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C E R T I F I C A T E

I, **Dr. P. T. Joseph** do hereby certify that this report entitled **"EFFECT OF MENTAL IMAGERY TRAINING PROGRAMME ON SELECTED PSYCHOLOGICAL VARIABLES AND SKILL PERFORMANCES OF VOLLEYBALL PLAYERS",** is a record of bonafide study and research carried out by Mr. M. K. Radhakrishnan, under my supervision and guidance and that it has not been previously formed the basis for the award of a Degree, Diploma, Title or Recognition.

(**Dr. P. T. Joseph)**

Supervising Teacher.

DECLARATION

I, **M. K. Radhakrishnan** do hereby declare that this report entitled **"EFFECT OF MENTAL IMAGERY TRAINING PROGRAMME ON SELECTED PSYCHOLOGICAL VARIABLES AND SKILL PERFORMANCES OF VOLLEYBALL PLAYERS"** has not been previously formed the basis for the award of a Degree, Diploma, Title or Recognition.

Calicut University,

31-03-2008. **M. K. Radhakrishnan.**

Dedicated to

My Beloved Parents

Late Karunakara Kurup

&

Late Madhavi Amma

for showing me the way, and grooming me with love and support

VITA

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***

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M.K. Radhakrishnan.

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CHAPTER I

INTRODUCTION

The Power of Imagination

What is the power of imagination? We shall create and recall experiences mentally. For example, an employee rehearses how she will ask her boss for a raise, imagining how she will dress in her most business like suit and stand confidently in front of the boss's large, mahogany desk, with its smell of beeswax polish. She hears herself speaking slowly, quietly, and clearly, listing her skills and accomplishments that merit increased remuneration. Or, yesterday's bridegroom remembers standing in front of the wedding quests in their brightly coloured, new outfits as he made his speech in a shaky and unusually throaty voice. He senses against how dry his mouth felt as he spoke. He recalls the words he used in welcoming the guests to the celebration, lauding the bride, and thanking emotional parents (hearing echoes of his mother sobbing happily). He relives the embarrassment he felt when he knocked over a tall champagne flute as he waved his hands excitedly, as if conducting his own speech. He feels the rap of his hand against the glass, hears the tinkle it made as it hit a saucer on its way down, and senses, the cool moisture of the champagne on the back of his hand. In fact, just from reading these descriptions you might be experiencing some of the sights, sounds, smells, and bodily sensations that these experiences evoked in others.

Introduction

Athletes frequently experience such mental episodes (e.g. Hall 2001; Martin, Moriz, and Hall 1999; Rotella, Boyce, Allyson, and Savis 1998; Rushall and Lippman 1998). Many sport performances generate detailed and precise image intentionally. A tennis player who is about to compete on the center court as Wimbledon might be able to generate a vivid image of the venue, picturing the dark-green walls, smelling the freshly mowed grass, and hearing the applause of the spectators as he moves around on that hallowed turf. He can feel the sensations in his muscles as he plays his shots powerfully and accurately. He sees his opponent stretching, struggling to reach the probing drives, and hears his gasps of frustration when his desperate effort results in yet another netted shot. Out Wimbledon star feels in control already! (Morris, Spittle and Watt, 2005)

Imagery is the mental creation or re-creation of sensory experiences that appear to the person imagining them to be similar to the actual event (Suinn, 1993). We constantly relive past experiences and imagine wished for events, in pictures, sounds, smells - in fact, with all our senses. We can also experience the same emotions as those that the real event generated, which can led to changes in physiological indicators such as heart rate, respiration, or muscle tension. In other words, an imaginary event can provoke real-life emotional and physiological responses.

With practice, we can manipulate out imagination to preview upcoming events, as the tennis player did. We can review things that have already happened, sometimes intentionally but often when we would rather

not, as in the example of the gymnast's unwanted imagery of her biggest disaster. We can "replay" these imagery experiences in real time (at the same speed that they occurred) or we can slow them down. And, as the gymnastics example shows, we can imagine only part of an event - although we would prefer it to be that part where we performed at our bets! Taking full advantage of the amazing flexibility of imagery, we can zoom in on specific, aspects of the action or pull back to see more of what was happening around us or to observe the event from different angles. Similarly, we can focus on one sense modality, such as the kinesthetic sense, for example, how our fingers and wrist feel as we imagine bowling a leg-spin ball in cricket or pitching curve ball in baseball. Sometimes, especially when we consciously control the imagery, we call these experiences daydreams. On other occasions, they can be nightmares, such as when an athlete imagines missing the final shot that would have won the championship. The most important point to understand about imagery is anxiety, increase confidence, enhance endurance, speed recovery from injury or heavy exercise, and much more. (Morris, Spittle and Watt, 2005)

Power of Imagery

Imagination is terrifically powerful. By mentally rehearsing a routine before a major competition, athletes can prepare themselves to achieve their optimal performance when it counts most. By imaging playing at their peak,

athletes can build their confidence for a match. Imagery can also help a performer through a tough injury layoff by shifting attention away from the injury onto the mental rehearsal of sport skills. Knowing that research supports the value of imagery for maintaining skill level when physical practice is not possible can help motivate an athlete during recovery. When physical practice is not possible such as, during travel, imagery can provide athletes with a way to practice. It allows them to review previous strokes or movements so they can correct errors. It is difficult to think of anything else that has as much potential to enhance or destroy not only performance outcomes but also the entire experience of sports.

Imagery: Definitions

The definition and conceptualization of the imagery construct in relation to sport remains an ongoing challenge for researchers and theorists. A recent resurgence in interest in the task is apparent; however, limited liaisons between the various investigative cohorts may restrict the formulation of accepted definitions of sport imagery constructs.

Within the filed of cognitive psychology, descriptions of mental imagery lack consistency in terms of the features that constitute the process. The focus of each definition seems to vary depending on the purpose for which the imagery description is used.

Introduction

Unfortunately, many definitions of imagery derived from sport psychology literature have tended to focus on only limited aspects of this ubiquitous mental experience.

Moran (1993), in examining imagery assessment in sport, referred to two simple definitions of the term. The first, presented by Matlin (1989), described imagery as a procedure for mentally representing things that are not physically present. The second definition, developed by Solso (1991), described it as "a mental representation of non-present object or event". Moran (1993) extended these descriptions by emphasizing that imagery should include not only the visual sense but multiple sensory inputs. Such a belief contrasts with a tendency in areas of the sport psychology literature, even in relatively recent texts (Cox 1998; Wann 1997), in which the definition of imagery concentrates on the visual perspective only, through terms such as "visualization", "mental picture," or "the mind's eye" (Morris 1997). Hardy, Jones, and Gould (1996) avoided this problem by focusing on the sensorial nature of imagery, describing the term "as a symbolic sensory experience that may occur in any sensory mode". Murphy (1994) proposed a definition that highlighted the memorial aspects of the process, suggesting that it relied on the recollection of stored sensory experiences, which may be recalled in the absence of external stimuli. Although these definitions provide a basic foundation for describing the process, they have tended to oversimplify a complex concept of substantial importance within sport psychology.

Introduction

Denis (1985) formulated a definition that highlighted the dynamic and creative properties of images:

“Imagery is a psychological activity which evokes the physical characteristics of an absent object (either permanently or temporarily absent from our perceptual field). It is worth emphasizing here that imagery is not restricted to recollection of the appearance of static objects, but it extends to moving objects, objects undergoing transformations, in other words, to dynamic events. The scope of imagery is not limited to recalling objects or events that have been perceived in the past (recent or distant past), but imagery also refers to objects or events that have not yet been accomplished. Imagery allows people to anticipate future (or even purely theoretical) events.).”

Mental practice, according to Corbin, is the "repetition of a task, without observable movement, with the specific intent of learning" (1972, 94). Mental practice may not use imagery at all; it could include non image-based strategies such as verbal rehearsal or self-talk.

Within an applied sport psychology context, Suinn (1976a, 1983, 1993) used the term "Imagery" in relation to his procedure known as visuomotor behaviour rehearsal (VMBR):

The imagery of visuomotor behaviour rehearsal apparently is more than sheer imagination. It is a well-controlled copy of experience, a sort of body-thinking similar to the powerful illusion of certain dreams at night.

Perhaps the major difference between such dreams and VMBR is that the imagery rehearsal is subject to conscious control. (Suinn 1976a).

Recently, Simons (2000) presented an excellent analysis of the process of using imagery as a psychological-skills training technique. The information relevant to his definition of imagery emanated from his conclusions about the manner in which athletes imagine. Simons described the process as follows:

Imagery is intriguing for its close relationship to perception and action. It is such a rich memory system, matching the complexity of information presented by the environment and contained in the execution of motor skills. Images bind personal thoughts and emotions to experience, and they have qualities far beyond simple stimulus /response propositions…. Imagery can be creative, allowing one to experience attitudes and actions mentally in ways that have not yet been encountered in real performance.

Working Definition of Sport Imagery

For the purpose of this study, it seems appropriate to select a complete definition of sport imagery to aid in interpreting and evaluating the theory and research presented. The following definition by Morris and Watt (2005) complies specific elements of relevance from the definitions of Richardson (1969) and Denis (1985), the conceptualizations of Suinn (1976a. 1983, 1993) and Vealey and colleagues (Vealey and Walter 1993; Vealey and Green leaf 1998, 2001), and the applied interpretation of Simons

(2000). emphasizes the nature of mental imagery in relation to involvement in sport.

Imagery, in the context of sport, may be considered as the creation or re-creation of an experience generated from memorial information, involving quasi-sensorial, quasi-perceptual, and quasi-affective characteristics, that is under the volitional control of the imager, and which may occur in the absence of the real stimulus antecedents normally associated with the actual experience.

A review of several other recent conceptualizations reveals the researchers' efforts to generate a suitable framework from which to explore how imagery operates in sport. Conceptualizations such as sport imagery use, PETTLEP, and imagery content models represent viable representations that further research will refine and confirm. The Murphy and Martin (2002) model of imagery in sport establishes a base from which to categorize theories and evidence about the imagery's operation and involvement in athletic performance.

Efforts to extend the explanation of the imagery construct within sport psychology are progressing positively. For a long time, too few theorists were prepared to propose definitions or construct models. Thus, perhaps undeservedly, they sustained the misconception that describing imagery was too difficult a task. Although the various conceptualizations reflect a reasonable degree of divergence, increased information sharing and

interaction between research groups should lead to a more succinct set of descriptors for sport imagery.

The structural conceptualization underlying measures of imagery ability and imagery use has varied considerably. There are unimodal, uni-dimensional tests such as the VVIQ, VMIQ, and GTVIC; multimodal, uni dimensional questionnaires such as the SQMI, and MIQ; and multi scale measures of imagery use such as the SIQ.

Imagery is a powerful and useful psychological tool that can be applied for various purposes in sport and exercise. Although we have described some of those potential applications, many more uses than we can imagine probably exists. The applications we discussed include skill learning and practice, development and practice of tactical skills, competition preparation and performance, improvement of psychological skills, and coping with injury and heavy training.

A great deal of research effort has been dedicated to understanding imagery and its application in sport situations. The results have generally supported the view that imagery can produce changes in physical performance and in psychological variables that may affect sport performance. Various factors, such as imagery speed and content, have been suggested as influences on the efficacy of imagery. How much imagery is optimal to bring about changes in performance is still an important research question.

Introduction

Imagery Research

Imagery perspectives and modalities appear to be important considerations in using imagery effectively in sport. Imagery modalities (visual and kinesthetic) can be differentiated and may provide discrete information. Research on visual and kinesthetic imagery suggests that both are important in sport and their effectiveness may be related to the purpose of imagery (e.g., motivation or confidence) or the type of sport skill being learned or performed. Similarly, the research on imagery perspectives suggests that the purpose of imagery (e.g., motivation or confidence) or task being imagined (e.g., open or closed, form based or nonform based) is important in the efficacious use of perspectives. A general conclusion about imagery modality and imagery perspective is that imagery is beneficial to the extent that it adds useful information to the movement experience (Hardy, 1997). Since it is likely, that visual and kinesthetic imagery is beneficial to the extent that, it adds useful information to the movement experience (Hardy, 1997). Since it is likely that visual and kinesthetic imagery and internal and external imagery provide different information about a movement experience, practitioners are advised that an effective approach to imagery might be to combine modalities and perspectives. In other words, using both modalities and both perspectives is often better than using only one perspective and modality, as they allow athletes to gain as much information as they can about a movement experience and makes imagery maximally effective.

Introduction

Because it is one of the most common tools used by sport psychologists, imagery has been the subject of many research investigations. The foremost question that sport psychology researchers have sought to answer is "Does imagery work?" If imagery is effective, then it would be valuable to know which factors may enhance or detract from the efficacy of the process. From a practical perspective, knowing the optimal amount of imagery that is needed to bring about changes in performance would be helpful.

A synthesis of research that has focused on imagery and sports performance has substantiated the influences and effectiveness of imagery in sport.

Most imagery research has concerned the effect of the cognitive rehearsal of sport skills on subsequent performance (Hall 2001). Early meta-analyses (Feltz and Landers 1983; Hinshwa 1991) concluded that mental practice was more effective than no practice for improving subsequent performance of motor skill. In Hinshaw's meta-analysis, the overall effect size for mental practice over no practice was 68 (SD=11).

Imagery is not superior, however, to physical practice for increasing motor-skill performance (Hird, Landers, Thomas, and Horan 1991). The research of Hird et al. showed that physical practice was the most effective for improving performance on pegboard and pursuit motor tasks.

Introduction

Combinations of physical and mental practice were progressively less effective with decreases in physical practice and increase in mental practice.

Imagery is a powerful and useful psychological tool that can be applied for various purposes in sports and exercise. Potential applications of imagery include skill learning and practice, development and practice of tactical skills, competition preparation and performance.

Probably the best known use of imagery is for practicing a particular sport skill. Athletes practice putting a golf ball, executing a takedown in wrestling, throwing the javelin, doing a routine on the balance beam or swimming the back stroke, all in their minds. You can practice skills to fine tune them or you can pinpoint weaknesses and visualize correcting them. Imagery can also be used to practice and learn new strategies or review alternate strategies for either team or individual sports.

The focus on imagery uses so far has been on performance related aspects of sport, but imagery can also influence an athlete's psychological state. It can enhance psychological skills such as concentration, self confidence, motivation, attention, and anxiety control.

Imagery can help athletes focus attention and regain focus when they become distracted. To help focus attention athletes can imagine relevant aspects of the upcoming performance. This narrows focus to those relevant aspects and limits the impact of irrelevant cues. To learn to remain focused during performance athletes could imagine the upcoming performance and

all the potential distracters that might be present and developed coping strategies to deal with them before they become a problem. Athletes also need to be able to refocus their attention if they are distracted or if something goes wrong. They can imagine themselves in the situations in which they often lose concentration, and then imagine being composed and focused on the game. By imagining what they want to do and how to do it, they may remain more focused on their performance.

Imagery can also be used to increase or decrease arousal. For instance, scenes that “pump up” a player, such as playing aggressively in front of a crowd might be used prior to a game to increase arousal. Alternatively, imagining a successful performance, relaxing scenes (such as a peaceful place) or muscular tension floating out of the body reduces feeling of anxiety. Imagery can also help athletes cope successfully with problems or situations that might provoke anxiety by allowing them to create plans for dealing with these situations and imagine using those plans successfully.

Imagery has been widely suggested as a means of enhancing self confidence. Images that create feelings of competence and success, such as performing well or executing skills correctly increase an athlete’s confidence.

Introduction

Imagery is a fascinating device for influencing thoughts, affective states, and behaviors in sport and exercise, and its application is limited only by our imagination and creativity.

Imagery is a ubiquitous process that most people experience almost all the time. In sport and exercise, imagery has many functions, which had led to a great deal of research. Unfortunately, much of that research has not been systematic; often, it is as if we have opened the door and glanced into another room, then another. We need to identify the most critical issues relating to the imagery process in the context of sport and exercise and establish major research programmes to study them in detail.

Majority of imagery studies on skill and performance of athletes have concentrated on individual events and more specifically on closed skills like golf, shooting etc. Furthermore, it seems that very few imagery intervention studies have been able to successfully consider the complexity of open and dynamic team ball sports. Studies in team ball sports have typically isolated one or several closed skills and used these as dependent variables, for example basketball players performing free throws (e.g., Shambrook & Bull, 1996) and soccer players dribbling, passing, and shooting, without any opponents present (Blair, Hall, & Leyshon, 1993).

In this study the investigator tries to analyse the effectiveness of imagery intervention on a team sport like volleyball, with emphasis on psychological variables as well as skill performances during the game situations. Moreover, the researcher himself, being a volleyball player, and

volleyball being a popular game in the Malabar region of Kerala, it seemed justified that undertaking such a study would be beneficial in improving the psychological build of the players and thereby improvement in performance.

Objectives of the study

The present study on imagery intervention programmes on psychological variables and skill performances of volleyball players was undertaken with the following objectives:

1. To examine the effectiveness of mental imagery as a potential tool for psychological preparation of volleyball players.
2. To find out the effectiveness of three weeks mental imagery intervention programme on selected skill performances variables of volleyball players.
3. To find out the effectiveness of mental imagery intervention programme for the total duration of twelve weeks on selected psychological variables of volleyball players.
4. To find out the effectiveness of mental imagery intervention programme for the total duration of twelve weeks on selected skill performances of volleyball players
5. To assess the effectiveness of mental imagery intervention programme on selected psychological variables and skill performances for elite and novice volleyball players.

Introduction

Statement of the Problem

The present study is titled **"Effect of Mental Imagery Training Programme on Selected Psychological Variables and Skill Performances of Volleyball Players"**.

Delimitations

The study was delimited to the following aspects:

1. The study was delimited to only three weeks duration of mental imagery training programme for each of the selected skill.
2. The total duration of the mental imagery intervention for all the selected four skills was delimited to twelve weeks.
3. The study was confined to 60 male volleyball players; 30 elite performers and 30 novice performers from North Kerala.
4. The age group of the subjects in this study was delimited to 17 years to 25 years.
5. The study was delimited to the assessment of the following variables only.

Psychological Variables

1. Cognitive Anxiety
2. Somatic Anxiety
3. Self confidence
4. Attention.

Skill Performance Variables

1. Serve
2. Pass (service reception)
3. Attack/ Spiking
4. Block

Limitations

The following limitations were recognised for the present study:

1. The individual variations in imagery ability of the subjects, which might have affected the study results, may be considered as limitation of the study.

Hypotheses

The present study was undertaken with the following hypotheses:

(i) There would be significant effect for the three weeks mental imagery intervention programme on selected skill performance variables namely, serve, pass (service reception), attack and block of volleyball players.

(ii) There would be significant effect for the mental imagery intervention programme on selected psychological variables namely, cognitive anxiety, somatic anxiety and self confidence and attention of volleyball players.

(iii) There would be significant effect for the imagery intervention programmes for all the four skills (three weeks each) for the total duration of twelve weeks on selected skill performances variables namely, serve, pass (service reception), attack and block of volleyball players.

Definition of Key Terms

Operational definition of key terms involved in the study is explained below in order to have clarity about the study.

Mental Imagery

Imagery is defined as “An experience that mimics real experience, we can aware of seeing an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing” (White and Hardy, 1998).

“Imagery, in the context of sport, may be considered as a creation or re-creation of an experience generated from memorial information,

involving quasi-sensorial, quasi-perceptual and quasi-affective characteristics, that is under the volitional control of the imager, and which may occur in the absence of the real stimulus antecedents normally associated with the actual experience" (Morris Spittle and Watt, 2005).

For the purpose of the present study the definition by Morris Spittle and Watt, (2005) is more acceptable.

Cognitive Anxiety

Cognitive anxiety is the mental component of anxiety and is caused by negative expectations about success or by negative self-evaluation (Martens et al, 1990).

Somatic Anxiety

Somatic anxiety refers to the physiological and affective elements of the anxiety experience that develop direct autonomic arousal. (Martens et al., 1990).

Attention

Attention is the term used to describe the process whereby an individual uses his or her senses to perceive the external environment (Roberts, 1986).

Self Confidence

Refers to the degree of certainty athletes possess about their ability to be successful in sport (Vealy. I986).

Introduction

Significance of the Study

In sport psychology, there is considerable research that supports the use of mental skills training programmes for improving sport performance. Mental strategies in general have shown to improve the psychological attributes favourable to performance among athletes, and this area has received considerable attention in research as well as competitive situations.

Numerous studies have reported that athletes experience their best sporting performances when they plan and execute mental strategies prior to competition. For instance, Olympic wrestlers have claimed to have their best performances in matches after using mental preparation techniques (Gould et al., 1992), and golfers report more self-confidence in tournament play after cognitive reinforcement strategies are employed prior to their matches (Cohn, 1991).

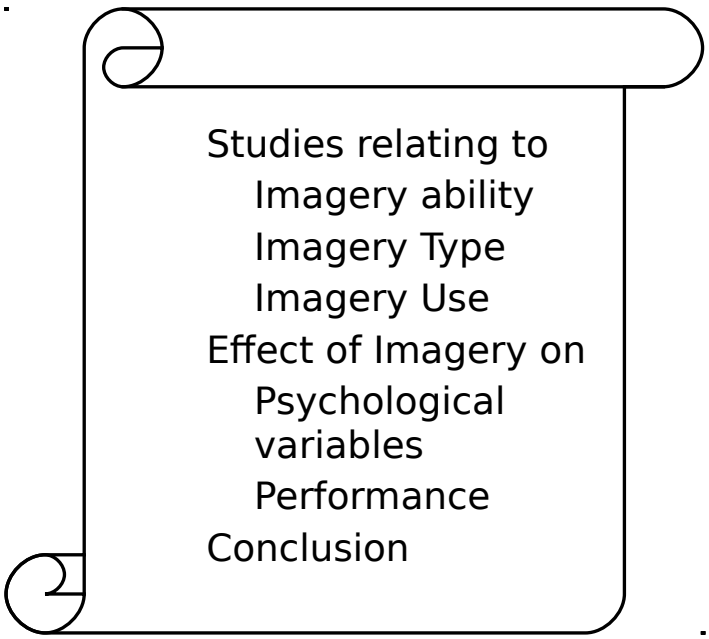
One psychological skill in particular, mental imagery has received much attention for its role in athletic performance and is often included in psychological skills training packages given to athletes to complement their regular training programmes. Hall (2001) has even suggested that imagery for the rehearsal of skills should be treated similar to physical practice given that research has suggested a functional equivalence between the two activities (Gabriele *et al.*, 1989; Holmes and Collins, 2001). More specifically, it has been suggested that imagery and the preparation and execution of autonomous, overt motor performance relate to the same mental representation system (i.e. Decety and Grèzes, 1999). Given the

potential influence of imagery interventions in sports, the present investigation on the effect of imagery interventions on selected psychological variables and skill performances of volleyball players will be significant in the following ways:

1. The study will reveal the effect of mental imagery training programme on psychological and skill performance aspects of volleyball players.
2. The study will be an eye opener for further research on imagery modalities on team events and open skilled sports.
3. The study will provide knowledge in the area of psychology with special significance on mental rehearsal and mental imagery
4. The study will be of benefit to coaches and physical education teachers in mental preparation of volleyball teams for competition.

CHAPTER 2

REVIEW OF RELATED LITERATURE



CHAPTER II

REVIEW OF RELATED LITERATURE

A brief account of literature related to the present study is enumerated in this chapter. The chapter is organized in two heads; (i) studies relating to imagery ability, imagery type and imagery use, and (ii) studies relating to imagery and psychological variables and performance.

Studies relating to Imagery Ability, Imagery Type and Imagery Use

Shorti; Tenutez and Feltz (2004) examined the relationships among efficacy in using imagery, imagery use and imagery ability. Consistent with Bandura's (1986, 1997) theory, it was hypothesized that there would The factors that influence whether an athlete chooses to engage in imagery be a positive correlation between efficacy in using imagery and imagery use, and that efficacy in using imagery would mediate the relationship between imagery ability and imagery use. Participants were seventyfour female athletes from various sports. The instruments we used were the Movement Imagery Questionnaire – Revised (Hall & Martin, 1997) for imagery ability, the Sport Imagery Questionnaire (Hall, Mack; Paivio, & Hausenblas, 1998) for imagery use, and a modified version of the latter questionnaire for efficacy in using imagery. Correlations showed that the more athletes were confident in their ability to use a certain image, the more they used it. Efficacy in using imagery was found to mediate only the relationship between imagery ability and cognitive imagery use.

Review

Short and Short (2005) investigated on the differences between high- and low-confident football players on imagery functions Recent research has suggested and shown that different athletes use the same image for different functions. These studies question the usefulness of the Sport Imagery Questionnaire (SIQ) as it consists of 30 images that comprise 5 functions. In this study, an original and a modified version of the SIQ were used. The modified SIQ took into account that different athletes could use the same image for different functions as it computed the SIQ function scores according to the athletes' perceptions. Seventy-nine male collegiate football players participated. It was found that the imagery–confidence relationship differed according to how the SIQ subscale scores were computed.

Mahoney and Avener (2005) conducted an exploratory study on the psychology of the elite athlete; thirteen male gymnasts were given a standard questionnaire and interviewed during the final trials for the U.S. Olympic team. Particular attention was given to psychological factors and cognitive strategies in their training and competition. Using their final competitive grouping as the primary dependent variable, correlations were performed to assess the relationship between these factors and superior athletic performance. Data from this exploratory study suggested that varying patterns of cognition may be strongly correlated with successful and superior gymnastic performance. Specifically, dream frequency, self-verbalizations, and certain forms of mental imagery seemed to differentiate the best gymnasts from those who failed to make the Olympic team. These

two groups also appeared to show different anxiety patterns and different methods of coping with competitive stress. The implications of these results for sport psychology are briefly discussed.

Recent research suggests that there are at least four aspects to the content of self-talk its valance, overt ness, person, and structure (Hardy 2001). Although Hardy. (2004, Studies 1 & 2) reported that the majority of athletes' self-talk is positive (e.g., "you can do this"), said covertly (or internally), and is abbreviated (e.g., "head" instead of "remember to keep your head down") in structure, sex and sport type differences for the content of self-talk have been found (Hardy 2004, Study 1). Specifically, male athletes were found to use more negative, overt (external) and less covert (internal) self-talk compared to female athletes. Moreover, team sport athletes were found to differ from individual sport athletes in almost identical manner. Post hoc analyses revealed that the significant effect of sex was confounded with the effect of sport type.

Hatzigeorgiadis; Theodorakis and Zourbanos (2004) examined the effect of instructional and motivational self-talk on the occurrence of interfering thoughts and performance on two water-polo tasks with similar characteristics performed in the same environment. Two experiments were conducted in the swimming pool, one involving a precision task (throwing a ball at target) and one involving a power task (throwing a ball for distance). In the first experiment (precision task), both self-talk groups improved their performance in comparison to the baseline measure, with participants using

instructional self-talk improving more. In the second experiment (power task), only the motivational self-talk group improved its performance significantly. In both experiments the occurrence of interfering thoughts declined for both groups. The results of the study provide further support for the effectiveness of self-talk and give preliminary evidence regarding likely mechanisms through which self-talk influence performance, that is through indications that self-talk reduces thoughts not related to task execution, thus enhancing concentration to the task.

Hall and Hardy (2004) reports on athlete's use of self talk. Recent studies focusing on self-talk have increased our understanding of this much promoted mental skill. As a result, self-talk can be thought of as a multidimensional phenomenon focusing on athletes' self-verbalizations, which can serve both instructional and motivational functions.

Laguna and Ravizza (2003) conducted a study, the purpose of which was to examine athlete's mental skill use in practice and competition, their mental skills training experience, and their perceptions of success. The Test of Performance Strategies (TOPS) and a perception of success questionnaire were administered to 199 collegiate baseball and softball players. An ANOVA revealed a significantly greater use of mental skills in competition than in practice, and significantly higher perceptions of success in practice and competition were found when athletes reported a greater use of mental skills in both environments. The athletes experience with mental skills training, however, did not have a significant influence on their mental skill

use during practice or competition. The results demonstrate the importance of mental skill use, and provide numerous applied implications for practitioners as well as opportunities for further research regarding the practice environment of athletes.

Wilson et al (2003) studied to examine the relationship between exercise regulations varying in self-determination and exercise imagery. Female Canadian university exercise participants (N = 165) completed measures of exercise regulations and exercise imagery following an exercise class. Descriptive statistics indicated participants held more self-determined reasons for exercise participation in the form of greater endorsement of both identified and intrinsic exercise regulations, as well as reporting more frequent use of appearance related exercise imagery. Canonical correlation analysis revealed two significant canonical functions (Rc1 = .47, Rc2 = .30). The first function suggested that more self-determined exercise regulations were associated with both appearance and technique imagery, while the second function revealed that introjected regulation was most strongly associated with appearance-related imagery. Collectively, these data suggest that the content of exercise imagery can be understood within a theoretical framework that clarifies the functional role played by different images in exercise promotion based upon their motivational foundations.

Abma et al (2002) conducted a study; the purpose of this research was to examine how high and low trait sport confident track and field athletes differed in their imagery content and imagery ability. NCAA

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Division I track and field athletes (*M* age = 20.5 +/– 1.61 years; *M* = 7.15 +/– 3.3 years experience; *N* = 111, 44 males and 67 females) completed the following measures: Trait Sport Confidence Inventory (TSCI), Sport Imagery Questionnaire (SIQ), and Movement Imagery Questionnaire-Revised (MIQ-R). Profile analyses revealed that high trait sport confident athletes utilized each category of imagery (Motivational General-Mastery, Motivational General-Arousal, Motivational Specific, Cognitive General, and Cognitive Specific) significantly more than low trait sport confident athletes. No significant differences emerged between the groups on the two imagery ability scales. The results suggest that the high confident athletes used more imagery, but they did not have higher imagery skills than low confident athletes.

Rojerson and Hrycaiko (2002), examined the effectiveness of two mental skills on the performance of ice hockey goaltenders during league games .The mental skills utilized were relaxation, in the form of centering, and self talk .The participants were five male junior A hockey goaltenders .A single –subject multiple baseline across individuals design was employed to evaluate the use of mental skill. The results demonstrated that the mental skill training was effective in producing improvements in the save percentage of the goaltenders. The social validation results indicated that the participants enjoyed using the mental skills and were satisfied with the results obtained. Furthermore, the coaches were very satisfied with the

results and felt that the mental skill training was an important ingredient for improving performance, in particular performance consistency.

Callow and Hardy (2001) explored to find out the relationship between imagery type and confidence, and two possible moderating variables, skill level of the athlete and sport type. One hundred and twenty-three female county netball players participated in the study; fifty five from a low standard county and 68 from a high standard county. Participants were administered the Sport Imagery Questionnaire (SIQ). One week later, at a county netball match, the State Sport Confidence Inventory (SSCI) was administered. Hierarchical multiple regression analyses showed that in the lower standard sample, mastery imagery and imagery related to strategies of the game accounted for a significant proportion of the variance in sport confidence. Additionally, imagery related to the emotions of playing predicted confidence negatively. With the higher standard sample, goal achievement oriented imagery was the only significant predictor of variance in confidence. The results are discussed in relation to the pertinence of, and function that, different imagery types have for performers.

The frequency with which netball players use various types of imagery has been linked with their confidence of performing successfully in a game (Callow and Hardy 2001). In the Callow and hardy study, two samples of netball players were used: one each from higher-ranked and lower-ranked counties. For the players from the higher-ranked country greater confidence of performing successfully was associated with more

frequent use of motivational-specific (i.e. goal-oriented) imagery. For those from the lower-ranked county, greater confidence was related to more frequent use of motivational-general-mastery imagery (i.e. mastering a skill in a competitive situation), cognitive-general imagery (i.e. game strategy), and motivational-general-arousal imagery (i.e. psyching up). More research is needed to determine whether imagery can increase confidence levels and whether athletic ability might influence the effectiveness of an imagery treatment.

Studies have shown the speed at which skills are imaged may be different from the speed at which they are physically executed. Clamels and Fournier (2001) found that twelve gymnasts imaged a routine, and each of the six acrobatic and choreographic stages that comprised it, at a faster rate than they actually performed them. Factors that may have contributed to these differences are the time constraints that gymnasts normally have on their pre routine preparation, the intended function of the imagery (i.e. cognitive or motivational), and the perceived task difficulty. The duration of the imagery was longer for the more technically difficult stages.

Cumming and Hall (2001) studied to examine mental imagery within the context of the deliberate practice framework. Altogether, one hundred and fifty nine athletes from one of three different competitive standards (recreational, provincial and national) completed the Deliberate Imagery Practice Questionnaire, which was designed for the present study to assess the athletes' perceptions of the importance of imagery along the three

deliberate practice dimensions of relevancy, concentration and enjoyment. The results indicated that national athletes perceived imagery to be more relevant to performing than recreational athletes. In addition, athletes of a higher standard (i.e. provincial and national) reported using more imagery in a recent typical week and they had accumulated significantly more hours of imagery practice across their athletic career than recreational athletes. Finally, the relationships among the dimensions of deliberate practice did not lend conclusive support to either the original conception of deliberate practice or a sports-specific framework of deliberate practice.

Cumming; Hall and Harwood (2001) investigated to establish whether different motivational profiles that result from performing a cluster analysis reflect the use of different functions and amounts of imagery. One hundred and five competitive swimmers were recruited to participate in the study. They were asked to complete both the Task and Ego Orientation in Sport Questionnaire (TEOSQ) and the Sport Imagery Questionnaire. The results of a *K*-means cluster analysis on the TEOSQ scores resulted in a three-cluster solution that maximized between-group differences and minimized within-group differences. A multivariate analysis of variance revealed that the three cluster groups could be distinguished by their use of imagery. Specifically, the results indicated that individuals with a 'complementary balance' between task and ego orientations were more motivated to perform the functions of imagery that would help them to maximize their performance.

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An additional aspect of self-talk that has recently received attention from researchers (e.g. Gammage; Hardy, & Hall, 2001; Hardy et al., 2001; Theodorakis et al., 2000) is the functions that self-talk can serve (i.e. the reasons *why* athletes use self-talk). It has been found that self talk seems to serve two main functions for athletes (and exercisers), a cognitive (instructional) function and a motivational function. Both main functions can be further sub-divided into more focussed functions. Specifically, the cognitive function can be split into cognitive specific and cognitive general functions, which relate to assisting the athlete, learn and execute individual skills and strategies, respectively. Similarly, the motivational function can be further divided into three separate functions. The motivational arousal function is used by athletes to help "psych" up, relax, and control their arousal levels. The motivational mastery function is concerned with mental toughness, focus, confidence, and mental preparation - all required if the athlete is to successfully master their circumstances. The motivational drive function is slightly more global in nature than the previous two motivational functions. It is concerned with assisting athletes to keep on track in order to achieve their personal goals. Thus, this function is related to maintaining and increasing drive and effort levels. Individual sport athletes have been found to make greater use of

the functions of self-talk as compared to their team sport counterparts.

The detrimental effect that incorrect imagery speed may have on performance was illustrated in the Boschker et al. (2000) study. These

researchers had participants perform a motor sequence at their preferred speed, and at double and half that speed. Participants were then assigned to one of six treatment groups that practiced or imaged the sequence at a fast or slow pace or did not practice the sequence. The results showed that retroactive interference occurred, with the slow-practicing and slow-imaging participants recording slower performance times in the retention test than in the baseline test, and the fast-practicing and fast-imaging participants recording faster performance times in the retention test than in the baseline test.

Cocude; Mellet and Dennis (1999) reports on establishing the functional and structural similarities between images and perceptual events. Recent studies have focused on the comparison of images that are reconstructions of previous perceptual experience and images constructed from verbal descriptions. This article reports the findings of a research program based on the mental scanning paradigm; they reveal the similarities and differences between the two kinds of mental images. Neuro-imaging studies have also provided evidence that the parieto-occipital cortex is involved in the processing of visual images, whether they are based on perceptual experience or constructed from linguistic inputs. However, the PET studies conducted by our research groups provide no evidence that the primary visual cortex is engaged in the generation of visual images. As there is contradictory evidence about this, further research is needed to clarify the role of the early visual areas in mental visual imagery.

Review

The findings of the Orliaguet and Coello (1998) study, in which imagery and actual golf-putting speed were assessed, suggest that the results of other studies using short-duration movement imagery need to be reexamined. In the actual performance of a golf putt, the duration of the skill is consistent (≈ 250 milliseconds) regardless of the targeted distance, whereas the amplitude of the movement increases with greater distance of the target. Orliaguet and Coello found, however, that study participants took longer to image the skill with increasing target distance (the only imaging timed was the skill execution, not imagery of the time the ball took to travel to the hole). This finding means that, with increasing target distance, the imaged skill was progressively out of phase with actual performance.

Collet et al (1998) conducted a study to assess objectively the processes of mental rehearsing (imagery) by measuring variations of the autonomic nervous system (or ANS responses) during an open-ended complex motor skill in two actual experiments (volleyball) and during mental rehearsing taking place between them. Comparison between pre- and post-test (volleyball) scores related to imagining and non-imagining performances revealed significant improvement in case of the later. The ANS parameters (skin potential and resistance, skin temperature and heat clearance, instantaneous heart rate and respiratory frequency) were quantified by original techniques and indices. Results from a principal component analysis showed a strong correlation between the responses in actual tasks (pre- and post-test volleyball) and during mental imagery, since

the same preferential variables appeared on the main axis in 87% of cases. Thus the same autonomic channels seemed to be used during the actual activity and during the mental imagery of this activity. So far as basic results were concerned, the main finding was a differing development of skill between imagining and non-imagining volleyball players. No clear difference was seen between pre- and post- tests in non-imaginers, except an increase in the median of the duration of the response observed in heat clearance. Conversely, for other ANS parameters, a significant decrease was seen in the post-test responses compared to pre-test responses in the imagining group, while no change was observed in non-imaginers, except in the duration of the heat clearance response where an increase was seen. Compared to the non-imagining group, the latter result may also have been associated with a response decrease in the imagining group. Thus mental rehearsing induced a specific pattern of autonomic response: decreased amplitude, shorter duration and negative skin potentials compared to the control group. As this pattern was associated with better performance in the tests it can be suggested that in the case of open-ended motor activity, mental rehearsing may help in the construction of schema which can be reproduced, without thinking, in actual practice. Thus a neural information process might develop in the central nervous system changing from a parallel into a serial treatment.

Helstrup; Cornoldi and Debimi (1997) explored the relation between visual images classified in terms of the four categories of personal,

impersonal, specific, and general images. The result showed that subjects were able to generate all types of images, with personal images being the easiest recall. Personal images, together with general images, were the image types being easiest to integrate with one another. Overall the observations suggested the existence of two imagery dimensions: specific-general, and personal- impersonal. Memory was found to be best for personal images. Personal images turned out to be easier to integrate in memory than specific images. The findings were discussed in terms of different image generation models.

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Studies Relating to effect of Imagery on Psychological Variables and Performances

Nelson et al (2008) a studied the effects of video and cognitive imagery on throwing performance of baseball pitchers. The purpose of this study was to examine the effects of a three-week imagery and video imagery intervention program on the throwing accuracy of individual baseball pitchers. A secondary purpose of this study was to investigate whether differences in accuracy response characterize both low- and high-ability imagers. A sample of pitchers (n=30) were asked to take the Movement Imagery Questionnaire–Revised; study participants were randomly selected from the highest and lowest twenty percent of the group. The participants were obtained from high school and college teams within southeastern Georgia (n= 6). Following the first week of baseline measurements, two high-ability and two low-ability imagers took part in a three-week video imagery and imagery intervention program. One participant from each group together constituted a control group, which was asked only to try their best when throwing for the study's accuracy measurements. Results showed that two participants demonstrated an increase in performance, while all participants expressed a desire to continue to use imagery for its various effects. Suggestions for future research and further insight are discussed

Devonport (2006) explored the views of three high performance kick boxers regarding the contribution of psychology to the development and maintenance of expert performance within kickboxing. The results provide a

useful insight into the experiences of high performance kick boxers, identifying those mental skills and psychological attributes that are perceived to contribute to success. Participants identified seven mental skills that they believed to be linked to success in kickboxing; 1) effective use of self-talk, 2) relaxation, 3) heightened concentration, 4) self-regulation of arousal, 5) goal setting, 6) coping with being hit, and 7) imagery. Three psychological characteristics were identified by all participants as contributing to success, 1) high self-efficacy, 2) highly motivated and 3) mental toughness. Although not specifically identified by participants, it is suggested that a fourth psychological characteristic was also apparent. Participants demonstrated varying degrees of emotional intelligence through their ability to monitor and manipulate their emotional states prior to and during competition. Martial artists used a number of long and short-term psychological strategies in preparing for competition. Furthermore, whilst mental skills were not systematically practiced, all participants endeavored to integrate some form of mental training within physical training. The author concludes that the integration of mental skills training within physical training may help ensure quality practice, and facilitate the effective transfer of mental skills into competition.

Strachan; Munroe-Chandler (2006) conducted a study using imagery to predict self-confidence and anxiety in young elite athletes. Female participants were recruited from baton twirling competitions in Canada and the USA. Seventy-six athletes were divided into two age cohorts: 7 - 11 and

12 - 15 years. A modified version of the Sport Imagery Questionnaire (SIQ; Hall et al., 1998) and the Competitive State Anxiety Inventory 2 for Children (CSAI - 2C; Stadulis et al., 2002) were given to each participant. Results indicated that developmental differences might exist between the two age cohorts in imagery use, self-confidence, and anxiety

Ramachandran (2005) examined the effect of various imagery modalities on pre-competitive anxiety, self-confidence and archery performance. Twenty-four male archers, were randomly assigned to one of the following four groups: Group A, the written script group, received a personalized proposition led script; Group B, listened to an audio tape; Group C, watched an internal – perspective video tape of themselves performing; and Group D, the control group received no imagery training, and spent an equivalent amount of time reading archery literature. The subjects had archery practice sessions thrice a week for six weeks period, during which the experimental groups underwent the different modalities of imagery intervention programme. The programme effectiveness was evaluated through the Competitive State Anxiety Inventory - 2 (CSAI - 2) and actual performance points in archery. The pre-test post test data were statistically analysed for comparisons in pre-competitive anxiety, self-confidence and archery performance among the various groups.

The results indicated an increase in the direction decision of somatic anxiety, cognitive anxiety and self-confidence for the imagery intervention groups as compared to the control groups. The results also revealed that the

video and audio groups performed significantly better than the written script group in archery performance.

Vergeer and Roberts (2005) examined the effect of movement and stretching imagery on increases in flexibility. Thirty volunteers took part in a 4 week flexibility training programme. They were randomly assigned to one of three groups: (1) movement imagery, where participants imagined moving the limb they were stretching; (2) stretching imagery, where participants imagined the physiological processes involved in stretching the muscle; and (3) control, where participants did not engage in mental imagery. Active and passive range of motion around the hip was assessed before and after the programme. Participants provided specific ratings of vividness and comfort throughout the programme. Results showed significant increases in flexibility over time, but no differences between the three groups. A significant relationship was found, however, between improved flexibility and vividness ratings in the movement imagery group. Furthermore, both imagery groups scored significantly higher than the control group on levels of comfort, with the movement imagery group also scoring significantly higher than the stretching imagery group. We conclude that the imagery had stronger psychological than physiological effects, but that there is potential for enhancing physiological effects by maximizing imagery vividness, particularly for movement imagery.

Jordet (2005) studied to determine whether an ecological imagery intervention program would affect perception (i.e. exploratory activity and

prospective control of future actions) in three elite soccer players. The imagery was justed to the unique action opportunities typically experienced by each player in games .A single case, multiple baseline across participants design was implemented and close - up video analyses were conducted from a series of league games. Post-intervention questionnaires and interviews were also carried out to support the video analyses. Two of the participants appeared to increase their visual exploratory activity, but only one of the participants marginally improved his performance with the ball. It was concluded that elite players can improve components of perception through ecological imagery training, but it is questionable to what extent this leads to improved prospective control of actions. It is recommended that future imagery and/or perceptual training research addresses specific types of actions more directly.

Munroe-Chandler and Hall (2005) implemented a motivational general-mastery imagery intervention in order to increase a soccer team's collective efficacy. The participants were fourteen female members of a competitive traveling soccer club (M = 11.47 years, SD = .74). All athletes were placed into one of three groups based on playing position: forwards, midfielders, or defense/goal keeper. A staggered multiple baseline design across groups was employed to evaluate the imagery intervention. Collective efficacy data for training and competition were collected once a week for thirteen weeks. The imagery intervention began at weeks four, seven, and ten for the forwards, midfielders and defense/goal keeper, respectively.

Results from visual inspection as well as binomial tests revealed athletes' collective efficacy increased with the implementation of the motivational general - mastery imagery intervention for both training and competition for two of the three groups. In order to investigate the athlete's individualized imagery use, an imagery assessment questionnaire was administered. The results showed that the athletes used imagery on almost a daily basis. As well, the athletes had a very positive reaction to the imagery training

Cleofas and Kutty (2004) studied the effect of skill training with and without visual imagery on fosbury flop technique in high jump performance of men students. In this study thirty male students aged between 22-25 years of Dr. Sivanthi Aditanar College of Physical Education, Tiruchendur, were selected as subjects at random. They were equally divided into Group A, which underwent the skill training along with visual imagery, Group B, which underwent the skill training only and Group C, acted as the control group. The training was given on alternate days for a period of six weeks. Prior to and after the training programme three judges rated the subjects in their performance in the fosbury flop skill. Statistical application of analysis of covariance revealed that the training with visual imagery had a better effect in learning the fosbury technique in high jump.

Mamassis and Doganis (2004) studied the effects of mental training programme on junior’s pre-competitive anxiety, self-confidence and tennis performance. This investigation reports the impact of a season-long Mental Training Program (MTP) on two elite junior tennis players. The two

reported cases were part of a study in which MTP players (n = 5) in addition to their tennis practice were exposed to 5 different psychological skills: goal setting, positive thinking and self-talk, concentration and routines, arousal regulation techniques, and imagery. Another group of elite junior tennis players (n = 4) followed the same amount and quality of tennis practice but received no mental training practice. Program effectiveness was evaluated through (a) the Competitive State Anxiety Inventory - 2 (CSAI-2), (b) the athletes' appraisal on 8 aspects of tennis performance, and (c) tennis-specific statistical data of two selected cases. The results indicated an increase in the direction dimension of the somatic anxiety, cognitive anxiety and self-confidence for the intervention group at the post test. Moreover, the intensity of self-confidence, as well as the overall tennis performance, was greater for all the participants of the intervention group after the MTP. Results on two selected cases are reported which clearly demonstrate the effectiveness of the MTP in eliminating specific performance problems

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Tracey and Suzanne (2004) examined the relationship between self-confidence, anxiety, and mood states in collegiate tennis players. The Competitive State Anxiety Inventory--2 (CSAI-2) and the Profile of Mood States (POMS) were utilized based on their ability to assess a number of different psychological states thought to be crucial for proper mental preparation prior to athletic competition as well as for their psychometric properties. These inventories were employed to determine pre-competition levels of anxiety, self-confidence and mood disturbance and their relationship to successful or unsuccessful tennis match outcome. Twenty-four collegiate tennis players completed the POMS and CSAI-2, thirty minutes prior to their tennis match during their participation in the NCAA Regional (VII) Team Tennis Tournament. Results revealed winning tennis players displayed significantly higher self-confidence, lower cognitive and somatic anxiety levels, and lower total mood disturbance scores than loosing players. In addition, winning tennis players exhibited the iceberg profile on the POMS, which is consistent with the findings in similar research conducted with successful athletes in other sports. As such, athletes who displayed high self-confidence and low anxiety levels were potentially able to remain calm and relaxed under pressure and were not affected by negative events. Furthermore, these results suggest that mental state prior to the start of a tennis match plays a crucial role in overall success or failure

In a study conducted by Clamels, Berthoumieux, and d'Arripe-Longueville (2004), the authors sought to increase softball performance by

enhancing attentional focus. Participants in this study were four French national softball players who participated on the same team. None of the players in the study have had previous mental skill training, however all reported an interest in these skills. During this study, 28 ten-minute imagery sessions were conducted in an attempt to enhance the selective attention of each athlete. The sessions consisted of guiding and teaching the softball players at bat to integrate many external and internal stimuli at one time and to be able to restrict the number of the stimuli as the moment for batting approached by paying attention to stimuli that had been shown to be favored by the experts. The first ten sessions consisted of the batter mentally rehearsing various possibilities they may face. Next were four sessions mentally rehearsing successful performances, then four sessions using both the first and second techniques but also used mental rehearsal of potential runner positions. The next five sessions focused on ball trajectory and desired point of contact, and finally five sessions where the batter imagined all the above with possible distractions involved.

Three different aspects of selective attention were addressed during this study and the results found that the imagery training program proved to be effective in all of the participants. Participant One saw dramatic increases on all three selective attention dimensions that were assessed through visual inspection. Participant Two and Three both saw increases on at least two of the three dimensions. All three intervention participants reported that the imagery sessions were beneficial to their performance. Further illustrating

the effectiveness of the imagery training program was found through the evaluation of the control participant who did not participate in any of the imagery sessions. The control participant reported no change in any of the three dimensions of selective attention. Thus, the imagery training program proved to be an effective intervention when attempting to enhance selective attention which is an important aspect of successful performance in sport.

Miller and Donohue (2003) examined the influences of two mental preparation interventions on 1.6 km run performance in 90 (45 male, 45 female) high school long-distance runners in Nevada, U.S.A. After participants completed a 1.6 km baseline run, they were randomly assigned to receive one of these interventions three min prior to a second 1.6 km run (i.e. listening to a personalized script of motivational and running technique statements on headphones, listening to music on headphones, listening to no sound on headphones). Results of running performance indicated that participants who were assigned to the motivational and running technique statements and music conditions significantly improved their run performance, whereas participants in the no sound control condition did not. Youth ratings of intervention satisfaction were consistent with performance outcome. Study implications and future directions are discussed in light of these results

Positive imagery may enhance performance, negative and suppressive images have been found to be detrimental to performance. In a competitive golf situation, Taylor and Shaw (2002) asked skilled and unskilled

participants to execute putts under each of three conditions: positive-outcome imagery, negative-outcome imagery, and no imagery. Greater putting error was recorded for the negative-outcome imagery condition than for either of the other two conditions, and there was no difference between the positive-outcome imagery and no-imagery conditions. For skilled golfers, there was a mean difference in golf-putting error of 11.3 cm between the positive- and negative-outcome imagery conditions. Confidence, as assessed by a single item before each putt, was lower following the negative-imagery condition than the two others.

Campos et al (2002) investigated the possible effects of imaging capacity and body image on judo movement skills among intermediate-level judokas aged 21-26 years. Statistical analysis of the results suggest that, of the various measures of imaging capacity and body image considered, only the Body Competence subscale of the Body Consciousness Questionnaire had a significant effect on judo performance

Taylor and Shaw, (2002) studied the effects of outcome imagery on golf -putting performance, positive and negative outcome imagery on golf-putting performance. Players of both high and low ability performed a golf-putting task in three imagery conditions: (a) a positive outcome imagery condition, (b) a negative outcome imagery condition and (c) a no-imagery control condition. The task was conducted in a competitive setting, reducing the possibility of demand characteristics. We found that negative outcome imagery was detrimental to putting performance; however, performance in

the positive outcome imagery condition was no better than performance in the control condition. There was also evidence to suggest that outcome imagery operated through the mechanism of confidence, as negative outcome imagery was detrimental to both confidence and performance. The results of the present study suggest that golfers should avoid visualizing negative images, as this could damage both confidence and performance

Carboni et al. (2002) conducted a study that sought to examine the effects of brief (5-minutes or less) imagery training on free throw performance of college athletes. In this single subject, multiple baseline investigation, the authors used the previous season's free throw percentage and compared that percentage to the percentage established throughout the intervention for each of the five participants in the study. One athlete was used as the control for this investigation and did not take part in any of the imagery training during the study. The proper use of imagery was taught to each of the five participants in the study and asked to engage in a brief imagery session prior to shooting any set of free throws once the intervention phase began. Results of this study did not show any consistent increases or decreases in free throw shooting percentage. However, there were increases in the ability to concentrate on the task after the imagery intervention was implemented.

Boschker; Bakker and Michaels (2001) studied on the effect of mental imagery on realizing affordances. Using a reaction time experiment, they examined whether imagining a response would lead to an increase in

the frequency of its execution. During a pre-test and a post-test, participants had to respond as quickly as possible with either their left or their right hand, as they preferred, to the illumination of one of seventeen target positions arrayed in front of them in a semicircle. Between these two phases, participants performed a practice condition. Each of forty right-handed participants was assigned to one of four groups that differed in their practice condition: One group made only dominant-hand responses to all target locations, two imagery groups imagined dominant hand responses to all target locations, and the last group received a no-practice, control task. One imagery group received instructions emphasizing that imagery has a strong effect; the second group received instructions suggesting that imagery was not effective. The results showed an increased incidence of the practiced response for both imagery groups during the post-test. No effect was found for the physical performance group and the control group. The change in performance for the imagery groups was not accompanied by a change in reaction time. The results are discussed in terms of imagining the realization of action possibilities and from a neuropsychological point of view.

Boschker; Bakker and Rietberg (2000) in two retroactive interference experiments, assessed the effect of mentally imagined Movement speed on subsequent motor performance. All participants performed a sequential motor action at three speeds during a baseline test and a retention test. During the retention interval of Experiment one, the participants (n = 50) physically performed the action at a slow speed, physically performed it at a

fast speed, imagined it at a slow speed, imagined it at a fast speed, or performed a no-practice control task. In Experiment two, the participants (*n* = 24) imagined the movement, overtly vocalized words, or both, all at a slow speed. The results revealed that the speed of the imagined motor action affected the speed of subsequent performance in the retention test and that imagery and physical practice were functionally equivalent. The results are consistent with Lang's bio-informational theory.

Roure et al. (1998) conducted an experimental study on autonomic nervous system responses correlate with mental rehearsal in volleyball training. They found six specific autonomic nervous system (ANS) responses that correlated with mental rehearsal, thereby improving sports performance. The subjects were placed into an imagery group and a control group. The task measured in each group was based on their ability to pass an opponent's serve to a given teammate, in the sport of volleyball. The experimenters measured the variations of the ANS during the motor skill and during the mental rehearsing sessions. The ANS parameters tested included: skin potential and resistance, skin temperature and heat clearance, instantaneous heart rate, and respiratory frequency. The results of the test revealed a strong correlation between the response in the actual physical tasks (both pre- and post-test volleyball) and during the mental imagery sessions. There existed a difference in the skills between the imagery and the control group, the former being the better. In addition, no clear difference was present between the pre- and post- tests in the control group.

Review

This study showed that mental imagery induces a specific pattern of autonomic response. These include: decreased amplitude, shorter duration and negative skin potentials when compared to the control group. As a consequence of the ANS, the imagery group was associated with better performance. In light of this experiment, Roure suggested that metal imagery may help in the construction of schema which can be reproduced, without thinking, in actual practice

Using a single-subject, multiple-baseline design, Callery and Morris (1997) conducted twenty-min imagery-rehearsal sessions three times per week with eight elite Australian Rules football players over a competitive season. The players imaged themselves getting to front-and-centre positions during games. For all players, both performance and front-and-centre self-efficacy were higher during the treatment phase than they had been throughout the preceding baseline phase.

In a similar single-case, multiple-baseline study, She and Morris (1997) found that an imagery program for nine male elite baseball players was effective in improving their batting averages, self-efficacy relating to batting, and the state self-confidence in their batting ability. Three players clearly showed an improvement in their batting averages, two had batting averages that tended toward improvement, two had no change, and two had a decline in batting averages. In regard to self-efficacy, five players improved, one had a trend toward improvement, and three showed no change. Similar results were found for state self-confidence, with five

players improving their confidence and four showing no change. Only one player showed no improvement on any of the measures, which may have been due to recurring injuries and an accompanying lack of form.

The success of an imagery intervention to reduce anxiety may depend on the personal characteristics of the athlete. A study by Carter and Kelly (1997) demonstrated that, following paradoxical imagery (i.e. imagery of performing while feeling anxious and doubtful), high-reactant basketball players (i.e. those players with a tendency to offset pressure or restrictions placed on them with the aim of protecting their personal freedom) had lower somatic state anxiety and higher state self-confidence than did low-reactant players. This finding suggests that high-reactant athletes who wish to lower their anxiety levels may benefit more from defiance-based imagery than the commonly used compliance-based imagery. There was little difference in free-throw performance, however.

Glisky; Kihlstrom and Williams (1996), studied on Internal and External Mental Imagery Perspectives and Performance on Two Tasks. It has been well documented that mental practice can improve performance on various cognitive and motor skills. However, the processes involved in mental practice and the theoretical explanations are less clear. The present study examines two variables that contribute to the efficacy of mental practice--imagery perspective and task type. Subjects, who were natural internal or natural external imagers, mentally practiced a cognitive/visual task (an angles estimation task), and a motor/kinesthetic task (a

stabilometer). Only the external imagers showed greater performance than the control on the motor/kinesthetic task, and only internal imagers, showed greater improvement than the control group on the cognitive/visual task. Subjective reports of visual and kinesthetic imagery clarity also differed depending on the type of task being imaged

Martin and Hall (1995) determined whether subjects who used mental imagery would spend more time practicing a golf putting task and would have higher task specific self efficacy than would controls. Thirty nine beginner golfers were assigned to either an imagery treatment conditions (performance plus outcome imagery or performance imagery) or a no imagery (control) condition. During the first three sessions all subjects were taught how to put a golf ball. Imagery treatment subjects also participated in an imagery program designed for the golf putting task. Subjects in the performance imagery group spend significantly more time practicing the golf putting task than did controls. Subjects who used imagery also set higher goals for themselves, had more realistic self expectations, and adhered more to their training programmes outside of the lab.

Martin and Hall (1995) demonstrated an association between imagery and motivation. These researchers conducted a study of 39 beginner golfers to investigate whether the use of mental imagery would affect intrinsic motivation to perform a golf-putting task. The participants were divided in to three groups; performance plus outcome imagery, performance imagery, and a no-imagery control. In this instance, motivation was inferred from the

length of time that participants voluntarily spent practicing putting and a measure of intrinsic motivation: the Task Reaction Questionnaire (TRQ, Mayo 1977). When participants were asked to achieve researcher-set goals, differences were found between groups (performance-plus-outcome imagery, performance imagery, and no imagery) in terms of the time voluntarily spent practicing. The performance-imagery participants, who focused on how they performed the skill, practiced longer than the other two groups; however, the groups showed no differences in terms of their TRQ scores. Although no group achieved the researcher-set goals, the performance-plus outcome-imagery group, which imaged both their behavior and the result, consistently improved their performances. The other two groups' performances were inconsistent. The improvements in performance of the performance-plus-outcome-imagery group, which were in line with their own established goals of doing as well as or better than they had previously, could explain why this group did not practice longer. The findings encourage further investigation of how imagery can affect motivation.

Not only does mental imagery seem to enhance athletic performance, but it has been shown to enhance intrinsic motivation and attention as well. Martin & Hall (1995) A study in 1995 tested who would spend more time practicing a golf putting task and who would result in having higher self efficacy. Thirty nine beginner golfers were grouped into an imagery or control group. For three sessions, both groups were taught how to hit golf

balls. The imagery group practiced in an imagery training session designed for this specific golf skill. As a result, the imagery group spent significantly more time practicing the golf putting task than the control group. In addition, the subjects in the imagery group had more realistic self-expectation, set higher goals to achieve, and adhered more to their training programs outside the experimental setting.

Bence; Price and Sharps (1992) conducted a research on mental imagery has demonstrated the importance of visual imagery to recall performance. Thirty adult subjects were recruited from introductory psychology classes at the University of Wyoming and at California State University, Fresno. All subjects possessed visual acuity of at least 20/40 and were able to identify sounds played at the volume we used. A tape was made of forty common sounds, such as a trumpet, a crying baby, a helicopter, and a barking dog. A Sony high-fidelity tape recorder was used for the auditory item presentation. High-quality photographs of these items, approximately three in. in diameter on average, were placed on standard 11.7 x 16.4 cm stimulus cards. The subjects were seated in groups of three to five within 1.5 m of the tape recorder speakers, and of the experimenter, who displayed the cards. The experimenter was unaware of the purpose of, and our expectations for, the experiment. The subjects were presented with the forty stimulus items sequentially, for five seconds each, with a two seconds inter-stimulus interval. The items were the printed verbal labels of the items, the verbal labels and sounds of the items, or the verbal labels and

pictures of the items. Oral labels were spoken at the beginning of the five seconds exposure period in all three conditions and were used in all conditions to avoid difficulties with idiosyncratic responding. After the forty items were presented, the subjects engaged in interpolated arithmetic for two min to control for the idiosyncratic effects of rehearsal. Then the subjects were asked to recall as many items as they could. These results of the study was consistent with the hypothesis that auditory imagery has mnemonic value of a type and magnitude similar to that of visual imagery; auditory imagery produced recall at a level similar to that of visual imagery and substantially above that of purely verbal stimuli..

Isaac (1992) conducted a study which examined the influence of mental practice on sports skills. She tested 78 subjects and classified them as novice or experienced trampolinists. Then she further divided the two groups into an experimental and control group. She also classified the subjects as either high or low imagers based on initial skill level. Both groups were trained in three skills over a six week period. In order to prevent confounds, the imagery group was unknown to the experimenter until afterwards. The experimental group physically practiced the skill for 2-1/2 minutes, which was then followed by 5 minutes of mental practice. Lastly, an additional 2-1/2 minutes of physical practice followed the mental practice. Meanwhile, the control group physically worked on the skill for 2-1/2 minutes, which was then followed by 5 minutes of a session trying a mental task of an abstract nature, such as math problems, puzzles, and

deleting vowels. Then, 2-1/2 more minutes were spent physically working on the skill again. The outcome of the experiment was as follows: there existed a significant difference in the improvement of the high and low imagers. In both novice and experimental groups where the initial skill ability was similar, the high imagery groups showed significantly more improvement than the low imagery group. Furthermore, there was a significant difference between the experimenter and control groups. Not surprisingly, the experimental group had significantly more improvement than the control group. This study posits that despite the level of skill (beginner or experienced) visual imagery proves effective.

Epstein (1980) examined the relationship of internal and external imaginal rehearsal and imaginal style to skilled motor behavior. Dart throwing was used as the dependent measure of physical performance. All subjects were randomly assigned to a control group, an internal mental rehearsal group, or an external mental rehearsal group. After assessing baseline performance, subjects were instructed to mentally rehearse before throwing sets of three darts. Control subjects were given a distracting task prior to throws. The results showed a slight, negative relation between spontaneous external imagery and physical performance. The mental rehearsal factor, however, was not significant. Males significantly outperformed females, and imagery groups had more variability in improvement scores than the control group for women but not for men. It was proposed that females' lower dart-throwing ability may have caused

mental practice to be distracting for some subjects, and thus increased improvement variability in the mental rehearsal group. Conclusions regarding the concept of imaginal style as well as the negative relation between motor performance and the propensity to use external imagery were offered.

Conclusion

Though imagery as a tool for research and performance enhancement is in its early years, a comprehensive analysis of the studies undertaken in this area indicates, that imagery is a powerful and potential tool that has varied application in the field of sports. The reviews cited above reveal that imagery use is getting popular among sportspersons in different sports disciplines. Imagery has also shown to improve the psychological attributes of sportspersons such as in reducing anxiety and arousal; in improving self confidence, attention and concentration abilities. Imagery has shown to improve performances in various closed skilled events such as golf, dart throwing, archery, shooting, and other individual performance events. However, reviews also indicate the possibilities of imagery in improving performance in open skilled events also. Imagery research indicates wide variations in terms of imagery modalities, duration of imagery training, and performance outcomes. This warrants the need and relevance for further research in imagery in sports with variations in the modalities, durations, type of imagery, and the level of subjects so as to establish the effectiveness of imagery as a potential tool for performance enhancement.

CHAPTER 3

METHODOLOGY

- Selection of Subjects
- Selection of Variables
- Experimental Design
- Administration of test
- Experimental training procedure
- Collection of data
- Construction of imagery script
- Statistical procedure

CHAPTER III

METHODOLOGY

In this chapter the selection of subjects, selection of variables, experimental design, administration of tests, experimental training procedure, construction and execution of imagery script, collection of data, and statistical procedure used are described.

Selection of Subjects

Initially twenty elite and twenty novice volley ball players were selected as subjects for the experimental group. They were given general imagery training for one week, so as to orient and prepare them for the specific imagery training after which they were tested for their imagery ability following the MIQ-R (Hall). According to the imagery ability 15 elite and 15 novice players were selected as samples for the actual 12 weeks experimental (imagery) training programe. Another 15 elite and 15 novice volleyball players were also selected for the control group. The elite players were those who have represented Calicut University or those who have secured at least first or second positions in the intercollegiate tournaments during the years 2005-06 and 2006-07. Moreover all the players were presently playing club and district level league tournaments in North Kerala. The novice volley ball players were beginners who were playing in various clubs, but not actively participating in competition.

Selection of Variables

Considering the purpose of the study, the following variables were selected to find out the effectiveness of the mental imagery training programme:

Psychological Variables

1. Cognitive anxiety
2. Somatic anxiety
3. Self confidence
4. Attention

Skill Performance Variables

1. Serve
2. Pass (Service Reception)
3. Attack
4. Block

Experimental Design

The mental imagery intervention for each skill was for a period of three weeks. Imagery interventions were given for four skills namely, serve, pass (service reception), attack and block following the Latin square repeated measures design. The subjects were grouped and each group received the imagery intervention on rotation basis. The subjects were divided into four groups as Group 1, Group 2, Group 3, and Group 4. Except group 4, all other groups consisted of eight subjects; four elite and four novice volleyball players. Group 4 consisted of six subjects; three elite and three novice volleyball players. Imagery intervention for each of the skill were given to the groups for a period of three weeks, after which the groups were rotated for imagery intervention for another skill as indicated in table 1. An initial test on the psychological variables and skill performances were conducted before the commencement of the experimental training programme and a final post test was conducted after the completion of the twelve weeks imagery intervention. Before and after every three weeks imagery intervention, a pre and post test was conducted on the skill performances of the subjects.

The schedule of mental imagery training programme following the repeated measures design is presented in table 1.

Table 1
Experimental Design for Mental Imagery Training Programme

Training Group	Initial Test	WEEKS															Final Post Test
		1	2	3	3 weeks post test	Pre Test (for next three weeks)	4	5	6	3 weeks post test	Pre Test (for next three weeks)	7	8	9	3 weeks post test	Pre Test(for next three weeks)	10	11	12	
Group I		Serve					Pass					Attack					Block			
Group II		Pass					Attack					Block					Serve			
Group III		Attack					Block					Serve					Pass			
Group IV		Block					Serve					Pass					Attack			

Administration of Tests

The imagery ability of the subjects for the experimental groups were assessed by administering the Movement Imagery Questionnaire revised (MIQ- R) (Hall & Martin, 1997). Following the imagery ability levels, the subjects were randomly assigned for the imagery intervention for each of the four selected skill. The mental imagery intervention for each skill was given for a period of three weeks. The total experimental training period for the four skills was for 12 weeks excluding the period for pre and post tests.

The pre and post tests of other four psychological variables namely cognitive anxiety, somatic anxiety, self confidence was measured by using CSAI-2 and attention was measured by using attention grid by Harris and Harris (1984).

The pre and post-test of skill performances for the selected skills namely serve, pass, attack and block was conducted by using a four point rating scale by three experienced and well known judges.

The detailed procedures of administration of the tests are given below:

Movement Imagery Questionnaire revised (MIQ- R)

The Revised Movement Imagery Questionnaire (MIQ-R) (Hall & Martin, 1997) was used to assess each subject's ability to imagine movement. The purpose of the MIQ-R was to evaluate the subject's ability to see (visual imagery) and feel (kinesthetic imagery) movements. This instrument consists of 8 items, 4 visual and 4 kinesthetic, each item being a separate movement.

The MIQ-R is a revised version of the MIQ (Hall & Pongrac, 1983). (shown in Appendix - B). The test-retest coefficient for the MIQ is .83 for a 1-week interval (Hall, Pongrac, & Buckolz, 1985). Similarly, Atienza et al. (1994) reported internal consistencies of .89 for the visual subscale and .88 for the kinesthetic subscale of the MIQ. Hall and Martin (1997) found a significant correlation between the MIQ and the MIQ-R in both scales, visual and kinesthetic. They conclude that the MIQ-R is an acceptable revision of the MIQ.

Completing an item on the MIQ-R questionnaire requires several steps. First, the movement is produced by the subject exactly as described. Second, the movement is imaged either visually or kinesthetically (no movement is actually performed). Third, a value is assigned from a seven-point rating scale regarding the ease/difficulty with which the movement was imaged. A low rating indicates that a movement is difficult to image and a high rating indicates that a movement is easy to image. A visual score and a kinesthetic score for each subject is obtained by summing the items. Accordingly, the subjects who had higher imagery ability scores were selected as subjects for the study.

Competitive State Anxiety Inventory (CSAI- 2)

The Competitive State Anxiety Inventory-2 (CSAI-2) developed by Martens, Vealey, Bump & Smith (1990) assesses the state anxiety levels and self confidence in competition. The CSAI-2 contains three subscales of

cognitive anxiety, somatic anxiety and self-confidence prior to competitive situations.

The CSAI-2 is a questionnaire (shown in Appendix - C) consisting of 27 sport related, multidimensional items. Each item is rated on a 4-point scale ranging from one ('not at all') to four ('very much so').

The CSAI- 2 was scored by computing a separate total for each of the three subscales, with scores that ranged from nine to a high of thirty six. The higher the score, the greater the cognitive or somatic anxiety state, or the greater the state self confidence. No total score for the inventory was computed. To score the CSAI 2 test one of four responses was possible: (1) Not at all, (2) Somewhat, (3) Moderately So, (4) Very much so.

The cognitive anxiety state sub scale is scored by totaling the responses for the following nine items: 1, 4, 7, 10, 13, 16, 19, 22, and 25; the somatic anxiety state sub-scale is scored by adding the responses for the following nine items: *2, 5*, 8, 11, 14R, 17, 20, 23, and 26. Scoring for item 14 was reversed in calculating the score for the somatic anxiety state sub scale as indicated below:

1 = 4;

2 = 3;

3 = 2;

4 = 1.

The self confidence sub-scale was scored by totaling the responses for the remaining 9 items. Thus the range of possible CSAI scores extended from

9- 36. CSAI-2 questionnaires in which two or more items were omitted were invalidated.

Procedure

Liaison with the players occurred one week prior to testing. During this period, a verbal consent was received. Later, a written consent explaining the aims of the research was given to provide information to the participants.

Players completed the CSAI-2 10 minutes prior to the onset of warm-up and competition. Players were given as long as needed to complete the questionnaire; however the questionnaire was completed within 2-5 minutes.

Attention Grid

This exercise for assessing attention or concentration among athletes was developed by Harris and Harris (1984) and first written about in their book "The Athlete's Guide to Sport Psychology: Mental Skills for Physical People".

In case of attention, the attention grid (shown in Appendix - D), which consists of a block grid containing two digit numbers ranging from 00 to 99. The object is to scan the grid and within a set period of time (two minute) and make a slash mark through as many sequential numbers as possible.(00, 01, 02, 03,etc…..)

The object of this exercise is to scan the grid and put a mark through as many numbers in sequence as possible in a one-minute period of time, starting with the number 00. Good levels of attention/concentration are

indicated by the ability to score in the upper 20's and low 30's within a one-minute period of time.

Rating Scale for assessing Skill Performances

A four point rating scale corresponding to the rating scale prepared by (Schall, 1985) was employed to assess the skill performances of the volleyball players during game situations. Data in the four skills namely; serve, pass (service reception), attack, and block were rated on a scale from zero to three.. These ratings are made using the following scale of values:

Serve

3 – Excellent	(Service ace, ball not controlled, immediate score)
2 – Good	(Aggressive serve that results in no attack)
1 – Poor	(Serve that is passed well for multiple attack)
0 – Failure	(Serving error)

Pass (service reception)

3 – Excellent	(Perfect pass for multiple attack)
2 – Good	(Pass that can be set for non-quick attack)
1 – Poor	(Pass that results in no attack advantage)
0 – Failure	(Passing error/Failure of reception)

Attack

3 – Excellent	(Kill, return for point or side out / deep attack)
2 – Good	(Play resulting in attaining attack advantage./touching the

block, but not retrieved back).

1 – Poor (Play giving opponent attack advantage / smashed ball defended by opponent)

0 – Failure (attack which goes out side, net, dead block) /error or foul)

Block

3– Excellent (Dead block, or return for point)

2 – Good (Blocker touches the ball, and the defender is able to retrieve the ball / play that results in attaining attack advantage)

1 - Poor (Blocker touches the ball, but the defender cannot retrieve the ball (touch out) / play giving opponent attack advantage)

0 - Failure (Error / foul / blocker can't be able to touch a successful attack)

With the help of the above rating system, data are used to calculate each player's percentage for each skill. The total score secured by a player in all the three sets divided by the number of attempts will give the average score for each skill. A skill with few attempts has equal weight as one with many. The rating of the players was done by three experienced and well known judges as per the rating scale during match situations. An illustration of the rating being done during match situation is shown in Figure 1.

Figure 1. Rating of Skill performances of the players being done during match situation

Experimental Training Procedure

The imagery training for the four skills was given according to Latin square repeated measures design. For the purpose, eight subjects; four elite and four novice volleyball players were grouped for each of the four skills, namely serve, pass, attack and block. The first group was given 15 minutes serve imagery training after 2 to 3 minutes of relaxation for a period of three weeks. The other 3 groups (second, third and fourth group) were also given 15 minutes pass, attack, and block imagery respectively after relaxation. Each group was given five to six repetitions of imagery training for each skill with short relaxation periods in between. The schedule of the imagery training programme for the total duration of twelve weeks was given as mentioned in the experimental design. The illustration of the imagery training programme given to the subjects are shown in Figure 2.

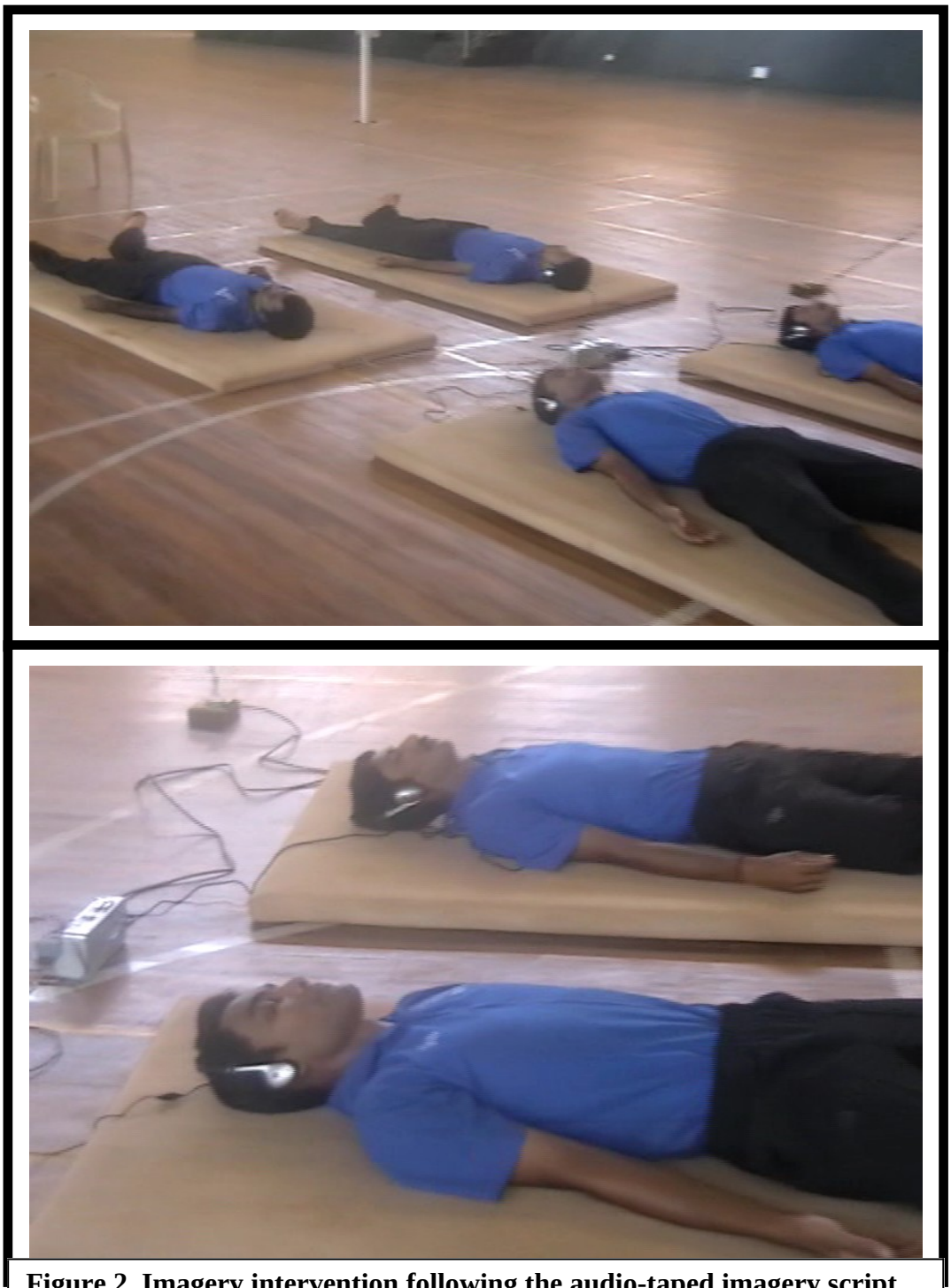


Figure 2. Imagery intervention following the audio-taped imagery script

Construction and Execution of Mental Imagery Script

For the mental imagery intervention, the imagery script was carefully prepared in Malayalam. Ten minutes general imagery and fifteen minutes specific imagery script, relevant to each skill was prepared under the supervision of the guide and the other experts with utmost care, taking into consideration, the maximum worth while effects from the subjects. Attempts were made to make the script simple, clear and relevant as far as possible leaving no room for ambiguity and vagueness. Sequentially and systematically prepared script was recorded and the audio script played to the subjects with the help of headphones. A sample imagery script is given in Appendix E.

Subjects are asked to be in a comfortable lying position with closed eyes, and follow their breath in…….and out……. of their nose, allow their body to become very relaxed. After instruction and relaxation for 2 to 3 minutes, systematically recorded script (mental imagery training script) was played to the subjects. The imagery training by using the imagery script was played repeatedly three times within 15 minutes, with short period of relaxation in between. Later they were asked to open their eyes and relax. The detailed schedule of the mental imagery training programme for the twelve weeks for all the groups are shown in Appendix F.

Collection of data

Pre test of all the skills and psychological variables for all the groups were conducted just before the start of the training programme. Skill performance namely serve, pass (service reception), attack, and block was rated by three experts with the help of four point rating scale, and the psychological variables namely cognitive anxiety, somatic anxiety, and self confidence was assessed by using CSAI-2 questionnaire and attention was measured by using attention grid.

Post test of the psychological variables for all the groups were conducted after the imagery training programme (12 weeks) by the same method used for the pre test. The experimental group, including both elite and novice group were divided into four sub groups, first three groups consisting of eight subjects each, and the last group consisting of 7 subjects. Before and after the three week imagery training to each of the sub groups, pre test and post tests were conducted in the concerned skills.

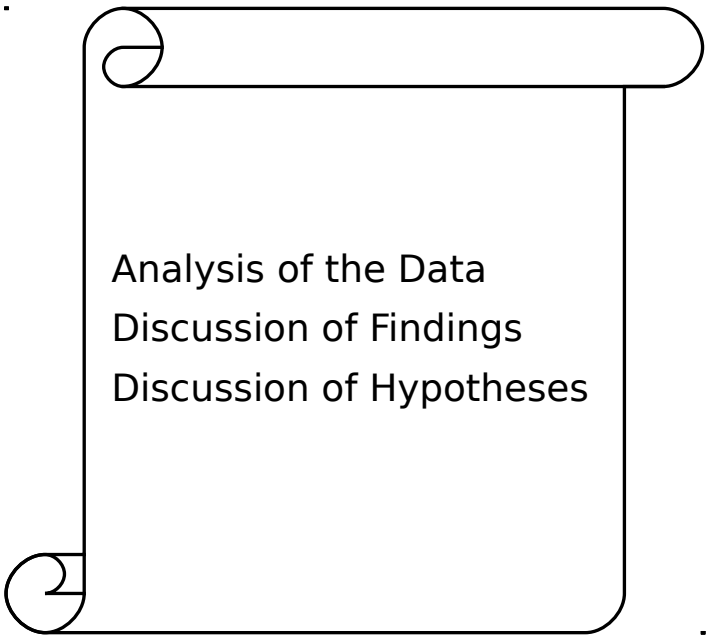
Statistical Procedure

To compare and find out the effectiveness of mental imagery training programme on selected psychological variables and skill performances of volleyball players, the analysis of covariance was applied. The analysis of covariance was done from the pre to post test scores for the three weeks mental imagery intervention on the selected variables; and it was also done for the pre to post test scores from the initial to the final post test after the total twelve week experimental period. The Benforronni post hoc analysis

was done to find out the significant difference between the paired means in case of significant F-values.

CHAPTER 4

ANALYSIS AND RESULTS



CHAPTER IV

ANALYSIS OF DATA AND RESULTS OF THE STUDY

The analysis of data related to the effect of mental imagery training programme on selected psychological variables and skill performances of volleyball players are presented in this chapter.

To find out the effect of the experimental training programme on the independent variables, the analysis of covariance was done for the two experimental and the two control groups.

In case of significant F – ratio's, the Benferroni post hoc analysis was done to find out the significant differences between the paired means of the experimental and control groups.

The analysis of the data was done in SPSS (Statistical Package for Social Sciences) (Version 14). The results pertaining to the analysis done and the graphical representation of relevant results are presented in this chapter.

The results of the ANCOVA for the pre-test scores and the three weeks post test scores on selected skill performance variables, after the three weeks experimental training programme are presented in tables 2 to 13

The results of the ANCOVA for the pre-test scores and the final post test scores after the twelve weeks duration of the experimental programme on selected psychological variables, are presented in tables 14 to 25.

The results of the ANCOVA for the pre-test scores and the final post test scores after the twelve weeks duration of the experimental programme on selected skill performance variables are presented in tables 26 to 37.

Pre-test and three weeks post-test scores of the experimental and control groups on serve are presented in the table 2..

Table 2
Pre and Three Weeks Post-Test Scores of the Experimental and Control Groups on Serve

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	51.14	2.04	54.75	1.80
Control (Elite)	15	47.92	5.26	48.47	5.36
Experimental (Novice)	15	38.23	3.20	41.62	3.62
Control (Novice)	15	36.63	3.45	37.38	2.82

The above table of the pre-test and three weeks post-test means of the experimental and control groups on serve indicates that in case of elite experimental group, the pre and three weeks post-test mean and SD were 51.14 (2.04) and 54.75 (1.80) respectively. In case of elite control group, the pre and three weeks post-test mean and SD were 47.92 (5.26) and 48.47 (5.36), respectively.

In case of novice experimental group, the pre and three weeks post-test mean and SD were 38.23 (3.20) and 41.62 (3.62) respectively, and for

the novice control group, the corresponding pre and three weeks post-test mean and SD were 36.63 (3.45) and 37.38 (2.82) respectively

The means of pre and three weeks post test on serve of the experimental and control groups are graphically shown in Figure 3.

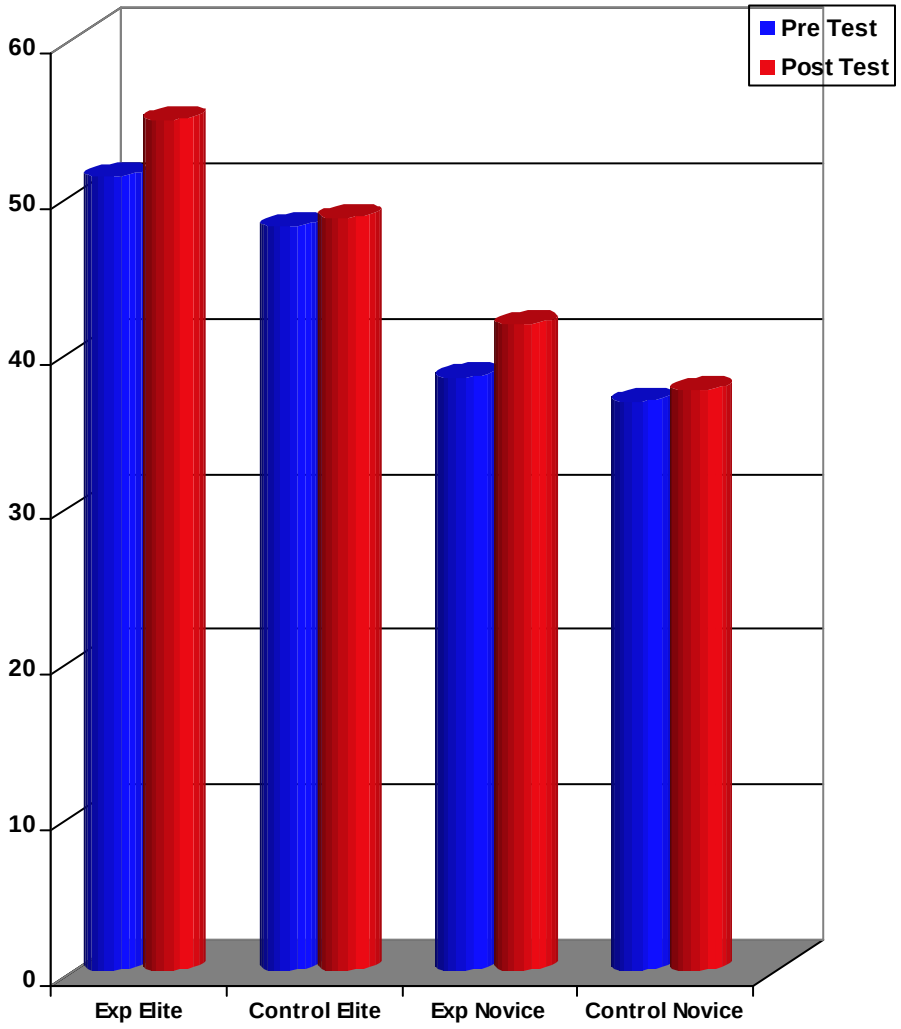


Fig. 3. Means of Pre and Three Weeks Post of the Experimental and Control Groups on Serve

Table 3
ANCOVA Table for Post Means on Serve after Three Weeks of Mental Imagery Training Programme.

	DF	SS	MSS	F	Sig. Level
Corrected Model	4	3270.276	817.569	431.663 *	0.000
Intercept	1	12.476	12.476	6.587*	0.013
Pre	1	639.450	639.450	337.619 *	0.000
Groups	3	127.021	42.340	22.355*	0.000
Error	55	104.170	1.894		
Total	**60**	**127908.150**			

* Indicates significance

The effect of imagery intervention on post adjusted means on serve was examined by using ANCOVA with pre serve scores used as covariate. As seen from table 3, significant F ratio's of 337.619 and 22.355 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted serve scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted serve scores. All pair wise

comparisons among the groups were determined, and the results of the same are shown in table 4.

Table 4
Pair Wise Comparison of Post Adjusted Means on Serve after Three Weeks of Mental Imagery Training Programme

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
47.716	44.395			3.321*
47.716		46.450		1.266
47.716			43.673	4.042*
	44.395	46.450		2.055*
	44.395		43.673	0.72
		46.450	43.673	2.776*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on serve indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means after the three weeks experimental period on serve are presented in Figure 4.

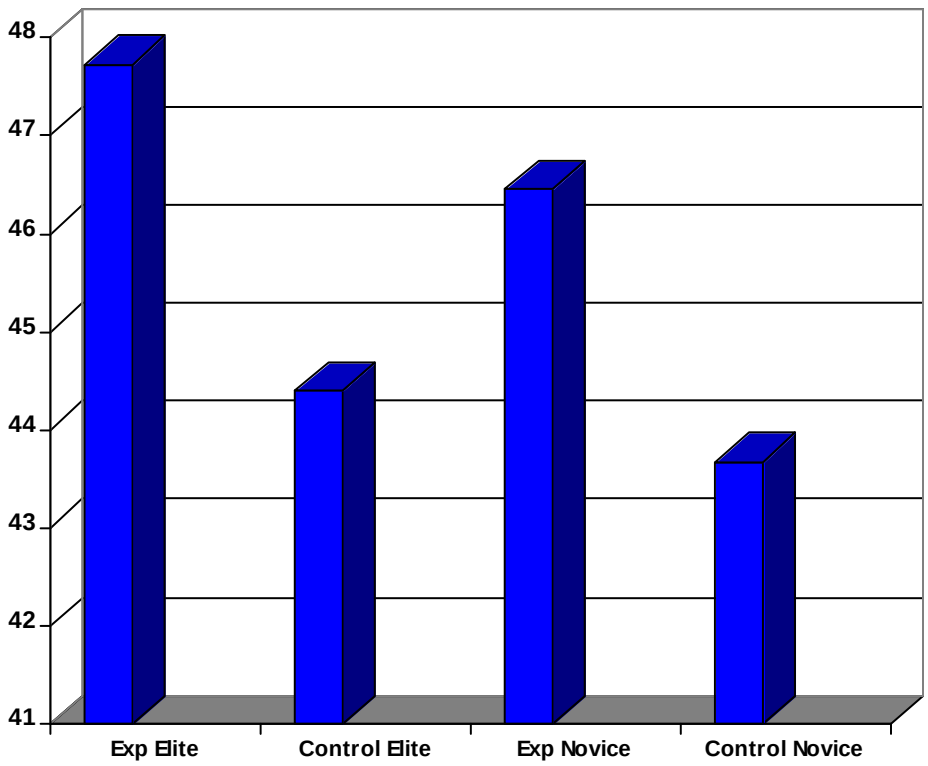

48
47
46
45
44
43
42
41
Exp Elite
Control Elite
Exp Novice
Control Novice

Figure 4: Paired Adjusted Post Means after Three Weeks Experimental Period on Serve.

Pre-test and three weeks post-test scores of the experimental and control groups on pass (service reception) are presented in the table 5

Table 5
Pre and Three Weeks Post-Test Scores of the Experimental and Control Groups on Pass (Service reception)

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	51.68	4.36	54.51	4.06
Control (Elite)	15	45.77	3.43	46.78	3.18
Experimental (Novice)	15	39.11	2.81	42.02	3.51
Control (Novice)	15	37.73	2.85	39.02	2.88

The above table of the pre-test and three weeks post-test means of the experimental and control groups on pass (service reception) indicates that in case of elite experimental group, the pre and three weeks post-test mean and SD were 51.68 (4.36) and 54.51 (4.06) respectively. In case of elite control group, the pre and three weeks post-test mean and SD were 45.77 (3.43) and 46.78 (3.18) respectively.

In case of novice experimental group, the pre and three weeks post-test mean and SD were 39.11 (2.81) and 42.02 (3.51) respectively, and for the novice control group, the corresponding pre and three weeks post-test mean and SD were 37.73 (2.85) and 39.02 (2.88) respectively.

Pre and three weeks post test means on pass (service reception) of the experimental and control groups are graphically shown in Figure 5.

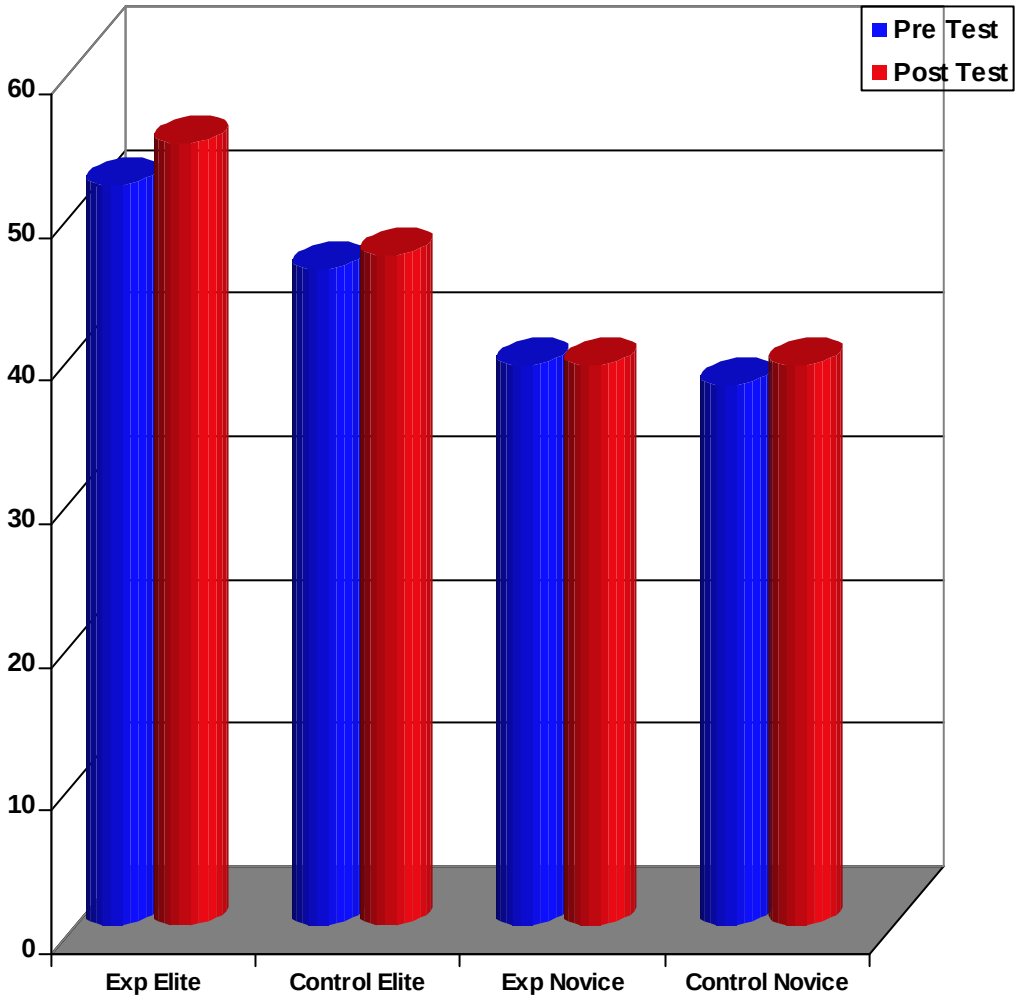


Fig. 5. Pre and Three Weeks Post Means of the Experimental and Control Groups on Pass (Service Reception)

Table 6

ANCOVA Table for Post Means on Pass (Service Reception) after Three Weeks of Mental Imagery Training Programme

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	2612.293	653.073	343.228*	0.000
Intercept	1	9.886	9.886	5.195*	0.027
Pre	1	558.019	558.019	293.272*	0.000
Groups	3	48.775	16.258	8.545*	0.000
Error	55	104.651	1.903		
Total	**60**	**127387.360**			

* Indicates significance

The effect of imagery intervention on post adjusted means on pass (service reception) was examined by using ANCOVA with pre pass (service reception) scores used as covariate. As seen from table 6, significant F – ratio's of 293.272and 8.545were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted pass (service reception) scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted pass (service reception) scores.

All pair wise comparisons among the groups were determined, and the results of the same are shown in table 7

Table 7

Pair Wise Comparison of Post Adjusted Means on Pass (Service Reception) after Three Weeks of Mental Imagery Training Programme

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
47.031	44.750			2.282*
47.031		46.136		0.895
47.031			44.416	2.615*
	44.750	46.136		1.387
	44.750		44.416	0.333
		46.136	44.416	1.720*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on pass (service reception) indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means after the three weeks experimental period on pass (service reception) are presented in Figure 6.

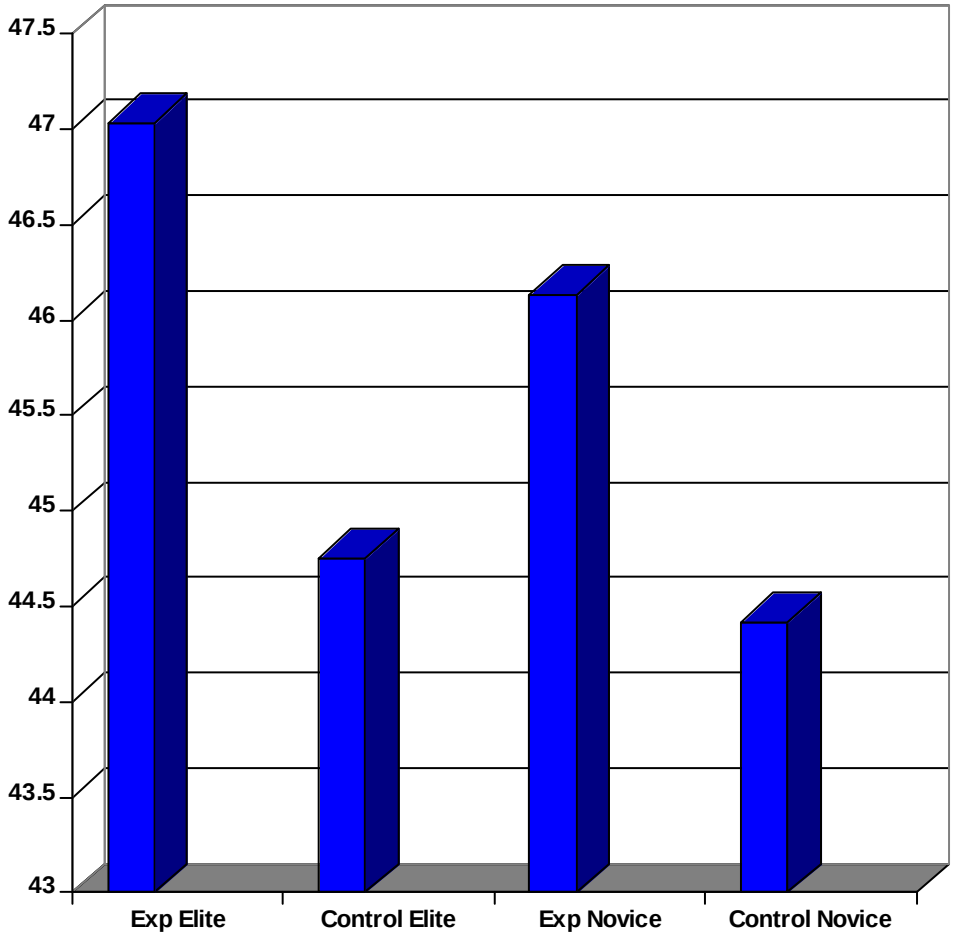


Figure 6: Paired Adjusted Post Means After Three Weeks Experimental Period on Pass (Service Reception).

Pre-test and three weeks post-test scores of the experimental and control groups on attack are presented in the table 8.

Table 8
Pre and Three Weeks Post-Test Scores of the Experimental and Control Groups on Attack

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	50.73	3.23	54.56	3.50
Control (Elite)	15	49.49	4.43	50.04	4.87
Experimental (Novice)	15	38.14	4.04	41.01	4.72
Control (Novice)	15	37.47	4.39	38.26	4.11

The above table of the pre-test and three weeks post-test means of the experimental and control groups on attack indicates that in case of elite experimental group, the Pre and three weeks post-test mean and SD were 50.73 (3.23) and 54.56 (3.50) respectively. In case of elite control group, the pre and three weeks post-test mean and SD were 49.49 (4.43) and 50.04 (4.87) respectively.

In case of Novice experimental group, the Pre and Three weeks Post-Test mean and SD were 38.14 (4.04) and 41.01 (4.72) respectively, and for the novice control group, the corresponding pre and three weeks post-test mean and SD were 37.47 (4.39) and 38.26 (4.11) respectively.

Pre and three weeks post test means on attack of the experimental and control groups are graphically shown in Figure 7.

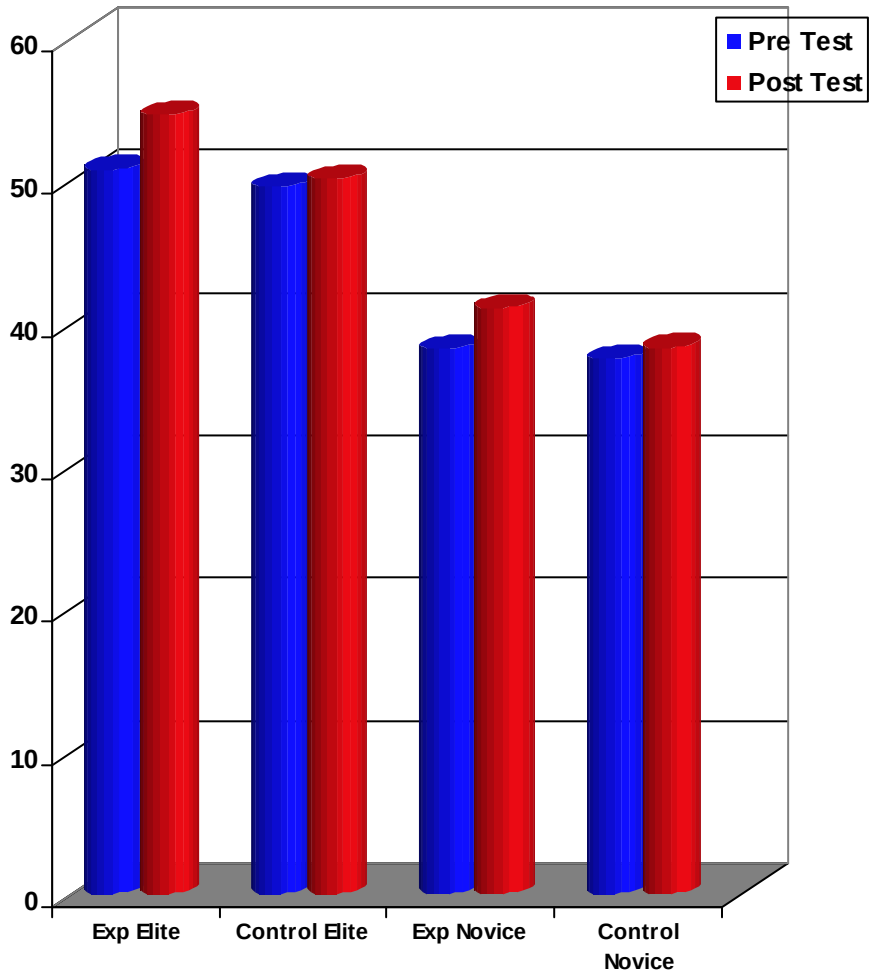


Fig7. Pre and Three Weeks Post Means of the Experimental and Control Groups on Attack

Table 9

ANCOVA Table for Post Means on Attack after Three Weeks of

Mental Imagery Training Programme

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	3561.100	890.275	462.608*	0.000
Intercept	1	0.873	0.873	0.453*	0.504
Pre	1	947.157	947.157	492.165*	0.000
Groups	3	110.713	36.904	19.176*	0.000
Error	55	105.846	1.924		
Total	**60**	**130461.400**			

* Indicates significance

The effect of imagery intervention on post adjusted means on attack was examined by using ANCOVA with pre attack scores used as covariate. As seen from table 9, significant F – ratio's of 492.165 and 19.176 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted attack scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted attack scores. All pair wise

comparisons among the groups were determined, and the results of the same are shown in table 10.

Table 10

Pair Wise Comparison of Post Adjusted Means on Attack after Three Weeks of Mental Imagery Training Programme

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
47.689	44.428			3.262*****
47.689		46.917		0.773
47.689			44.846	2.843*****
	44.428	46.917		2.489*
	44.428		44.846	0.419
		46.917	44.846	2.070*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on attack indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means after the three weeks experimental period on attack are presented in Figure 8.

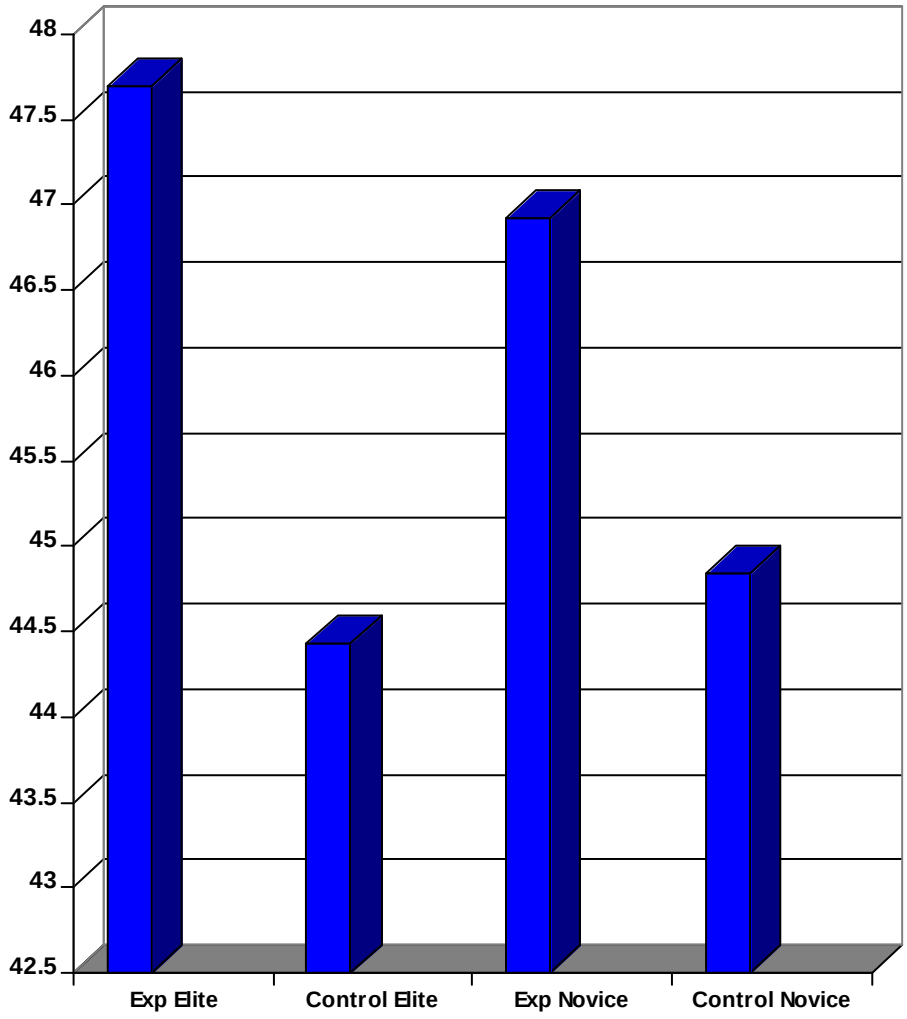


Figure 8: Paired Adjusted Post Means after Three Weeks Experimental Period on Attack.

Pre-test and three weeks post-test scores of the experimental and control groups on block are presented in the table 11

Table 11
Pre and Three Weeks Post-Test Scores of the Experimental and Control Groups on Block

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	51.41	2.35	54.38	2.19
Control (Elite)	15	50.33	3.23	50.67	3.96
Experimental (Novice)	15	39.08	2.71	42.73	2.64
Control (Novice)	15	37.77	3.12	38.88	3.24

The above table of the pre-test and three weeks post-test means of the experimental and control groups on block indicates that in case of elite experimental group, the pre and three weeks post-test mean and SD were 51.41 (2.35) and 54.38 (2.19) respectively. In case of elite control group, the pre and three weeks post-test mean and SD were 50.33 (3.23) and 50.67 (3.96) respectively.

In case of novice experimental group, the pre and three weeks post-test mean and SD were 39.08 (2.71) and 42.73 (2.64) respectively, and for the novice control group, the corresponding pre and three weeks post-test mean and SD were 37.77 (3.12) and 38.88 (3.24) respectively

The means of pre and three weeks post test means on Block of the experimental and control groups are graphically shown in Figure 9.

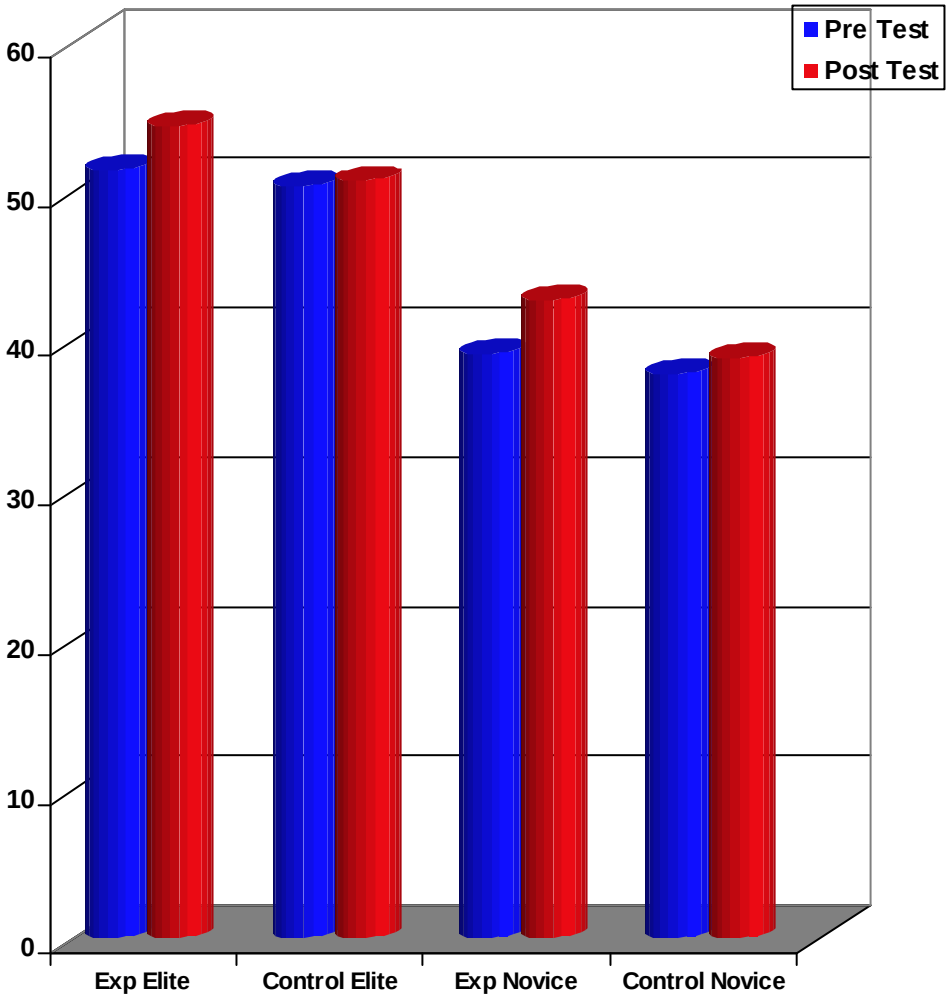


Fig.9. Pre and Three Weeks Post Means of the Experimental and Control Groups on Block

Table 12

ANCOVA Table for Post Means on Block after Three Weeks of Mental Imagery Training Programme

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	2606.288	651.572	176.829*	0.000
Intercept	1	18.488	18.488	5.017*	0.029
Pre	1	329.962	329.962	89.548*	0.000
Groups	3	109.947	36.649	9.946*	0.000
Error	55	202.662	3.685		
Total	**60**	**133484.950**			

* Indicates significance

The effect of imagery intervention on post adjusted means on block was examined by using ANCOVA with pre block scores used as covariate. As seen from table 12, significant F – ratio's of 89.548 and 9.946 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted block scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted block scores. All pair wise comparisons among the groups were determined, and the results of the same are shown in table 13.

Table 13

Pair Wise Comparison of Post Adjusted Means on Block After Three Weeks of Mental Imagery Training Programme

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
38.670	45.874			2.795*
38.670		47.437		1.233
38.670			44.693	3.977*
	45.874	47.437		1.562
	45.874		44.693	1.181
		47.437	44.693	2.744*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on block indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means after the three weeks experimental period on Block are presented in Figure 10.

Pre-Test and Post-Test scores of the Experimental and Control groups for cognitive anxiety are Presented in the table 14.

Table 14
Pre and Post-Test Scores of the Experimental and Control Groups on Cognitive Anxiety

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	18.93	3.17	16.73	3.15
Control (Elite)	15	16.80	4.84	16.20	4.41
Experimental (Novice)	15	20.13	3.02	17.40	2.47
Control (Novice)	15	16.33	5.16	16.33	4.36

The above table of the pre-test and post-test means of the experimental and control groups on cognitive anxiety indicates that in case of elite experimental group, the pre and post-test mean and SD were 18.93 (3.17) and 16.73 (3.15) respectively. In case of elite control group, the pre and post-test mean and SD were 16.80 (4.84) and 16.20 (4.41) respectively.

In case of novice experimental group, the pre and post-test Mean and SD were 20.13(3.02) and 17.40 (2.47) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 16.33 (5.16) and 16.33 (4.36) respectively

The means of the experimental and control groups on cognitive anxiety are graphically shown in Figure 11.

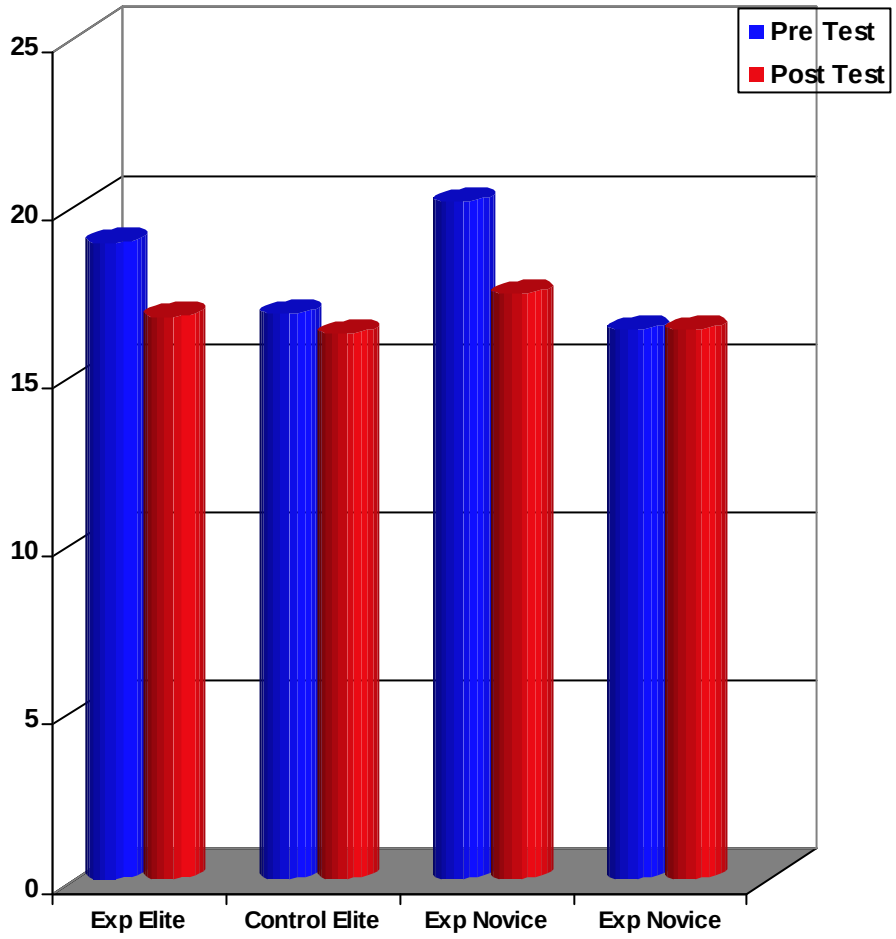


Fig. 11. Means of the Experimental and Control Groups on Cognitive Anxiety

The results of the analysis of covariance of the experimental and control groups on cognitive anxiety are presented in tables 15.

Table 15

ANCOVA Table for Post Means on Cognitive Anxiety of the

Experimental and Control Groups

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	699.009	174.752	122.712*	0.000
Intercept	1	6.309	6.309	4.430*	0.040
Pre	1	665.942	685.942	481.674*	0.000
Groups	3	40.222	13.407	9.415*	0.000
Error	55	78.324	1.424		
Total	**60**	**17444.000**			

* Indicates significance

The effects of imagery intervention on post adjusted means on cognitive anxiety were examined by using ANCOVA with pre cognitive anxiety scores used as covariate. As seen from table 15, significant F – ratio's of 481.674 and 9.415 were obtained for the pre and post groups respectively, there by indicating significant differences in post adjusted cognitive anxiety scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted cognitive anxiety scores. All pair wise comparisons among the groups were determined, and the results of the same are shown in table 16.

Table 16
Pair Wise Comparison of Post Adjusted Means on Cognitive Anxiety

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
15.991	17.251			1.260*
15.991		15.648		0.342
15.991			17.777	1.786*
	17.251	15.648		1.603*
	17.251		17.777	0.526
		15.648	17.777	2.128*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on cognitive anxiety indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means on cognitive anxiety means of the experimental and control groups are presented in Figure12.

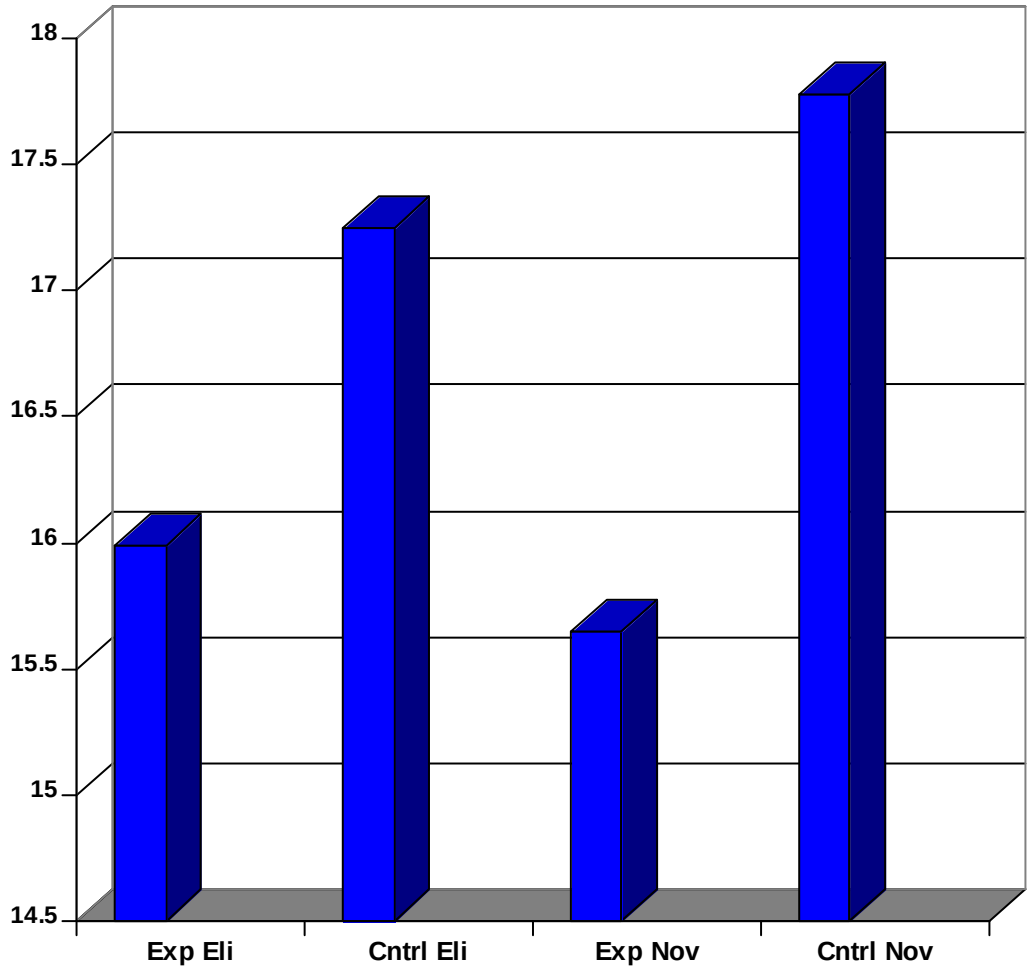


Figure. 12. Paired Adjusted Post Means on Cognitive Anxiety of the Experimental and Control Groups

Pre-test and post-test scores of the experimental and control groups are presented in the table 17

Table 17

Pre and Post-Test Scores of the Experimental and Control Groups on Somatic Anxiety

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD

Experimental (Elite)	15	16.13	5.03	14.06	3.88
Control (Elite)	15	15.73	5.09	16.00	4.69
Experimental (Novice)	15	17.00	3.76	15.66	3.39
Control (Novice)	15	15.93	3.56	15.26	3.23

The above table of the pre-test and post-test means of the experimental and control groups on somatic anxiety indicates that in case of elite experimental group, the pre and post-test mean and SD were 16.13 (5.03) and 14.06 (3.88) respectively. In case of elite control group, the pre and post-test mean and SD were 15.73 (5.09) and 16.00 (4.69) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 17.00 (3.76) and 15.66 (3.39) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 15.93 (3.56) and 15.26 (3.23) respectively

The means of the experimental and control groups on Somatic Anxiety are graphically shown in Figure 13.

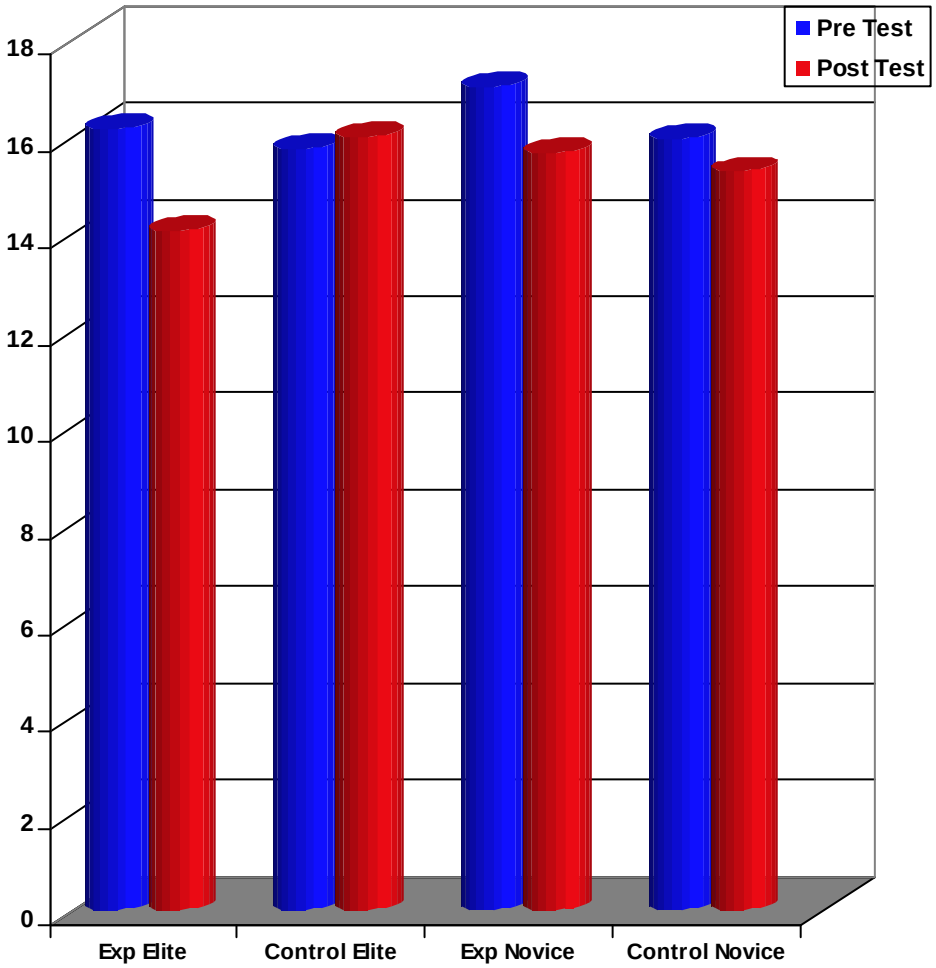


Fig. 13. Means of the Experimental and Control Groups

on Somatic Anxiety

Table 18

ANCOVA Table for Post Means on Somatic Anxiety of the

Experimental and Control Groups

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	761.165	190.291	106.704*	0.000
Intercept	1	15.718	15.718	8.814*	0.004
Pre	1	729.115	729.115	408.842*	0.000
Groups	3	39.883	13.294	7.455*	0.000
Error	55	98.085	1.783		
Total	**60**	**14813.000**			

* Indicates significance

The effects of imagery intervention on post adjusted means on somatic anxiety were examined by using ANCOVA with pre somatic anxiety scores used as covariate. As seen from table 18, significant F – ratio's of 408.842 and 7.455 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted somatic anxiety scores based on imagery interventions between the experimental and control groups.

A post comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted somatic anxiety scores. All pair wise

comparisons among the groups were determined, and the results of the same are shown in table 19

Table 19
Pair Wise Comparison of Post Adjusted Means on Somatic Anxiety

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
14.121	16.381			2.260*
14.121		15.013		0.892
14.121			15.485	1.363*
	16.381	15. 013		1369*
	16.381		15.485	0.897
		15. 013	15.485	0.472

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted mean on somatic anxiety indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice. pre-test and post-test scores of the experimental and control groups are presented in the table 19

The paired comparison of the adjusted post means on Somatic Anxiety means of the experimental and control groups are presented in Figure 14.

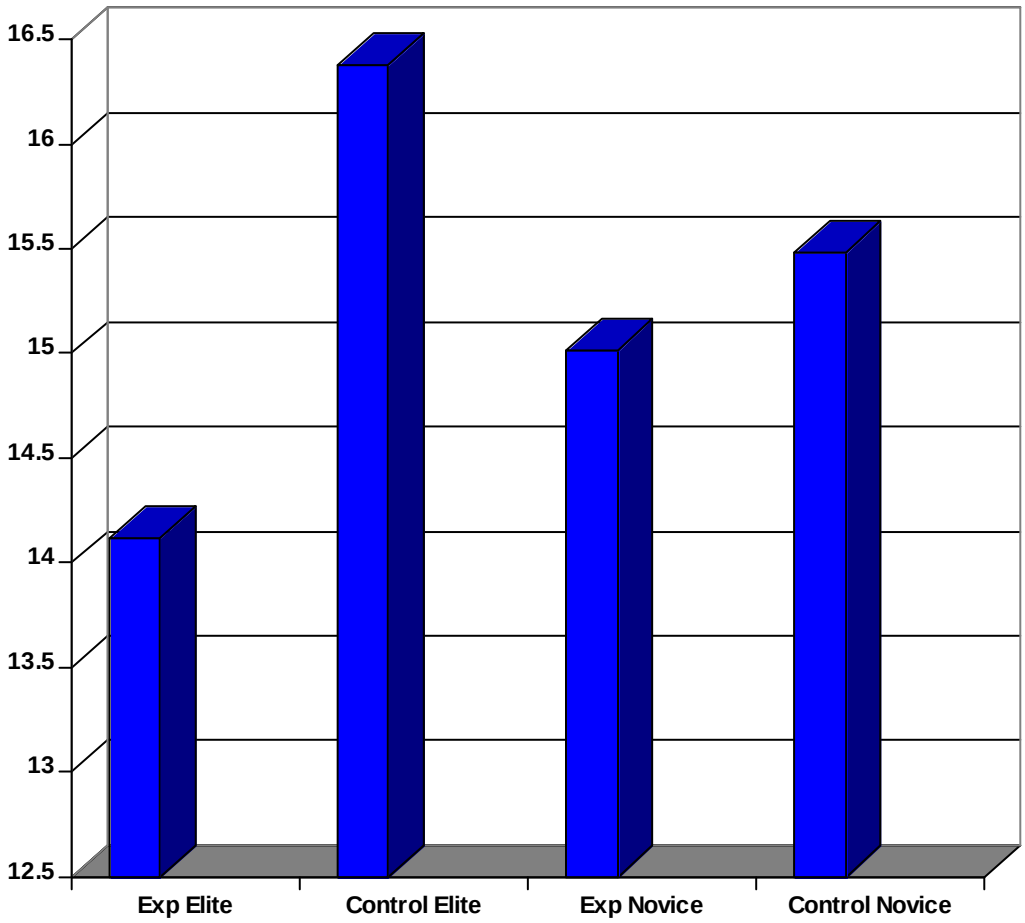


Figure 14. Paired Adjusted Post Means on Somatic Anxiety of the Experimental and Control Groups

Table20

Pre and Post-Test Scores of the Experimental and Control Groups on Self Confidence

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	25.20	3.84	28.40	3.24
Control (Elite)	15	25.27	4.00	26.26	4.23
Experimental (Novice)	15	22.40	3.48	27.00	3.02
Control (Novice)	15	27.07	3.33	27.26	2.91

The above table of the pre-test and post-test means of the experimental and control groups on self confidence indicates that in case of elite experimental group, the pre and post-test mean and SD were 25.20 (3.84) and 28.40 (3.24) respectively. In case of elite control group, the pre and post-test mean and SD were 25.27 (4.00) and 26.26 (4.23) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 22.40 (3.48) and 27.00 (3.02) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 27.07 (3.33) and 27.26 (2.91) respectively.

The means of the experimental and control groups on Self Confidence are graphically shown in Figure 15.

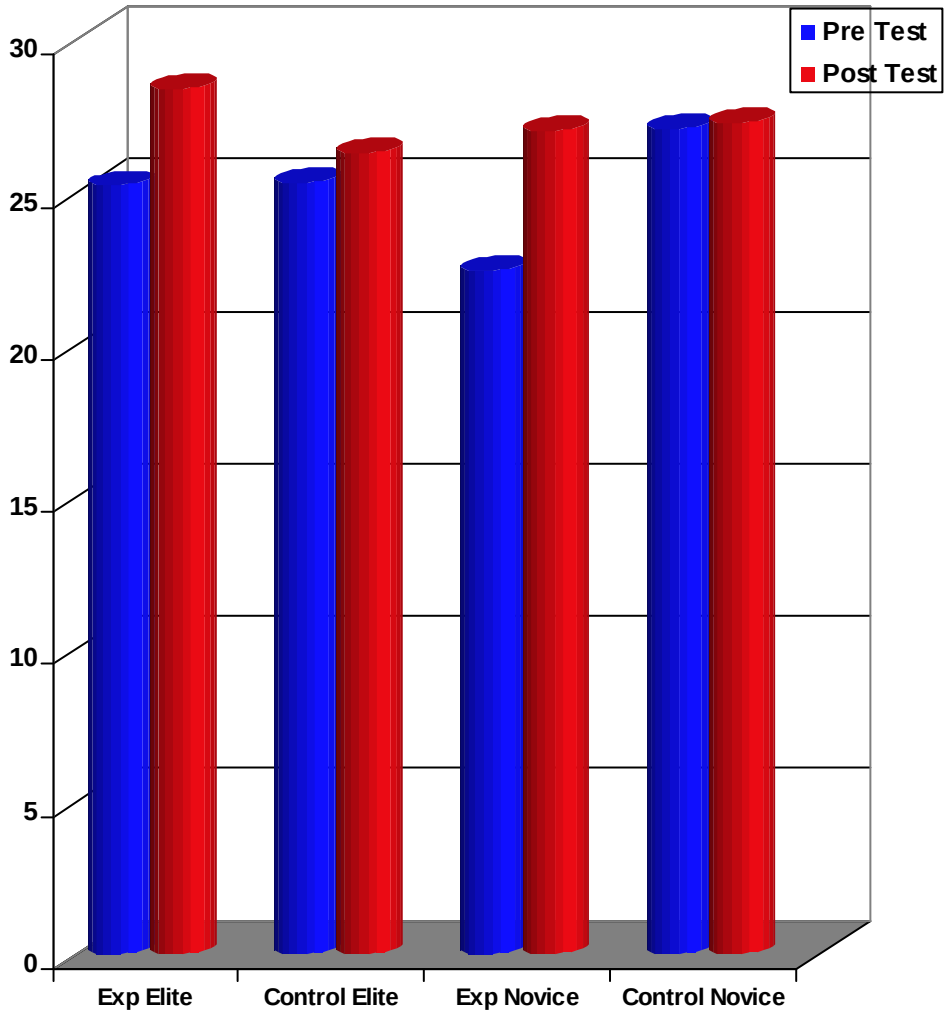


Fig. 15. Means of the Experimental and Control Groups on Self Confidence

Table 21
ANCOVA Table for Post Means On Self Confidence of the Experimental and Control Groups

	DF	SS	MSS	F	Sig. Level
Corrected Model	4	586.458	146.615	85.535*	0.000
Intercept	1	41.307	41.307	24.098*	0.000
Pre	1	551.191	551.191	321.564*	0.000
Groups	3	121.303	40.434	23.589*	0.000
Error	55	94.275	1.714		
Total	**60**	**45180.000**			

* Indicates significance

The effect of imagery intervention on post adjusted means on self confidence were examined by using ANCOVA with pre self confidence scores used as covariate. As seen from table 21, significant F – ratio's of 321.564and 23.589 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted self confidence scores based on imagery interventions between the experimental and control groups.

A post comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted self confidence scores. All pair wise

comparisons among the groups were determined, and the result of the same shown in table 22

Table 22
Pair Wise Comparison of Post Adjusted Means on Self Confidence

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
28.215	26.025			2.190*
28.215		29.206		0.991
28.215			25.488	2.727*
	26.025	29.206		3.181*
	26.025		25.488	0.537
		29.206	25.488	3.718*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on self confidence indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant differences were also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means on Self Confidence means of the experimental and control groups are presented in Figure 16.

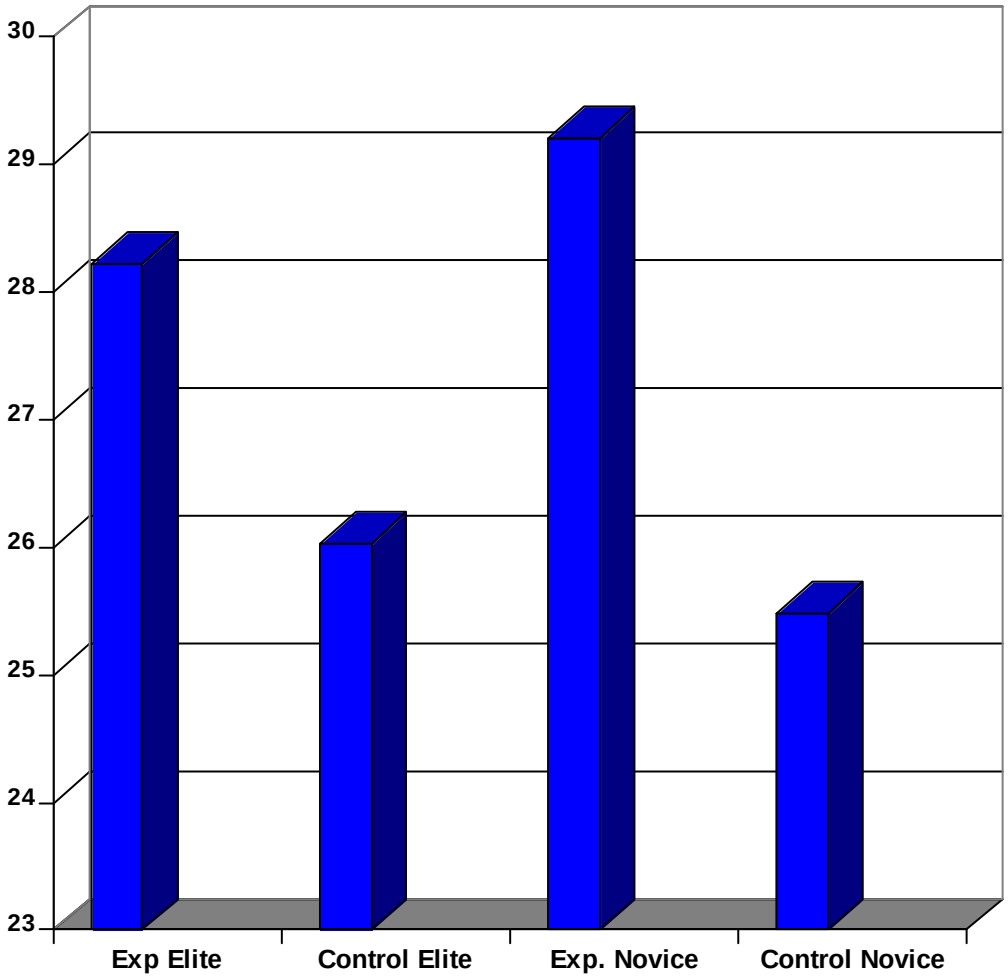


Figure 16. Paired Adjusted Post Means on Self Confidence of the Experimental and Control Groups

Pre-Test and Post-Test scores of the Experimental and Control groups are Presented in the table 23

Table 23

Pre and Post-Test Scores of the Experimental and Control Groups on Attention

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD

Experimental (Elite)	15	10.20	3.69	13.66	4.23
Control (Elite)	15	13.13	5.46	13.80	5.05
Experimental (Novice)	15	9.87	2.75	13.13	1.92
Control (Novice)	15	15.00	5.46	15.60	4.80

The above table of the pre-test and post-test means of the experimental and control groups on attention indicates that in case of elite experimental group, the pre and post-test mean and SD were 10.20 (3.69) and 13.66 (4.23) respectively. In case of elite control group, the pre and post-test mean and SD were 13.13 (5.46) and 13.80 (5.05) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 9.87 (2.75) and 13.13 (1.92) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 15.00 (5.46) and 15.60 (4.80) respectively

The means of the experimental and control groups on Attention are graphically shown in Figure 17.

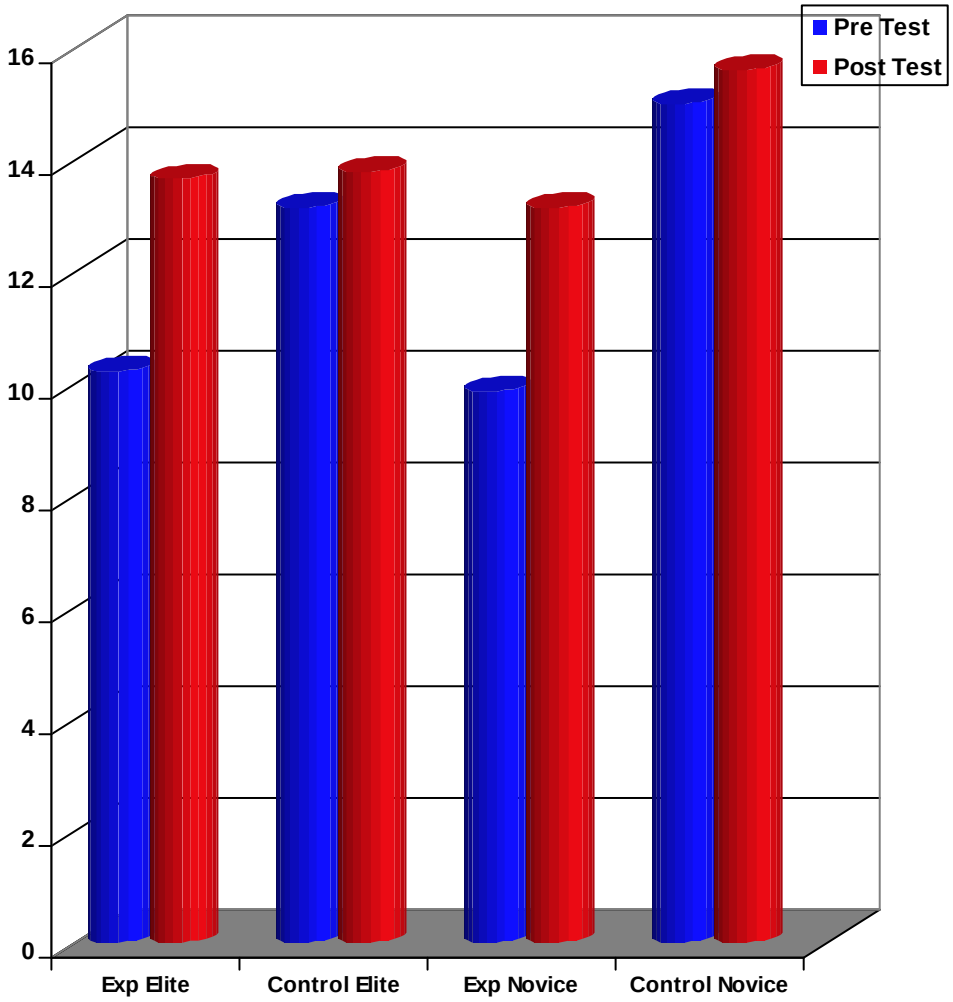


Fig. 17. Means of the Experimental and Control Groups on Attention

Table 24
ANCOVA Table for Post Means on Attention of the Experimental and Control Groups

	DF	SS	MSS	F	Sig. Level
Corrected Model	4	913.621	228.405	101.943*	0.000
Intercept	1	86.217	86.217	38.481*	0.000
Pre	1	861.838	861.838	384.659*	0.000
Groups	3	62.268	20.756	9.264*	0.000
Error	55	123.229	2.241		
Total	60	12881.000			

* Indicates significance

The effect of imagery intervention on post adjusted means on attention was examined by using ANCOVA with pre attention scores used as covariate. As seen from table 24, there was a significant F – ratio's of 384.659 and 9.264 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted attention scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted attention scores. All pair wise comparisons among the groups were determined, and the result of the same shown in table 25

Table 25
Pair Wise Comparison of Post Adjusted Means on Attention

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
15.281	12.855			2.426*
15.281		15.039		0.242
15.281			13.026	2.255*
	12.855	15.039		2.184 *
	12.855		13.026	0.171
		15.039	13.026	2.013*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on attention indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant differences were also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means on Attention means of the experimental and control groups are presented in Figure 18.

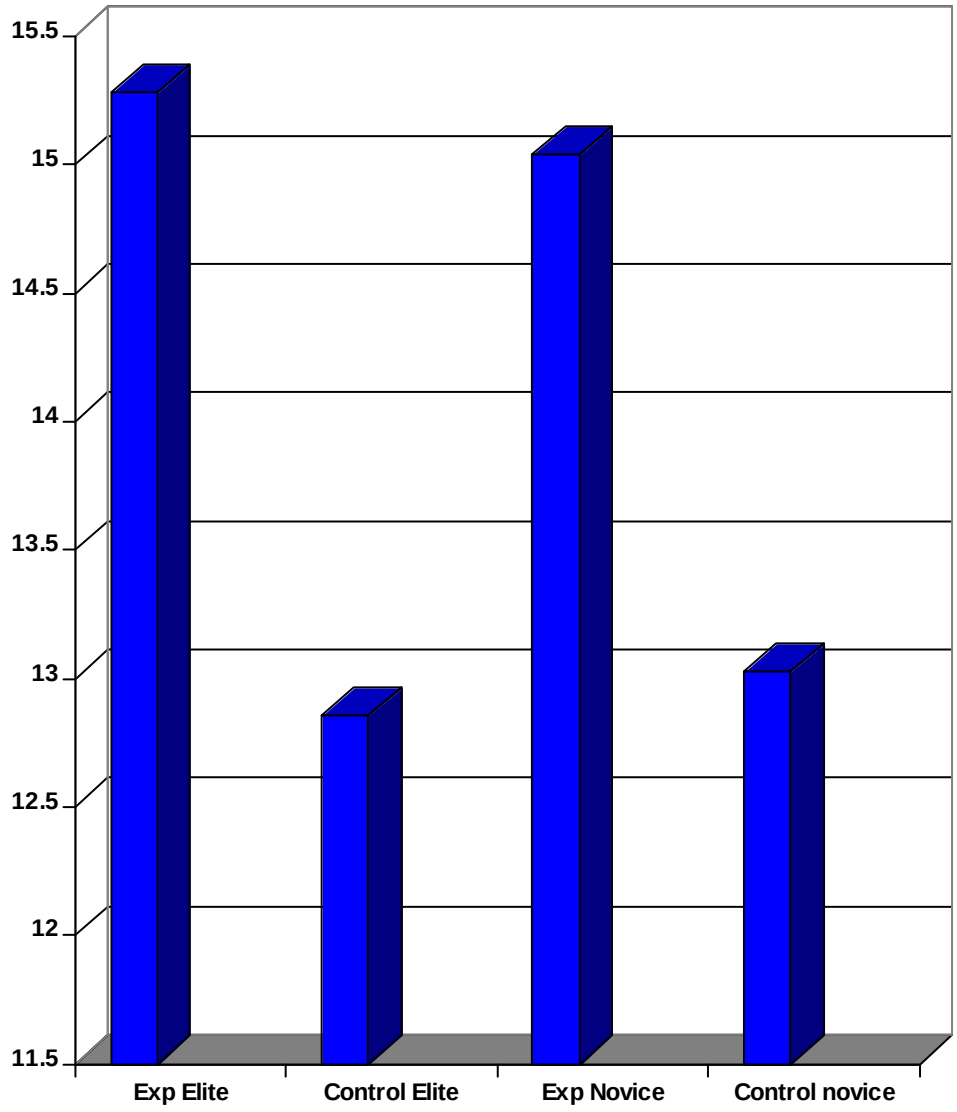


Figure 18. Paired Adjusted Post Means on Attention of the Experimental and Control Groups

Pre-Test and Post-Test scores of the Experimental and Control groups are Presented in the table 26

Table 26
Pre and Post-Test Scores of the Experimental and Control Groups on Serve

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	50.84	1.77	55.88	1.70
Control (Elite)	15	47.98	5.46	49.16	5.30
Experimental (Novice)	15	37.99	3.23	42.56	3.39
Control (Novice)	15	36.73	2.89	38.11	2.75

The above table of the pre-test and post-test means of the experimental and control groups on Serve indicates that in case of elite experimental group, the pre and post-test mean and SD were 50.84 (1.77) and 55.88 (1.70) respectively. In case of elite control group, the pre and post-test mean and SD were 47.98 (5.46) and 49.16 (5.30) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 37.99 (3.23) and 42.56 (3.39) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 36.73 (2.89) and 38.11 (2.75) respectively

The means of the experimental and control groups on Serve are graphically shown in Figure 19.

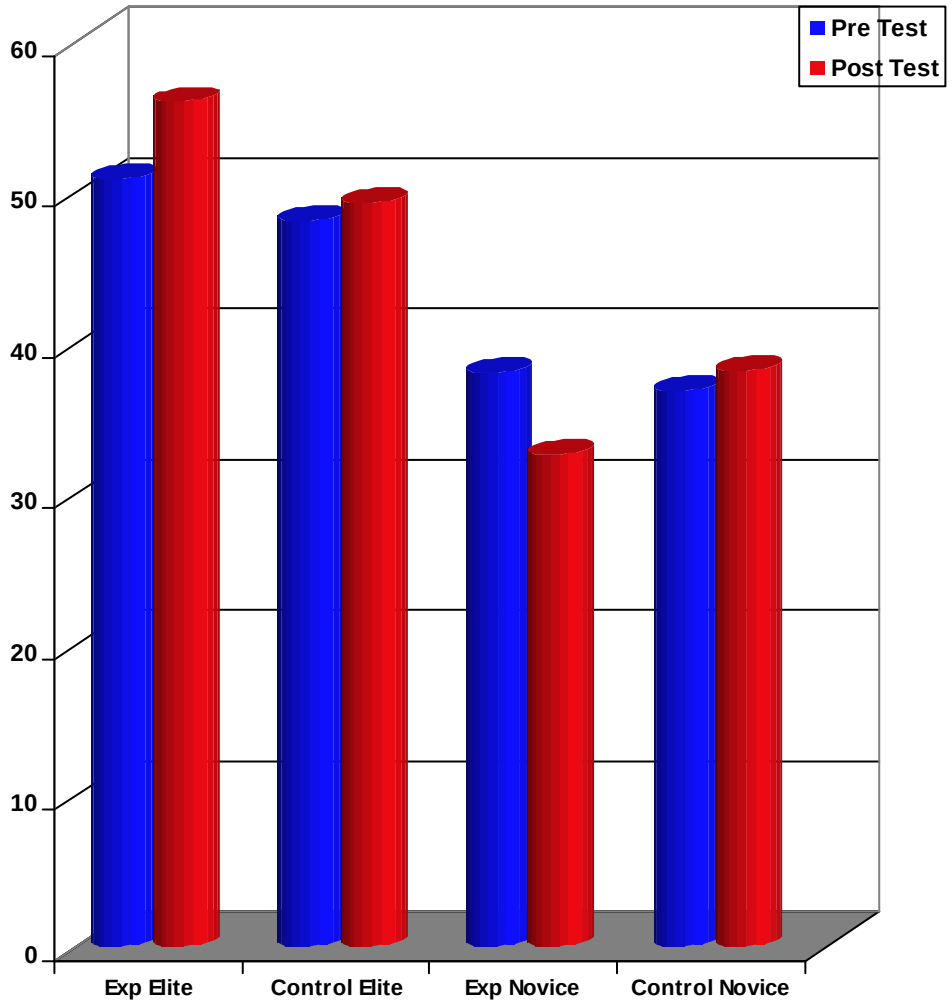


Fig. 19. Means of The Experimental and Control Groups

on Serve

Table 27
ANCOVA Table for Post Means on Serve of the Experimental and Control Groups

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	3374.871	843.718	1092.324 *	0.000
Intercept	1	9.803	9.803	12.692*	0.001
Pre	1	659.719	659.719	854.109*	0.000
Groups	3	186.104	62.035	80.314*	0.000
Error	55	42.482	0.772		
Total	**60**	**132780.620**			

* Indicates significance

The effect of imagery intervention on post adjusted means on serve was examined by using ANCOVA with pre serve scores used as covariate. As seen from table 27, significant F – ratio's of 854.109 and 80.314 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted serve scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted serve scores. All pair wise comparisons among the groups were determined, and the result of the same shown in table 28.

Table 28
Pair Wise Comparison of Post Adjusted Means on Serve

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
48.777	44.785			3.993*
48.777		47.708		1.069
48.777			44.462	4.314*
	44.785	47.708		2.924*
	44.785		44.462	0.322
		47.708	44.462	3.245*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on serve indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

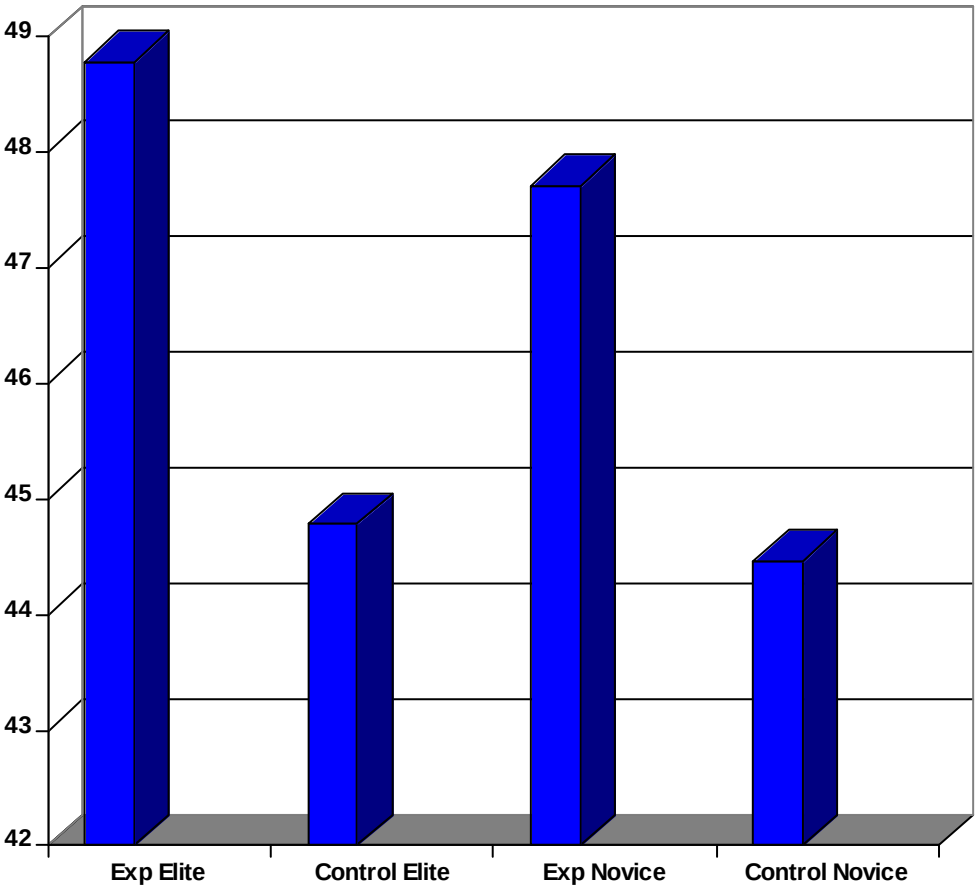


Figure 20. Paired Adjusted Post Means on Serve of the Experimental and Control Groups

Pre-Test and Post-Test scores of the Experimental and Control groups are Presented in the table 29.

Table 29
Pre and Post-Test Scores of the Experimental and Control Groups on Pass (Service Reception)

Groups	N	Pre Test		Pos-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	51.42	3.86	55.47	4.17
Control (Elite)	15	46.45	3.23	47.17	3.18
Experimental (Novice)	15	38.88	3.38	42.99	3.58
Control (Novice)	15	37.86	3.05	39.54	2.96

The above table of the pre-test and post-test means of the experimental and control groups on reception indicates that in case of elite experimental group, the pre and post-test mean and SD were 51.42 (3.86) and 55.47 (4.17) respectively. In case of elite control group, the pre and post-test mean and SD were 46.45 (3.23) and 47.17 (3.18) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 38.88 (3.38) and 42.99 (3.58) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 37.86 (3.05) and 39.54 (2.96) respectively

The means of the experimental and control groups on pass (service reception) are graphically shown in Figure 21.

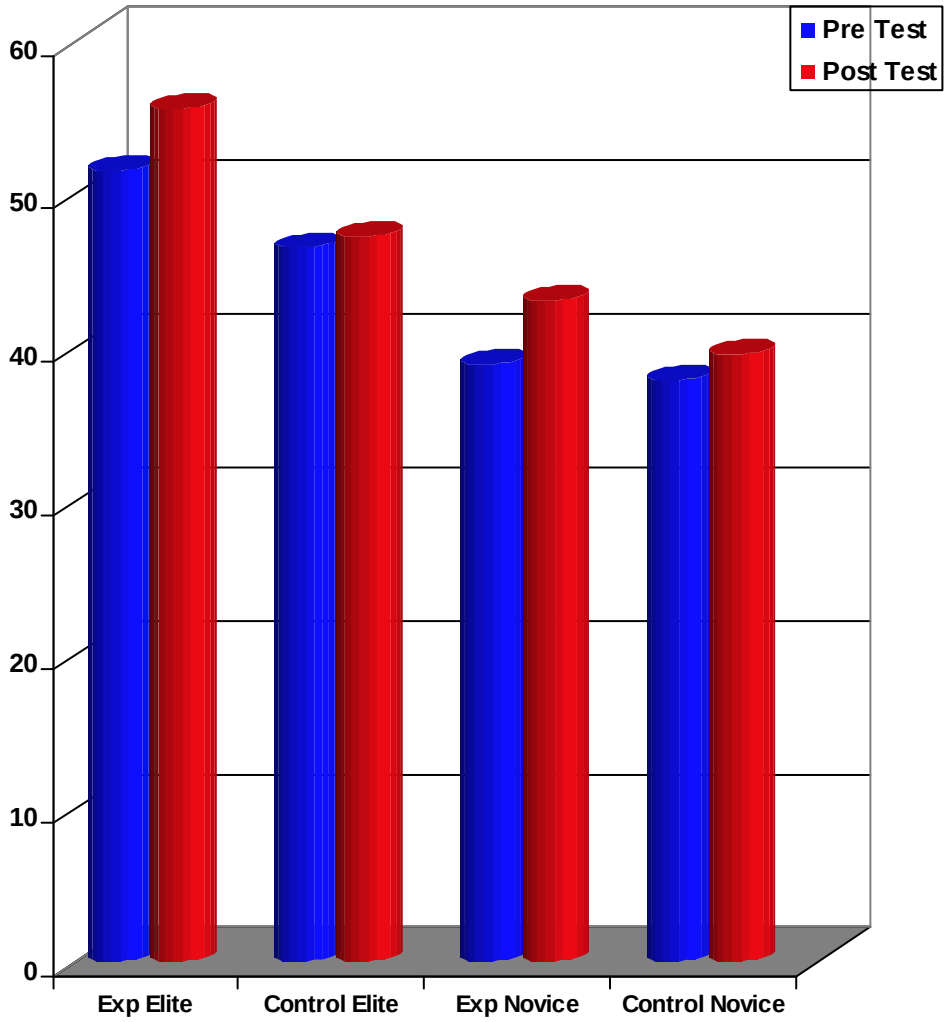


Fig. 21. Means of the Experimental and Control Groups

on Pass (Service Reception)

Table 30

ANCOVA Table for Post Means on Pass (Service Reception) of the Experimental and Control Groups

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	2702.560	675.640	341.772*	0.000
Intercept	1	8.284	8.284	4.190*	0.045
Pre	1	579.396	579.396	293.087*	0.000
Groups	3	133.341	44.447	22.483*	0.000
Error	55	108.728	1.977		
Total	**60**	**131404.910**			

* Indicates significance

The effect of imagery intervention on post adjusted means on pass (Service reception) was examined by using ANCOVA with pre pass(service reception)scores used as covariate. As seen from table 30, significant F – ratio's of 293.087 and 22.483 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted Pass(Service reception) scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted pass (service reception) scores.

All pair wise comparisons among the groups were determined, and the result of the same shown in table 31

Table 31
Pair Wise Comparison of Post Adjusted Means on Pass (Service Reception)

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
48.120	44.524			3.597*
48.120		47.515		0.605
48.120			45.012	3.099*
	44.524	47.515		2.991*
	44.524		45.012	0.498
		47.515	45.012	2.494*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on pass (service reception) indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post mean on Pas (service reception) means of the experimental and control groups are presented in Figure 22.

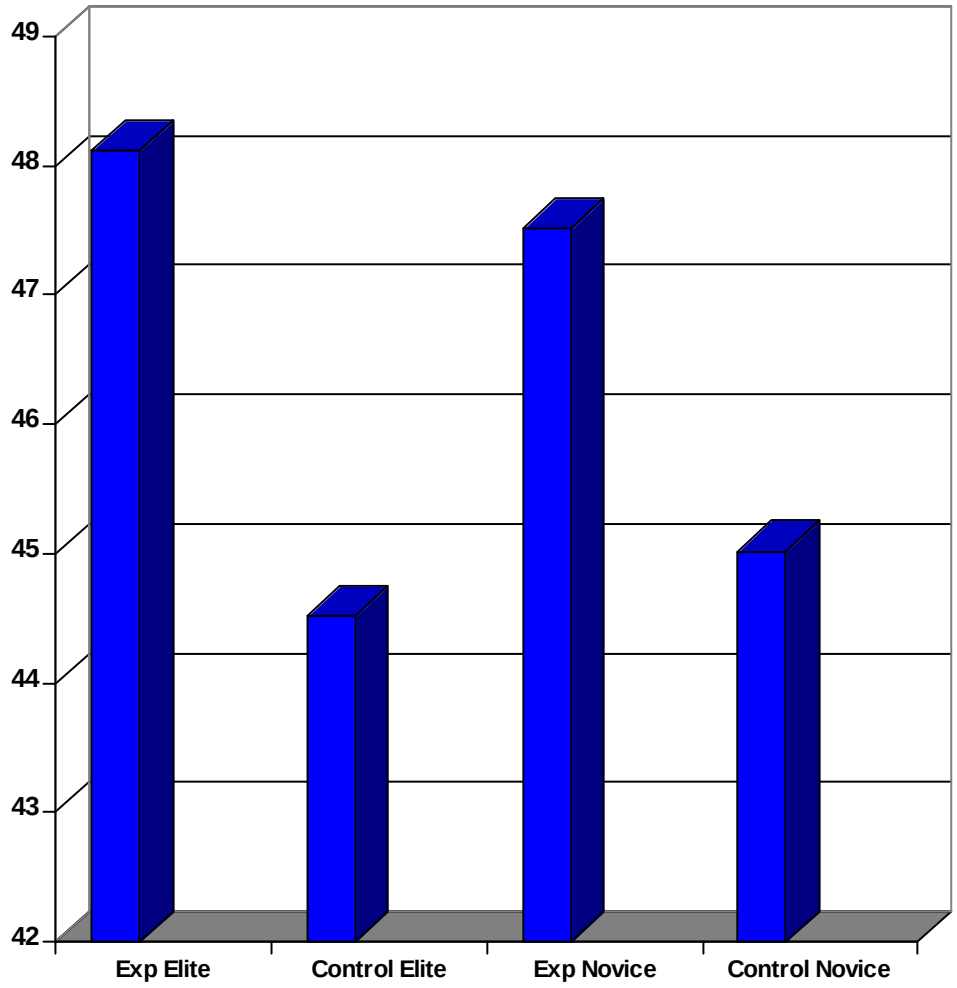


Figure 22. Paired Adjusted Post Means on Pass (Service Reception) of the Experimental and Control Groups

Pre-test and post-test scores of the experimental and control groups are presented in the table 32

Table 32

Pre and Post-Test Scores of the Experimental and Control Groups on Attack

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	50.82	3.61	55.74	3.59
Control (Elite)	15	49.83	4.97	50.48	4.81

Experimental (Novice)	15	37.90	3.82	42.08	4.91
Control (Novice)	15	37.43	4.35	38.77	4.34

The above table of the pre-test and post-test means of the experimental and control groups on attack indicates that in case of elite experimental group, the pre and post-test mean and SD were 50.82 (3.61) and 55.74 (3.59) respectively. In case of elite control group, the pre and post-test mean and SD were 49.83 (4.97) and 50.48 (4.81) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 37.90 (3.82) and 42.08 (4.91) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 37.43 (4.35) and 38.77 (4.34) respectively

The means of the experimental and control groups on attack are graphically shown in Figure 23.

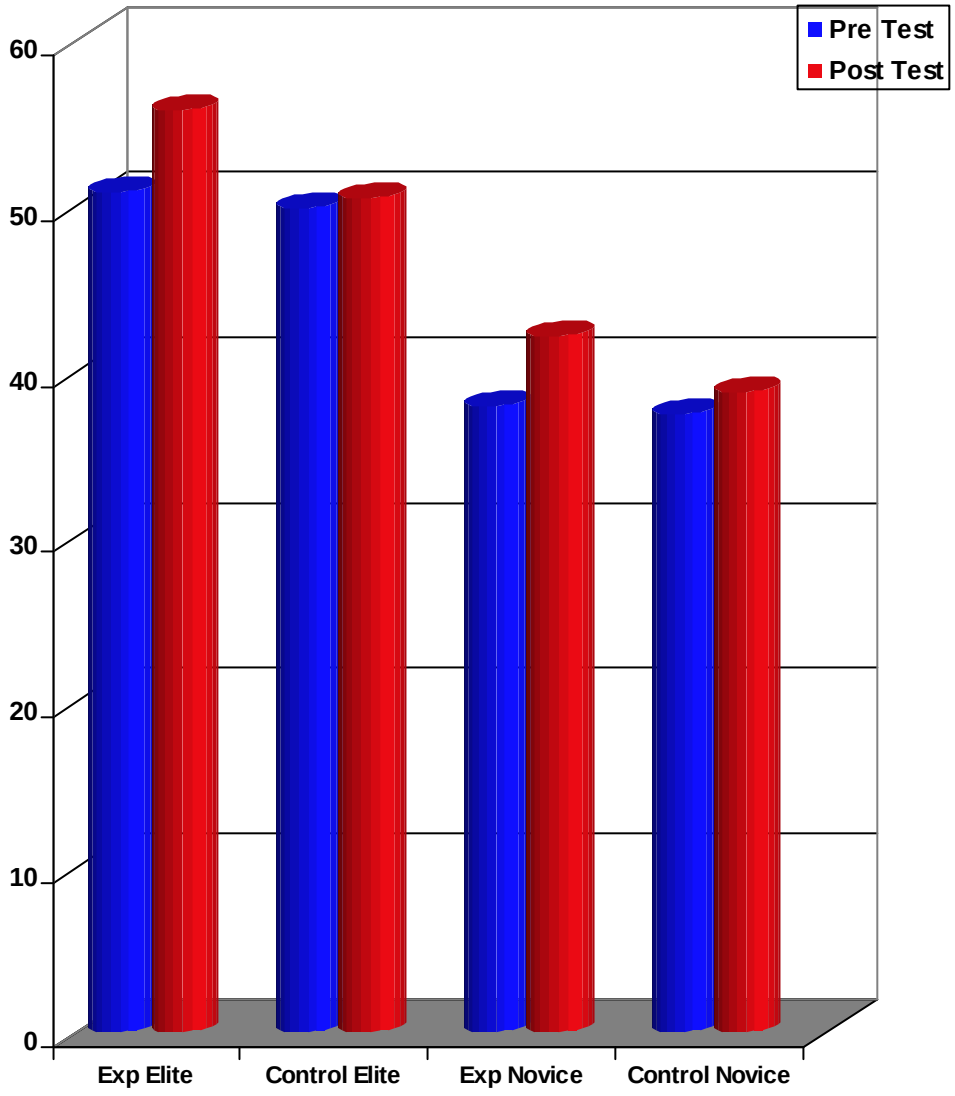


Fig.23. Means of the Experimental and Control Groups on Attack

Table 33

ANCOVA Table for Post Means on Attack of the

Experimental and Control Groups

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	3709.411	927.353	512.426*	0.000
Intercept	1	3.394	3.394	1.857*	0.176
Pre	1	1007.831	1007.831	556.896*	0.000
Groups	3	196.316	65.439	36.159*	0.000
Error	55	99.535	1.810		
Total	**60**	**135054.920**			

* Indicates significance

The effect of imagery intervention on post adjusted means on attack was examined by using ANCOVA with pre attack scores used as covariate. As seen from table 33, significant F – ratio's of 556.896 and 36.159 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted attack scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted attack scores. All pair wise

comparisons among the groups were determined, and the result of the same shown in table 21

Table 34
Pair Wise Comparison of Post Adjusted Means on Attack

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
48.883	44.621			4.262*
48.883		48.207		0.676
48.883			45.369	3.514*
	44.621	48.207		3.586*
	44.621		45.369	0.748
		48.207	45.369	2.838*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on attack indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means on Attack means of the experimental and control groups are presented in Figure 24.

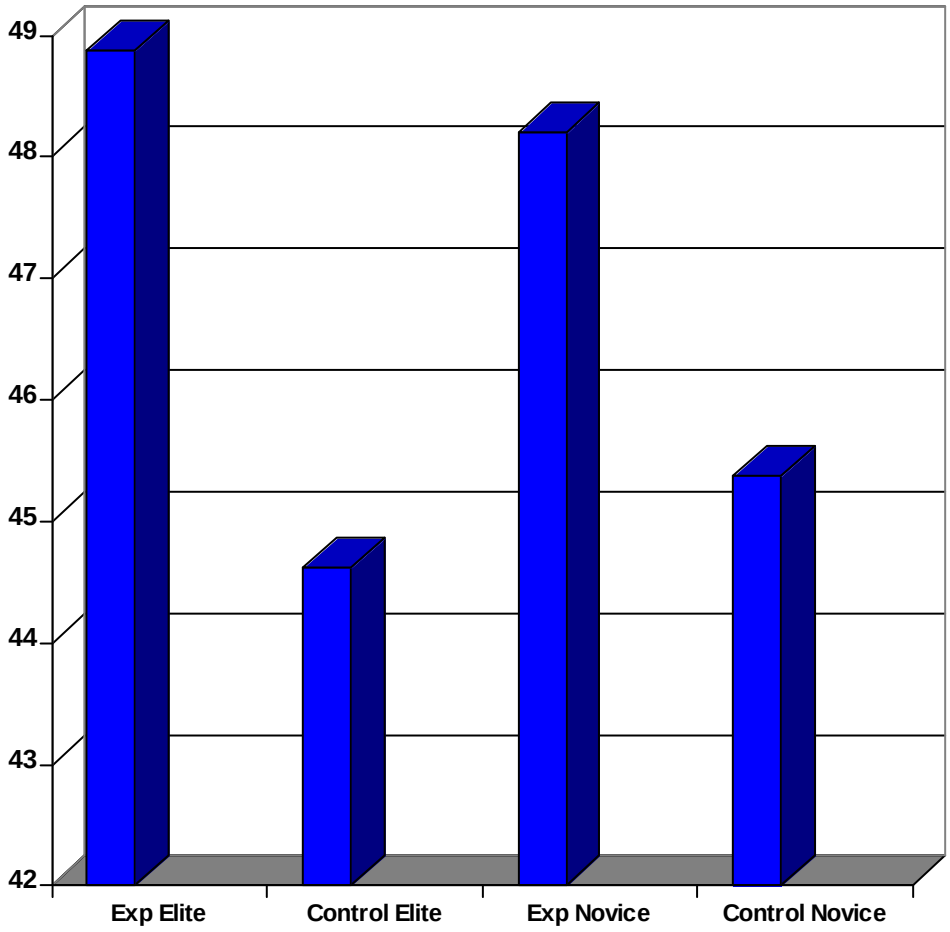


Figure 24. Paired Adjusted Post Means on Attack of the Experimental and Control Groups

Pre-Test and Post-Test scores of the Experimental and Control groups are Presented in the table 35

Table 35
Pre and Post-Test Scores of the Experimental and Control Groups on Block

Groups	N	Pre Test		Post-Test	
		Mean	SD	Mean	SD
Experimental (Elite)	15	51.01	2.83	55.45	2.45
Control (Elite)	15	50.13	3.33	51.26	3.76
Experimental (Novice)	15	39.48	1.80	45.00	2.05
Control (Novice)	15	38.21	3.31	39.28	3.07

The above table of the pre-test and post-test means of the experimental and control groups on block indicates that in case of elite experimental group, the pre and post-test mean and SD were 51.01 (2.83) and 55.45 (2.45) respectively. In case of elite control group, the pre and post-test mean and SD were 50.13 (3.33) and 51.26 (3.76) respectively.

In case of novice experimental group, the pre and post-test mean and SD were 39.48 (1.80) and 45.00 (2.05) respectively, and for the novice control group, the corresponding pre and post-test mean and SD were 38.21 (3.31) and 39.28 (3.07) respectively

The means of the experimental and control groups on Block are graphically shown in Figure 25.

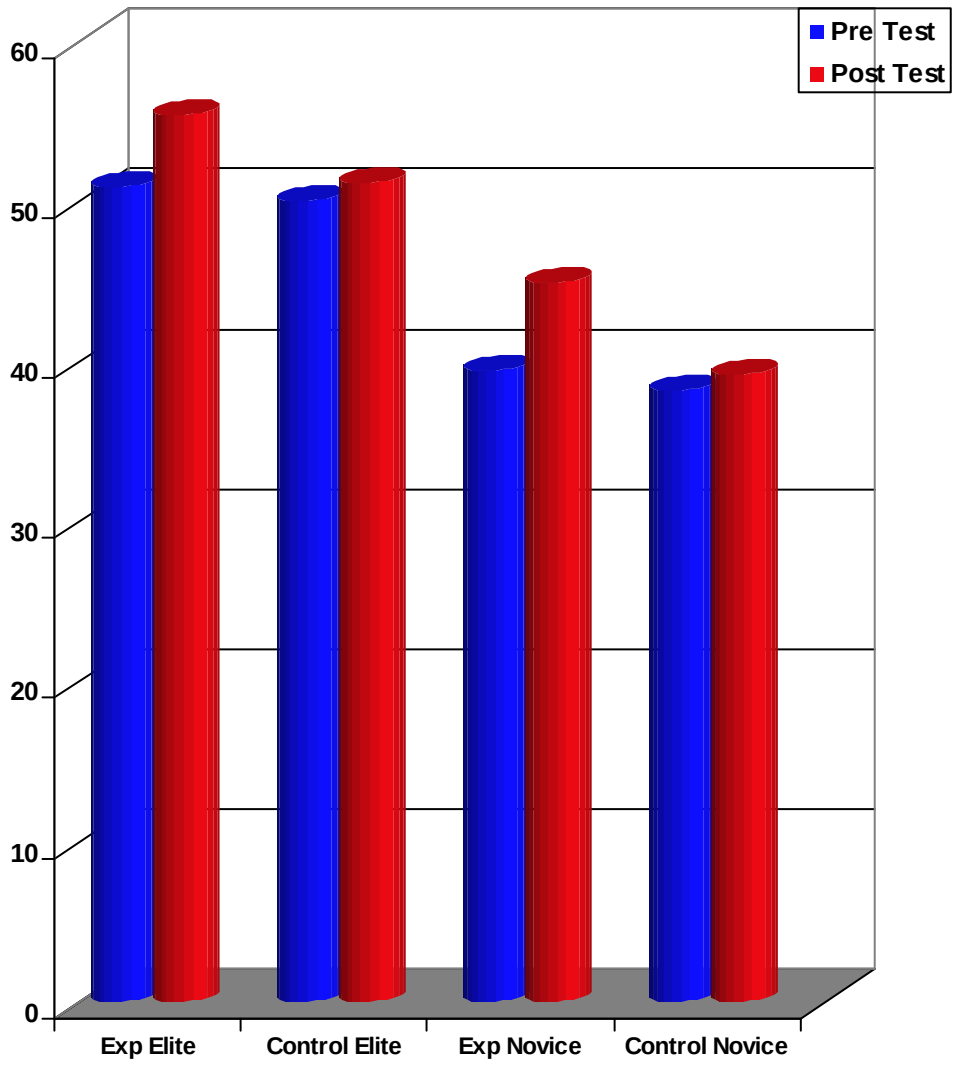


Fig. 25. Means of the Experimental and Control Groups

on Block

Table 36

ANCOVA Table for Post Means on Block of the

Experimental and Control Groups

	DF	**SS**	**MSS**	**F**	**Sig. Level**
Corrected Model	4	2632.404	658.101	343.652*	0.000
Intercept	1	14.996	14.996	7.830*	0.007
Pre	1	369.624	369.624	193.013*	0.000
Groups	3	237.952	79.317	41.419*	0.000
Error	55	105.326	1.915		
Total	**60**	**139541.480**			

* Indicates significance

The effect of imagery intervention on post adjusted means on block was examined by using ANCOVA with pre block scores used as covariate. As seen from table 36, significant F – ratio's of 193.013 and 41.419 were obtained for the pre and groups respectively, there by indicating significant differences in post adjusted block scores based on imagery interventions between the experimental and control groups.

A post-hoc comparison was performed using the Benferroni method to determine which of the experimental and control groups showed significant difference for the post adjusted block scores. All pair wise

comparisons among the groups were determined, and the result of the same shown in table 37

Table 37
Pair Wise Comparison of Post Adjusted Means on Block

Groups				
Experimental Elite	**Control Elite**	**Experimental Novice**	**Control Novice**	**Mean Difference**
49.851	46.441			3.411*
49.851		49.648		0.204
49.851			45.060	4.791*
	46.441	49.648		3.207*
	46.441		45.060	1.381
		49.648	45.060	4.588*

* Indicates significance at 0.05 level

The post-hoc pair wise comparison of adjusted means on block indicates significant difference between experimental elite and control elite, experimental elite and experimental novice, experimental elite and control novice. Significant difference was also observed between control elite and experimental novice, control elite and control novice, and experimental novice and control novice.

The paired comparison of the adjusted post means on Block means of the experimental and control groups are presented in Figure 26.

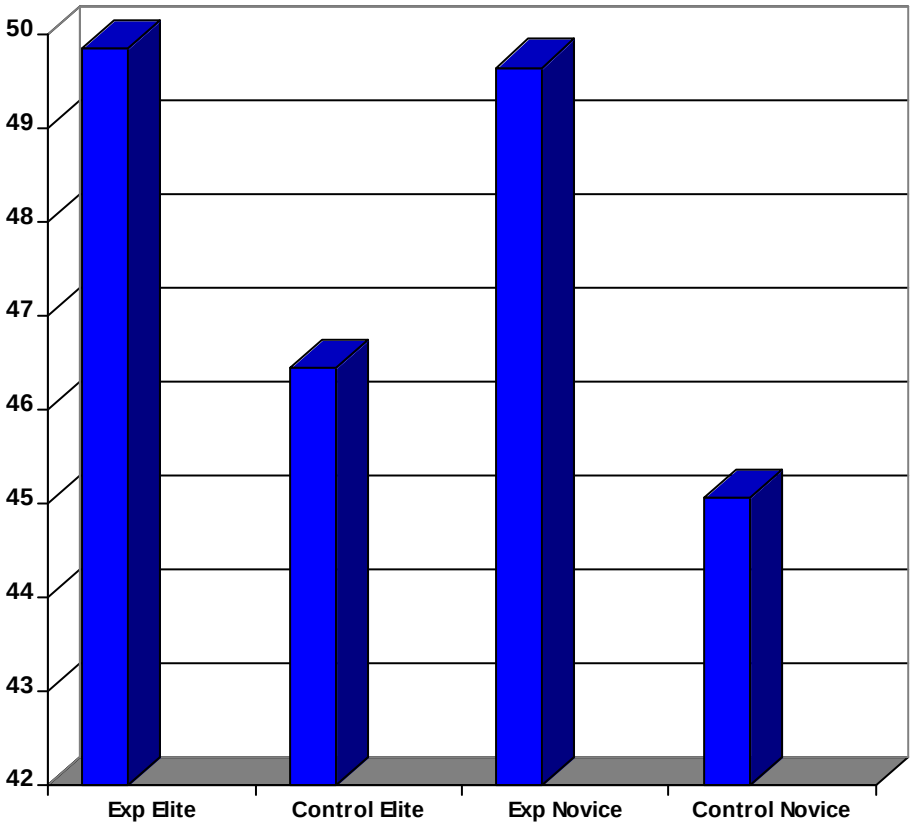


Figure 26: Paired Adjusted Post Means on Block of the Experimental and Control Groups

Discussion of Findings

The present study was undertaken with the following hypotheses:

(i) There would be significant effect for the mental imagery intervention programme on selected psychological variables namely, cognitive anxiety, somatic anxiety and self confidence and attention of volleyball players.

(ii) There would be significant effect for the three weeks mental imagery intervention programme on selected skill performance variables namely, serve, pass (service reception), attack and block of volleyball players.

(iii) There would be significant effect for the imagery intervention programmes for all the four skills (three weeks each) for the total duration of twelve weeks on selected skill performances variables namely, serve, pass (service reception), attack and block of volleyball players.

The results of the study with respect to the hypothesis (i) that there would be significant effect for the mental imagery intervention programme on selected psychological variables namely, cognitive anxiety, somatic anxiety and self confidence and attention of volleyball players indicated the following results.

In case of cognitive anxiety, it was found that both the experimental groups Experimental Elite (EE) and Experimental Novice (EN) showed significantly lower cognitive anxiety as compared to the control groups after the mental imagery training programme. The EE group had significant lower

cognitive anxiety as compared to EN group also. There was no significant difference in cognitive anxiety between the two control groups.

In case of somatic anxiety, it was found that Experimental Elite (EE) and showed significantly lower somatic anxiety as compared to the Control Elite after the imagery training programme. However, there was no difference in somatic anxiety between the two experimental groups. There was no significant difference between the Experimental Novice (EN) and Control Novice (CN).

The results indicating decrease in anxiety for the mental imagery intervention programmes may be explained with the reason that mental imagery programmes contribute to the enhancement of readiness to recognise and interpret signs of anxiety, and create a more positive outcome towards the upcoming task. As such a gain in confidence level of the players reciprocally leads to decrease in anxiety.

The above results are in consonance with the findings observed by Mamassis and Doganis, 2004; Anil, 2005; Craft et al, 2003.

In case of self confidence, it was found that both the experimental groups Experimental Elite (EE) and Experimental Novice (EN) showed significantly higher self confidence as compared to both the control groups after the mental imagery training programme.

Confidence is in effect, a belief, or self-assurance in ones own abilities. It is essentially a feeling of having an expectation of success.

Imagery can be a powerful means of developing confidence (Davies, 1989). Imagery can sometimes be more effective than actual practice, because the player/s can visualize him/herself playing in a competitive situation, and this to an extent, is more realistic and valuable (Davies, 1989). During mental rehearsal, the player imagines positive outcomes, and this creates a feeling of success, which in turn builds confidence (Davies, 1989). Improvement in self confidence following mental imagery training have been observed in the studies by Mamassis and Doganis, 2004; Anil, 2005; Short et al, 2002; Moritz et al., 1996)

The results showed no difference in self confidence between the two experimental groups. Imagery as a mental training skill has shown to be equally effective in case of competitive elite sportspersons as well as beginners (Cumming, Hall, Harwood, and Gammage, 2002). In the present finding the effectiveness of imagery intervention for both the elite experimental and novice experimental supports the above finding.

In case of attention, it was found that both the experimental groups Experimental Elite (EE) and Experimental Novice (EN) showed significantly higher attention as compared to both the control groups after the mental imagery training programme.

Research (Suinn, 1993) has demonstrated that thought content affects the athlete's focus of concentration. Angry thoughts, worry, and anxiety affects heart rate, muscle tension, and respiration rate, which in turn disturbs the attention and concentration of athletes. The imagery intervention in the

present study having reduced the anxiety of the volleyball players, it must have calmed their mind and thought processes, thereby improving their concentration and focus of attention.

However, there was no difference in attention between the two experimental groups, which indicate that both the experimental groups had beneficial effect in improving attention following the imagery interventions.

The results of the study with respect to the hypothesis (ii) that there would be significant effect for the three weeks mental imagery intervention programme on selected skill performance variables namely, service, reception, attack and block of volleyball players indicated the following results:

In case of serve, pass (service reception), and attack, both the experimental groups Experimental Elite (EE) and Experimental Novice (EN) showed significantly better performance as compared to both the control groups (Control Elite and Control Novice). However, there was no significant difference in serve, pass (service reception) and attack performance between the two experimental groups, Experimental Elite (EE) and Experimental Novice (EN) after the three weeks mental imagery intervention.

In case of service reception, the Experimental Elite (EE) group showed significantly better performance as compared to both the control groups (Control Elite and Control Novice). However, there was no

significant difference in reception performance among the experimental novice and control groups after the mental imagery programme

The effectiveness of mental imagery in improving the skill performance may be attributed to the following reasons: mental imagery can aid performance by enhancing the learning and execution of physical skills. Mental imagery reinforces nerve pathways that will be used during training and competition (Castella, 1996). Effectiveness of mental imagery on performance enhancement has be found in studies by Hall, Rodgers, and Barr, 1990; Mamassis and Doganis, 2004; and Bakker and Kayser, 1994; Blair et al, 1993)

In case of beginners or novice sportspersons, mental imagery can aid in learning skills by helping to develop the appropriate mental blueprint of the skill (Parker, 2000).

Imagery may strengthen muscle memory, for a task, by having the muscles fire in the correct sequence for a movement, without actually executing that movement (Martin et al, 1999).

The results suggest that the three weeks mental imagery training was effective in both elite and novice volleyball players in improving their skill performance as compared to control groups. These results are in consonance with the previous results obtained by Savoy and Beitel, 2006; Blair, Hall, and Leyshon, 1993)

The results of the study with respect to the hypothesis that there would be significant effect for the imagery intervention programmes for all the four skills (three weeks each) for the total duration of twelve weeks on selected skill performances variables namely, serve, pass (service reception), attack and block of volleyball players indicated the following results:

In case of serve, pass (service reception), and attack; both the experimental groups Experimental Elite (EE) and Experimental Novice (EN) showed significantly better performance as compared to both the control groups (Control Elite and Control Novice). However, there was no significant difference in serve. Service reception and attack performance between the two experimental groups after the mental imagery programme.

In case of block, both the experimental groups Experimental Elite (EE) and Experimental Novice (EN) showed significantly better performance as compared to both the control groups (Control Elite and Control Novice). However, there was no significant difference in block performance between the two experimental groups after the mental imagery programme.

The above results indicate that there was improvement in selected skill performances from the beginning (pre test) to the end (after twelve weeks post test) of the total imagery training programme. Though the imagery intervention for each skill was only for a period of three weeks, it was observed that there was significant improvement in performance up to the end of twelve weeks. As the study having employed the repeated

measures design, the subjects were assigned the three weeks of mental imagery for the selected four skills in rotation. Not withstanding the above, it was found that even after the end of the twelve week period there was significant improvement in all the skill performances of volleyball players. Though the mode of treatment as per the design can be one of the reasons, the study results definitely warrants further probing into the retention capabilities of mental imagery intervention programmes.

Discussion of Hypothesis

With reference to the results obtained from the study, the first hypothesis that there would be significant effect for the three weeks mental imagery intervention programme on selected skill performance variables namely, serve, pass, attack and block of volleyball players is accepted since both the experimental groups were effective in improving the performance in all the selected skills of volleyball players as compared to control groups.

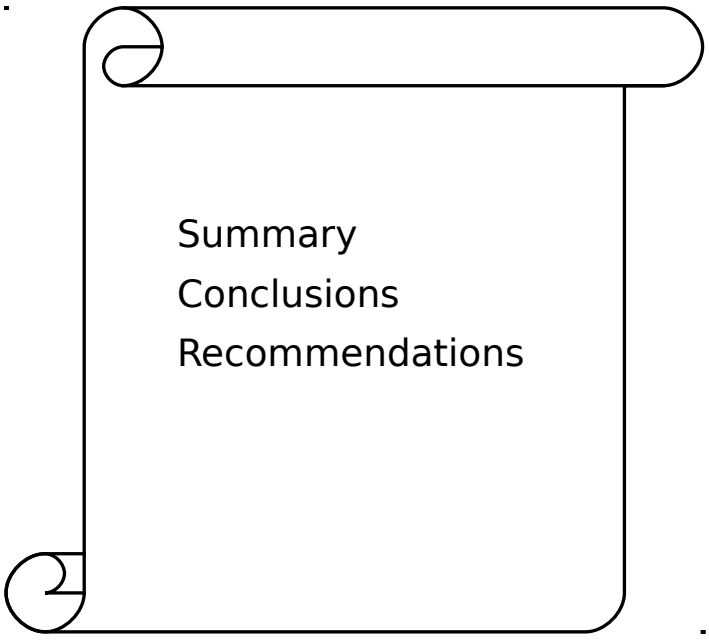
The second hypothesis that there would be significant effect for the mental imagery intervention programme on selected psychological variables namely, cognitive anxiety, somatic anxiety and self confidence and attention of volleyball players for the total duration of twelve weeks is accepted since both the experimental groups brought about significant improvement in all the selected psychological skills from the pre to post intervention tests.

The third hypothesis that there would be significant effect for the imagery intervention programmes for all the four skills (three weeks each) for the total duration of twelve weeks on selected skill performances

variables namely, serve, service reception, attack and block of volleyball players is accepted since the results shows significant improvement in all the selected skill performance after the twelve weeks of imagery training programme.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS



CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

Imagery as a powerful and useful psychological tool has been applied for various purposes in sports and exercise. Potential applications of imagery include skill learning and practice, development and practice of tactical skills, competition and practice. The focus on imagery uses so far has been on performance related aspects of sport, but imagery can also influence an athlete's psychological state. It can enhance psychological skills such as concentration, self confidence, motivation, attention, and anxiety control. Therefore it was the purpose of the study to investigate upon the effectiveness of imagery intervention on a team sport like volleyball, with emphasis on psychological variables as well as skill performances.

Initially twenty elite and twenty novice volley ball players were selected as subjects for the experimental group. They were given general imagery training for one week, so as to orient and prepare them for the specific imagery training after which they were tested for their imagery ability following the MIQ-R (Hall). According to the imagery ability fifteen elite and fifteen novice players were selected as samples for the actual twelve weeks experimental (imagery) training programme. Another fifteen elite and fifteen novice volleyball players were also selected for the control group. The elite players were those who have represented Calicut University or those who have secured at least first or second positions in the

intercollegiate tournaments during the years 2005-06, 2006-07. Moreover all the players were presently playing club and district level league tournaments. The novice volleyball players were beginners who were playing in various clubs, but not actively participating in competition tournaments.

The following psychological variables namely cognitive anxiety, somatic anxiety, self confidence, and attention; and the following skill performance variables namely, serve, pass (service reception), attack, and block were selected as dependent variables for the study.

Somatic anxiety, cognitive anxiety, and self confidence were assessed by Competitive State Anxiety Inventory (CSAI-2); and attention was assessed by the attention grid by Harris and Harris (1984). The skill performances were assessed following a four point rating scale by experienced and expert judges.

The imagery training for the four skills was given according to latin square repeated measures design. For the purpose, four subjects each were grouped for each of the four skills, namely serve, pass (service reception), attack and block. The first group was given fifteen minutes service imagery training after two to three minutes of relaxation for three weeks .The other three groups (second, third and fourth group) were also given fifteen minutes pass, attack, and block imagery respectively after two to three minutes of relaxation.

Summary

For the mental imagery intervention, the imagery script was carefully prepared in Malayalam. Ten minutes general imagery and fifteen minutes specific imagery script, relevant to each skill was prepared under the supervision of the guide and the other experts with utmost care, taking into consideration, the maximum worth while effects from the subjects. Attempts were made to make the script simple, clear and relevant as far as possible leaving no room for ambiguity and vagueness.

After instruction and relaxation for two to three minutes, systematically recorded script (mental imagery training script), which was audio-taped was played to the subjects. The imagery training by using the imagery script was given repeatedly five to six times within fifteen minutes and then they were asked to open their eyes and relax.

The pre and post tests on the selected psychological variables and skill performances were taken before and after the total duration of twelve weeks mental imagery training programme. Moreover, the pre and post tests were also taken before and after three weeks of mental imagery intervention for each of the skills.

To compare and find out the effectiveness of mental imagery training programme on selected psychological variables and skill performances of volleyball players, the analysis of covariance was applied. The analysis of covariance was done from the pre to post test scores for the three weeks mental imagery intervention on the selected variables; and also for the pre to post test scores from the initial to the final post test after the

total twelve week experimental period. The Benforronni post hoc analysis was done to find out the significant difference between the paired means in case of significant F-values.

Conclusions

On the basis of the results of the study, the following conclusions were drawn:

1. Mental imagery interventions were found to be effective in reducing the cognitive anxiety of volleyball players.
2. Mental imagery interventions were found to be effective in reducing the somatic anxiety of volleyball players.
3. Imagery interventions significantly improved the self confidence of volleyball players.
4. Mental imagery interventions were also effective in improving the attention of volleyball players.
5. It was found that the imagery intervention was effective in improving the performance in serve of volleyball players in actual playing situation.
6. Mental imagery interventions were found to be effective in improving the performance in pass(service reception) of volleyball players during actual game situation.
7. Mental imagery interventions were found to be effective in improving the performance in attack of volleyball players during actual game situation.

8. The imagery intervention was also effective in improving the blocking skill of volleyball players during actual playing situation.
9. Mental imagery interventions were found to be equally effective for elite volleyball players as well as novice volleyball players in improving their psychological states and skill performances.

Recommendations

On the basis of the results of the study, and the conclusions drawn, the following recommendations are made:

1. Mental imagery as a performance enhancement tool may be widely made use of in team games like volleyball for improving the psychological make of players as well as for performance improvement.
2. Mental skills training are yet to be applied in actual training and coaching situations. Therefore it is recommended that coaches and physical education teachers make use of various imagery as well as other mental skills training for performance enhancement among sportspersons.
3. Studies in mental imagery be undertaken to find the relative effectiveness of such techniques for tactics and strategies in team games.
4. It is recommended that further studies in mental imagery be done to find out the relative effectiveness of different modalities of imagery intervention on sporting situations.
5. With the results obtained in studies like this, it is recommended that sports policy makers and authorities bring sports psychology in the

forefront and recognize the need for psychological preparations of sportspersons.

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Appendix – A

Consent form

This form confirms the consent of **(name of the participant)** to participate in the research project titled ***"Effect of Mental Imagery Training Programme on Selected Psychological and Skill Performance Variables of Volleyball Players",*** conducted by **M K Radhakrishnan** under the supervision of **Dr. P T Joseph** in the Department of Education, University of Calicut, Kerala. The purpose of this study is to find out the effectiveness of mental imagery interventions on selected psychological varaiables and skill performances of volleyball players.

I have been informed, to an appropriate level of understanding, about the purpose and methodology of this research project, the nature of my involvement, and any possible risks to which I may be exposed by virtue of my participation.

I agree to participate in this project by doing the following:

1) Participate in the mental imagery training programme for a period of 12 weeks.

2) Complete the questionnaires required for the study.

My participation is voluntary and that I have the right to withdraw from this research any time without penalty.

I am also assured of the confidentiality of data collected on me which will be soley used for the purpose of research.

I, therefore, having read and heard about the detailed methodology of the study and my role as a participant, I agree to volunteer as a subject for the same.

Signature: _____

Date: _____

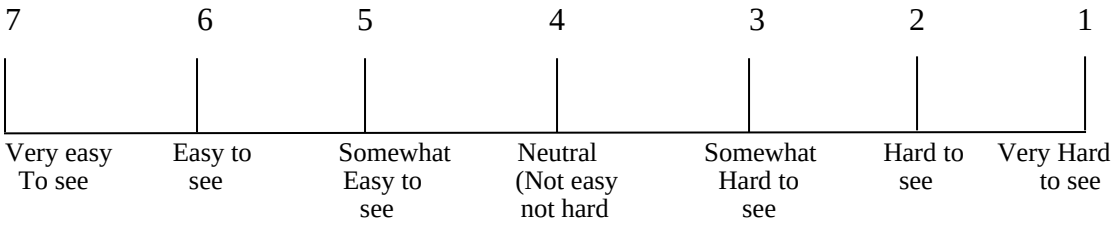
Appendix – B

MOVEMENT IMAGERY QUESTIONNAIRE – REVISED (MIQ-R)

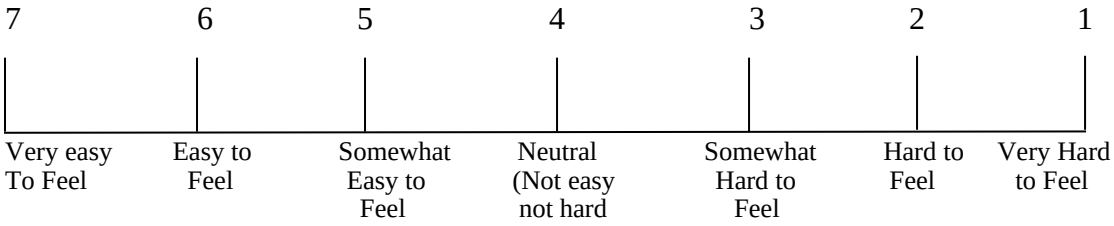
Craig R. Hall and Kathleen A. Martin, 1997

RATING SCALES

Visual Imagery Scale



Kinesthetic Imagery Scale



MOVEMENT IMAGERY QUESTIONNAIRE REVISED TEST ITEMS

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 the 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 nondominant 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 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 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 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 into the air as high as possible with both arms extended above the head. Land with your feet apart and lower your hands 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 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 were able to do this mental task.

Rating

Appendix C

Competitive State Anxiety Inventory (CSAI - 2)

Name :

Directions : A number of statements that players have used to describe their feelings before competition are given below.

Read each statement and then tick the appropriate column to the right of the statement to Indicate how you feel right now / at the moment. If there are no right answers, do not spend too much time on any one statement, but choose the answer which describes your feeling right now.

		Not at all	Some what	Modera tely so	Very much so
1	I am concerned about this competition	☐	☐	☐	☐
2	I feel Nervous	☐	☐	☐	☐
3	I feels at ease	☐	☐	☐	☐
4	I have self doubts	☐	☐	☐	☐
5	I feel Jittery	☐	☐	☐	☐
6	I feel comfortable	☐	☐	☐	☐
7	I am concerned that I may not do well in this competition	☐	☐	☐	☐
8	My body feels tense	☐	☐	☐	☐

9	I feel self-confident	☐	☐	☐	☐
10	I am concerned about loosing	☐	☐	☐	☐
11	I feel tense in my stomach	☐	☐	☐	☐
12	I feel secure	☐	☐	☐	☐
13	I am concerned about chocking under pressure	☐	☐	☐	☐
14 **R**	My body feels relaxed	☐	☐	☐	☐
15	I am confident I can meet challenges	☐	☐	☐	☐
16	I am concerned about performing poorly	☐	☐	☐	☐
17	My heart is racing	☐	☐	☐	☐
18	I am confident about performing well	☐	☐	☐	☐
19	I am concerned about reaching my goal	☐	☐	☐	☐
20	I feel my stomach sinking	☐	☐	☐	☐
21	I feel mentally relaxed	☐	☐	☐	☐
22	I am concerned that others will be disappointed with my performance	☐	☐	☐	☐
23	My hands are clammy	☐	☐	☐	☐

24	I am confident because I mentally picture myself reaching my goal	☐	☐	☐	☐
25	I am concerned I wont be able to concentrate	☐	☐	☐	☐
26	My body feels tight	☐	☐	☐	☐
27	I am confident of coming through under pressure	☐	☐	☐	☐

Signature of the player

Date :

Appendices

Appendices

Appendices

Appendices

Appendices

Appendices

Appendices

Appendices

APPENDIX – D

ATTENTION GRID

(D. V. Harris and B. L. Harris)

Name:

Instruction: Circle the numbers in order, starting from number of your choice in 120 seconds.

32	42	39	34	99	19	84	44	03	77
37	97	92	18	90	53	04	72	51	65
95	40	33	86	45	81	67	13	59	58
69	78	57	68	87	05	79	15	28	36
09	26	62	89	91	47	52	61	64	29
00	60	75	02	22	08	74	17	16	12
76	25	48	71	70	83	06	49	41	07
10	31	98	96	11	63	56	66	50	24
20	01	54	46	82	14	38	23	73	94
43	88	85	30	21	27	80	93	35	55

Signature:

Date:

Appendix – E

SAMPLE IMAGERY SCRIPT

Now in order to begin, you need to become very relaxed. I want you to be in a comfortable lying position. Take three deep, slow breaths that will fill your lungs and chest with air, breathe in…….. and breathe out……. breathe in…….. breathe out……Good, your mind is relaxed, and ready to start our imagery session.

Visualize your routine in the dressing room and on the court.---------- See your uniform folded on your chair.-------- Imagine yourself changing into your warm ups.---------- Can you smell the clean jersey----------, hear the talk and noise of your team mates----------, and feel yourself pulling up your kneepads and tying your shoes? Visualize and feel yourself jogging with your team around the court, stretching, and ball handling. Create the images of shared on-court hitting and then of each team attacking as a unit ----------. . . leaving the court, changing into your game uniform, and returning to the bench . . . then two minutes of serving, and hear the announcement of lineups and final instructions from your coach.---------- Finally, on the end line, hear the head official blow the whistle and feel yourself move onto the court---------- . . . Image the down referee checking the positions of the teams and the server catching the ball to begin the match.

Serve Imagery

Picture yourself receiving the ball from the ball pickers and getting the serving zone---------- signal from your coach. See and feel yourself move into proper position and listen for the official's whistle.---------- Feeling completely confident, locate the serving zone and pause to breathe. Raise your serving arm and toss the ball, step, make contact and follow through----------. Visualize an aggressive serve clearing the net and landing in the appropriate area. Feel it and see it.

Good, now return to the opening position, this time, try to take the imagery up----------. Can you make the picture clearer in your head?

Pass / Service reception imagery

In our previous imagery training sessions we have been working on service imagery'. Today, we will be working on the skill, pass. (service reception imagery)
In order to begin, you need to become very relaxed. I want you to be in a comfortable lying position. Take three deep, slow breaths that will fill your lungs and chest with air, breathe in…….. and breathe out……. breathe in…….. breathe out……Good, your mind is relaxed, and ready to start our imagery session

You see the server receive the ball from the ball pickers and you attend to his body position----------. Hear the official's whistle ----------and see the server contact the ball.---------- Watch it come towards you.---------- Continue to watch the path of the ball while feeling yourself move into position to make contact. See and feel that your contact position is low----------, with your weight a little forward and arms outstretched----------. Visualize the ball contacting your arms---------- and rebounding to the setter.---------- Feel your movement ---------- balanced with

solid follow through toward the setter----------. Observe that the pass is the optimal height and right on target.

Attack

In our previous imagery training sessions we have been working on service reception imagery .Today, we will be working on the skill attack. In order to begin, you need to become very relaxed. I want you to be in a comfortable lying position. Take three deep, slow breaths that will fill your lungs and chest with air, breathe in…….. and breathe out……. breathe in…….. breathe out…… Good, your mind is relaxed, and ready to start our imagery session

See and feel yourself move off the net to get a great approach to the ball.--------- You see it is a perfect pass to the setter---------- and quickly look at the block to see where they are lined up----------. Refocus on the ball and the setter----------, who delivers a perfect set to you----------. Feel that your footwork is quick and smooth as you accelerate up and into the air to attack the ball----------. You observe that there are two blockers up as you bring your arm through quickly to cut the ball off the blocker's left hand.---------- You feel the solid contact of hand on ball and see it deflected straight down into the opponent's court. See, feel, and hear yourself. Celebrate with your teammates.

Block

In our previous imagery training sessions we have been working on attack imagery .Today, we will be working on the skill block In order to begin, you need to become very relaxed. I want you to be in a comfortable lying position. Take three deep, slow breaths that will fill your lungs and chest with air, breathe in…….. and breathe out……. breathe in…….. breathe out……Good, your mind is relaxed, and ready to start our imagery session

You are blocking right front and the attacker has already moved off the court to approach. You see their setter deliver a high outside set to your opponent----------. You observe that the approach angle----------, the player's eyes and shoulders all show a cross-court shot----------. Feel yourself move your feet to line your body up on that angle and then jump straight up----------. Feel your outside hand turn slightly into the court as you place your inside hand in the seam----------. You have penetrated and sealed the net with both hands and forearms----------. Your position has taken away the shot of the attacker----------. Feel yourself block the ball straight down in front of them and then see, hear and feel the celebration with your teammates----------.

Ending note

The possible situations in the game of volleyball are unlimited. Each of the skills described above could have had many variations. The imaging methods written here have been used with volleyball players who have a solid understanding of the game of volleyball and the techniques used to make it successful. Hopefully, by

practicing these imagery techniques you will become a better player in both the physical and mental arenas.

APPENDIX - F

SCHEDULE OF MENTAL IMAGERY TRAINING PROGRAMME
(12 Weeks)

DAY	TIME	PROGRAMME		GROUP *
1st WEEK				
Monday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-1
	6.25am to 6.45am	_	reception imagery	Group-2
	3.40pm to 4.00pm	_	attack imagery	Group-3
	4.05pm to 4.25 pm	_	block imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-2
	6.25am to 6.45am	_	attack imagery	Group-3
	3.40pm to 4.00pm	_	block imagery	Group-4
	4.05pm to 4.25 pm	_	service imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-3
	6.25am to 6.45am	_	block imagery	Group-4
	3.40pm to 4.00pm	_	service imagery	Group-1
	4.05pm to 4.25 pm	_	reception imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-4
	6.25am to 6.45am	_	service imagery	Group-1
	3.40pm to 4.00pm	_	reception imagery	Group-2
	4.05pm to 4.25 pm	_	attack imagery	Group-3
2nd WEEK				
Monday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-1
	6.25am to 6.45am	_	reception imagery	Group-2
	3.40pm to 4.00pm	_	attack imagery	Group-3
	4.05pm to 4.25 pm	_	block imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-2
	6.25am to 6.45am	_	attack imagery	Group-3

	3.40pm to 4.00pm	_	block imagery	Group-4
	4.05pm to 4.25 pm	_	service imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-3
	6.25am to 6.45am	_	block imagery	Group-4
	3.40pm to 4.00pm	_	service imagery	Group-1
	4.05pm to 4.25 pm	_	reception imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-4
	6.25am to 6.45am	_	service imagery	Group-1
	3.40pm to 4.00pm	_	reception imagery	Group-2
	4.05pm to 4.25 pm	_	attack imagery	Group-3

3rd WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-1
	6.25am to 6.45am	_	reception imagery	Group-2
	3.40pm to 4.00pm	_	attack imagery	Group-3
	4.05pm to 4.25 pm	_	block imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-2
	6.25am to 6.45am	_	attack imagery	Group-3
	3.40pm to 4.00pm	_	block imagery	Group-4
	4.05pm to 4.25 pm	_	service imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-3
	6.25am to 6.45am	_	block imagery	Group-4
	3.40pm to 4.00pm	_	service imagery	Group-1
	4.05pm to 4.25 pm	_	reception imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-4
	6.25am to 6.45am	_	service imagery	Group-1
	3.40pm to 4.00pm	_	reception imagery	Group-2
	4.05pm to 4.25 pm	_	attack imagery	Group-3
Saturday	SKILL TEST for all the skills			

4th WEEK

Monday	6.00am to 6.20am	relaxation	reception imagery	Group-1

		(5 min)	(15 min)	
	6.25am to 6.45am	_	attack imagery	Group-2
	3.40pm to 4.00pm	_	block imagery	Group-3
	4.05pm to 4.25 pm	_	service imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation	attack imagery	Group-2
		(5 min)	(15 min)	
	6.25am to 6.45am	_	block imagery	Group-3
	3.40pm to 4.00pm	_	service imagery	Group-4
	4.05pm to 4.25 pm	_	reception imagery	Group-1
Thursday	6.00am to 6.20am	relaxation	block imagery	Group-3
		(5 min)	(15 min)	
	6.25am to 6.45am	_	service imagery	Group-4
	3.40pm to 4.00pm	_	reception imagery	Group-1
	4.05pm to 4.25 pm	_	attack imagery	Group-2
Friday	6.00am to 6.20am	relaxation	service imagery	Group-4
		(5 min)	(15 min)	
	6.25am to 6.45am	_	reception imagery	Group-1
	3.40pm to 4.00pm	_	attack imagery	Group-2
	4.05pm to 4.25 pm	_	block imagery	Group-3

5th WEEK

Monday	6.00am to 6.20am	relaxation	reception imagery	Group-1
		(5 min)	(15 min)	
	6.25am to 6.45am	_	attack imagery	Group-2
	3.40pm to 4.00pm	_	block imagery	Group-3
	4.05pm to 4.25 pm	_	service imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation	attack imagery	Group-2
		(5 min)	(15 min)	
	6.25am to 6.45am	_	block imagery	Group-3
	3.40pm to 4.00pm	_	service imagery	Group-4
	4.05pm to 4.25 pm	_	reception imagery	Group-1
Thursday	6.00am to 6.20am	relaxation	block imagery	Group-3
		(5 min)	(15 min)	
	6.25am to 6.45am	_	service imagery	Group-4
	3.40pm to 4.00pm	_	reception imagery	Group-1
	4.05pm to 4.25 pm	_	attack imagery	Group-2
Friday	6.00am to 6.20am	relaxation	service imagery	Group-4
		(5 min)	(15 min)	
	6.25am to 6.45am	_	reception imagery	Group-1

	3.40pm to 4.00pm	_	attack imagery	Group-2
	4.05pm to 4.25 pm	_	block imagery	Group-3

6th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-1
	6.25am to 6.45am	_	attack imagery	Group-2
	3.40pm to 4.00pm	_	block imagery	Group-3
	4.05pm to 4.25 pm	_	service imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-2
	6.25am to 6.45am	_	block imagery	Group-3
	3.40pm to 4.00pm	_	service imagery	Group-4
	4.05pm to 4.25 pm	_	reception imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-3
	6.25am to 6.45am	_	service imagery	Group-4
	3.40pm to 4.00pm	_	reception imagery	Group-1
	4.05pm to 4.25 pm	_	attack imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-4
	6.25am to 6.45am	_	reception imagery	Group-1
	3.40pm to 4.00pm	_	attack imagery	Group-2
	4.05pm to 4.25 pm	_	block imagery	Group-3
Saturday	SKILL TEST for all the skills			

7th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-1
	6.25am to 6.45am	_	block imagery	Group-2
	3.40pm to 4.00pm	_	service imagery	Group-3
	4.05pm to 4.25 pm	_	reception imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-2
	6.25am to 6.45am	_	service imagery	Group-3
	3.40pm to 4.00pm	_	reception imagery	Group-4
	4.05pm to 4.25 pm	_	attack imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-3

	6.25am to 6.45am	_	reception imagery	Group-4
	3.40pm to 4.00pm	_	attack imagery	Group-1
	4.05pm to 4.25 pm	_	block imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-4
	6.25am to 6.45am	_	attack imagery	Group-1
	3.40pm to 4.00pm	_	block imagery	Group-2
	4.05pm to 4.25 pm	_	service imagery	Group-3

8th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-1
	6.25am to 6.45am	_	block imagery	Group-2
	3.40pm to 4.00pm	_	service imagery	Group-3
	4.05pm to 4.25 pm	_	reception imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-2
	6.25am to 6.45am	_	service imagery	Group-3
	3.40pm to 4.00pm	_	reception imagery	Group-4
	4.05pm to 4.25 pm	_	attack imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-3
	6.25am to 6.45am	_	reception imagery	Group-4
	3.40pm to 4.00pm	_	attack imagery	Group-1
	4.05pm to 4.25 pm	_	block imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-4
	6.25am to 6.45am	_	attack imagery	Group-1
	3.40pm to 4.00pm	_	block imagery	Group-2
	4.05pm to 4.25 pm	_	service imagery	Group-3

9th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-1
	6.25am to 6.45am	_	block imagery	Group-2
	3.40pm to 4.00pm	_	service imagery	Group-3
	4.05pm to 4.25 pm	_	reception imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-2
	6.25am to 6.45am	_	service imagery	Group-3

	3.40pm to 4.00pm	_	reception imagery	Group-4
	4.05pm to 4.25 pm	_	attack imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-3
	6.25am to 6.45am	_	reception imagery	Group-4
	3.40pm to 4.00pm	_	attack imagery	Group-1
	4.05pm to 4.25 pm	_	block imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-4
	6.25am to 6.45am	_	attack imagery	Group-1
	3.40pm to 4.00pm	_	block imagery	Group-2
	4.05pm to 4.25 pm	_	service imagery	Group-3

Saturday SKILL TEST for all the skills

10th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-1
	6.25am to 6.45am	_	service imagery	Group-2
	3.40pm to 4.00pm	_	reception imagery	Group-3
	4.05pm to 4.25 pm	_	attack imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-2
	6.25am to 6.45am	_	reception imagery	Group-3
	3.40pm to 4.00pm	_	attack imagery	Group-4
	4.05pm to 4.25 pm	_	block imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-3
	6.25am to 6.45am	_	attack imagery	Group-4
	3.40pm to 4.00pm	_	block imagery	Group-1
	4.05pm to 4.25 pm	_	service imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-4
	6.25am to 6.45am	_	block imagery	Group-1
	3.40pm to 4.00pm	_	service imagery	Group-2
	4.05pm to 4.25 pm	_	reception imagery	Group-3

11th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-1
	6.25am to 6.45am	_	service imagery	Group-2
	3.40pm to 4.00pm	_	reception imagery	Group-3
	4.05pm to 4.25 pm	_	attack imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-2
	6.25am to 6.45am	_	reception imagery	Group-3
	3.40pm to 4.00pm	_	attack imagery	Group-4
	4.05pm to 4.25 pm	_	block imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-3
	6.25am to 6.45am	_	attack imagery	Group-4
	3.40pm to 4.00pm	_	block imagery	Group-1
	4.05pm to 4.25 pm	_	service imagery	Group-2
Friday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-4
	6.25am to 6.45am	_	block imagery	Group-1
	3.40pm to 4.00pm	_	service imagery	Group-2
	4.05pm to 4.25 pm	_	reception imagery	Group-3

12th WEEK

Monday	6.00am to 6.20am	relaxation (5 min)	block imagery (15 min)	Group-1
	6.25am to 6.45am	_	service imagery	Group-2
	3.40pm to 4.00pm	_	reception imagery	Group-3
	4.05pm to 4.25 pm	_	attack imagery	Group-4
Tuesday	6.00am to 6.20am	relaxation (5 min)	service imagery (15 min)	Group-2
	6.25am to 6.45am	_	reception imagery	Group-3
	3.40pm to 4.00pm	_	attack imagery	Group-4
	4.05pm to 4.25 pm	_	block imagery	Group-1
Thursday	6.00am to 6.20am	relaxation (5 min)	reception imagery (15 min)	Group-3
	6.25am to 6.45am	_	attack imagery	Group-4
	3.40pm to 4.00pm	_	block imagery	Group-1
	4.05pm to 4.25 pm	_	service imagery	Group-2

Friday	6.00am to 6.20am	relaxation (5 min)	attack imagery (15 min)	Group-4
	6.25am to 6.45am	_	block imagery	Group-1
	3.40pm to 4.00pm	_	service imagery	Group-2
	4.05pm to 4.25 pm	_	reception imagery	Group-3

Saturday POST TEST for all the skills

* Each group comprises of 4 elite and 4 novice volleyball players, except group 4, which comprises 3 elite and 3 novice volleyball players.

Appendices

Appendices

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