase study (that required meeting twice and practicing at home), students would more than likely go for the less time consuming study. With that issue surfacing, one way not to continue to delay the process of researching and collecting data was to recruit participants instead. Since participants had to be recruited in a short amount of time, there were no incentives being offered in exchange for participation; this factor led to another limitation.

Another major limitation in this study was that the subjects were required to practice for 5 consecutive days on their own time. Subjects being instructed to practice on their own time meant there was a chance not everyone would practice all 5 days, or even for any days. Aside from not receiving an incentive, not fully participating in the study could be due to reasons such as not having access to a basketball court, suffering an injury or sickness, exhaustion, etc. With lack of full participation, a test will not truly measure what it is supposed to measure. With this in mind, there presents a barrier that would threaten validity of the results from all groups. Validity is the extent to which a test measures what it claims to measure (Cherry, n.d.). It is vital for a test to be valid in order for the results to be accurately applied and interpreted (Cherry, n.d.). Since this study is similar to past studies, it would jeopardize the reliability of this study also.

Reliability concerns the ability of a score to consistently measure relative differences in ability (over different samples of items, tests forms, testing occasions, etc.) (Hughes, Linck, Bowles, Koeth, & Bunting, 2013). Other researchers must be able to perform the same experiment, under the same conditions, and generate the same results (Shuttleworth, 2008). Therefore, if subjects in similar past studies fully engaged in participation, and this study did not have the same honest participation, it may have caused a major threat to reliability.

It is also important to note the sample size of this study. Perhaps having a total of 67 participants was not a large enough sample for reliable results. Another possible drawback with the sample size was that the majority of the participants were predominantly Texas State University students. Having a sample size of people comprised mainly of students did not show a great representation of the general population, meaning it would cause a threat to generalizability. Also, 62 of the 67 participants were between the ages of 18-30 years of age - meaning only 5 were over the age of 30 (0 were younger than 18). Perhaps having more participants that were younger than 18 and older than 30 would have helped with causing a lesser threat to generalizability also.

One last limitation in this study was not being able to be hands on in regards to personally helping the participants rehearse the guided imagery and visualization exercises. Participants' reading a script, on their own, on how to exercise guided imagery likely lowered the chance of capturing a true state of relaxation. Therefore, if the person never reaches the full-relaxed state of mind that limits the chances of triggering positive images, making it more difficult to experience authentic guided imagery. If guided

imagery is not implemented correctly, it threatens the validity of the results. Usually when a person is being taught guided imagery for the first time, there is an expert guiding them step-by-step on exactly what to do. Though each participant was given written instructions (step-by-step) what to do, the subjects had a chance of performing this procedure incorrectly. Due to the number of participants, there would be a conflict of time and schedules, making it extremely difficult to assist all participants. Helping some participants, and not all, would have led to another limitation and threat to validity; therefore, the option chosen was not to personally assist any participants. If this study were to be repeated in the future, guided imagery might be more effective if the individuals were given an audio recording of exactly what to do step by step when exercising guided imagery and visualization.

Acknowledging limitations of a study can help researchers understand how to improve their study, which could improve the validity of results. Recognizing limitations can also help us understand why similar studies do not always obtain similar results. For instance, in the study conducted by Biasiotto, the one main modification from his study was the third control group that was utilized. In Biasiotto's study the control group was instructed not to shoot free throws, exercise GI, or practice. Where as in this current study the third group was instructed to exercise both guided imagery and free throw shooting combined. There are both similarities and differences in results between Biasiotto's study and the current study. For instance, both studies had their free throw group and guided imagery group both show improvements in free throw percentage, while their third groups both did not show any improvements. However, the difference between the two was the significance of the improvements. While Dr. Biasiotto's free throw group and GI

group saw great improvements, the current study saw minor improvements that did not reach statistical significance. Dr. Biasiotto predicted the outcome correctly for all three groups, while that was not the case for this study. One of the hypotheses' for this current study was that all three groups would see improvements in their free throw percentage, but only two of the three saw some improvements. Of those two, the guided imagery group had the best improvement. The second hypothesis was the group that practiced both free throws and guided imagery would have the highest free throw improvements of all three groups. Not only did this group have the poorest results, of the three, but also the mean free throw percentage for this group actually decreased. For the fact this group had both techniques to practice, it was extremely shocking that this group performed the worst of all three groups. Based on how effective both techniques are, and past research, it is only suspected that the subjects in that group did not fully participate in the study by rehearsing five days consecutively.

Besides providing incentives, audio recording for guided imagery, and a larger and more diverse sample size, there are a couple of other things that could have been applied to reduce the limitations in this study. For instance, when the free throw percentage was assessed in this study there was only one trial of 25 free throws shot during pretest and one trial of 25 free throws shot during posttest. For more accurate results future researchers could have the participants shoot 3 trials of 25 free throws and then compute the average of the three. Having a regression toward the mean will help with the free throw scores being more reliable and accurate. For instance, this protocol for measuring scores, is implemented during the National Football League combine when testing the 40-yard dash. The participants run three 40-yard dashes and the 3 times are

then averaged out for the final score. With technology changing almost daily, there are many opportunities for improving studies by taking advantage of that technology. Fore example, one could create a "smart" phone application (an "app") for the participants', which could provide an audio guided reminder of how to implement guided imagery while the individual was engaging in that imagery. The app could also be programmed to notify the researcher each time the participant listens to the guided imagery audio. This would allow the researcher to have more confidence that participants are actually engaging in the required rehearsal or at least allow the researcher to take lack of engagement with the guided imagery recording into account during subsequent analyses.

In summary, the current study did not find that the guided imagery intervention had a significant effect on enhancing free throw percentage. However, as stated in the literature review, there are several case studies and past research that provides reliable proof that guided imagery can be extremely effective in sports performance. Guided imagery and visualization is a technique that is slowly gaining recognition in the world of sports and athletic completion. Though this study had various limitations, it can still be used as a learning tool to provide more valid results in future research. More reliable and valid results will then be able to help more athletes, trainers, and coaches to have more effective results from their training sessions.

APPENDIX SECTION

Participant Background Information

Name_____

Email_____

Gender_____

Age_____

Race_____

Baseline Free Throw %_____

Post Intervention Free Throw %_____

Steve Nash and the Imaginary Free Throw

Every time Steve Nash goes to the foul line, he shoots five or six free throws. Sure, there's the two that really count, but the NBA's all-time free throw percentage leader always takes several imaginary shots before getting the ball. He says it helps him not only visualize the ball going through the net but also gets his brain and body prepped for the upcoming motor skill. After almost 3,400 regular season attempts, his **90.4%** success rate seems to work. According to basketball coach and sport science Ph.D. candidate Brian McCormick, players need to use a pre-performance routine to prepare their brain:

"A pre-performance routine accomplishes three main physical goals:

1. Stabilizes the motor pattern
2. Adds consistency
3. Establishes a rhythm

When Steve Nash attempts his practice shot, he uses the Imaging step. Rather than pure visualization, where a player may imagine a previous made shot, Nash adds the kinesthetic element. He imagines the ball going through the basket, but he also feels the shot."

McCormick credits Nash's pre-shot process, kept identical for every attempt:

"When Nash takes a pre-practice shot without the ball, he is accessing the motor pattern and moving it to the working memory. He stabilizes the motor pattern, so he can retrieve the pattern more quickly and effectively than someone who shoots cold. His routine also rhythmically prepares the movement. Most motor skills have a rhythm to them, and Nash feels the rhythm of his shot during the practice shot rather than shooting the real free throw cold."

"Visualization is an important tool for me"

Phil Jackson,

(One of the Most Successful Coaches in NBA History & current head coach of Steve Nash)

"You only achieve what you believe"

Visualization/Guided Imagery Steps

One of the best times to do this is just before you go to sleep, or when you wake up in the morning

1) Identify the goal you want to visualize (Making Free throws).
2) Find a comfortable place to acquire a deep place of relaxation.
    a. Eliminate all distractions (e.g. turn off phone, TV, etc.)
3) Close your eyes and focus on feeling relaxed
    a. Repeat the word "relax" to yourself—again and again. Say it slowly and purposefully. Feel more R-E-L-A-X-E-D each time you say it.
    b. Count down from 1 to 10. As you do so, imagine you're descending a staircase. Each step takes you to a deeper level of relaxation.
    c. Release any thoughts that come up & imagine watching a giant blank screen in front of you.
        i. As you notice these thoughts, refocus on the "nothingness" of the empty screen.
    d. Now, imagine yourself in the situation where you want to improve. Cast the image of you making a free throw on the big screen in front of you.
        i. Create a picture in your mind of not only the visual, but also the sounds and smells of the environment you will be competing in (Gary Job Corps Gym).
        ii. Turn it into a movie, featuring you in possession of your DREAM/GOAL. Make it clear & vivid, happy, and exciting.
4) Rather than pure visualization, where you imagine a made shot, add the kinesthetic element and also FEEL the shot being made.
    a. Practice your stance and motion of how you shoot your free throws. Make sure it's the EXACT same stance & motion every time. (e.g. if you spin the ball or dribble twice before shooting free throws make sure to do so every time before shooting)
        i. If you choose to listen to music while doing this exercise make sure to stick to one song that makes you focus, and remember to play that same song in your mind every time you shoot free throws.
5) See yourself happy that you have attained what you wanted. See yourself smiling and happy after reaching your goal. Take a moment to feel the pleasure and excitement of achieving this goal already complete.
    a. Imagine how that feels?
    b. What do you say to yourself?
    c. What are others saying about you?
    d. How GREAT does it all seem to you?

Say out loud:
Today, I am easily and effortlessly seeing my goal accomplished.
Today, I see myself successful.
Today, I see myself_____(your goal). ←Making my free throws

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