

## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

Review of related literature is a very important part of any research as it plays a vital role in understanding the problems thoroughly. The investigator has referred to the related literature and previous research done in this area has been collected and presented in this chapter.

#### **2.1 STUDIES RELATED TO COGNITIVE ABILITIES**

Amit Kauts & Neelam Sharma (2012) assessed the effect of yoga module on Concentration and Memory. To achieve the purpose of the study 800 adolescent students; 159 high stress students and 142 low-stress students were selected on the basis of scores obtained through Stress Battery. Experimental group and control group were given pre-test to assess their concentration as well as short term memory. A yoga module consisting of yoga asanas, pranayama, meditation, prayer and a value orientation programme was administered on experimental group for 7 weeks. The experimental and control groups were post-tested for their performance in concentration and memory tests. The results show that the students, who practiced yoga module yielded higher concentration levels and exhibited better short term memory.

Joseph Ciarrochi, Patrick Heaven, & Timothy Skinner (2012) investigated a longitudinal research on the links between intelligence and health behaviors among adolescents are rare. We report longitudinal data in which we assessed the relationships between intelligence as assessed in Grade 7 and consequential health outcomes in Grade 11. The mean age of respondents (N= 420; 188 males, 232 females) was 12.30 years (SD= 0.49) in Grade 7 and 16.17 years (SD= 0.45) in Grade 11. They completed

standardized verbal and numerical ability tests and a measure of conscientiousness in Grade 7 and health related questions in Grade 11. Results indicated that higher intelligence was associated with a number of healthy behaviors including delay in onset of cigarette smoking. Intelligence significantly predicted less time spent watching TV, lower physical exercise, and lower consumption of stimulant drinks. Covariate analyses showed that general intelligence predicted health outcomes after controlling for conscientiousness, socio-economic status, and gender.

Robyn Louise Vast, Robyn Louise Young & Patrick Robert Thomas (2010) conducted a study to explore attentional patterns associated with positive and negative emotions during sport competition, and athletes' perceptions of the consequences of these attentional changes for concentration and performance. Sixty-nine athletes completed the Sport Emotion Questionnaire following a national softball competition. They also retrospectively reported their perceptions of how emotions influenced their attention, concentration, and sport performance. Excitement and happiness were more closely associated with concentration than anxiety, dejection, and anger. Although excitement demanded more attention than the negative emotions, the positive emotions were perceived as more likely to lead to a performance-relevant focus and automatic physical movements, both of which were beneficial for concentration and performance. Emotional intensity increased these effects.

Jayashree Acharya, Ashutosh Acharya & Shailaja Mohan (2009) conducted a study to compare the cognitive test performance of male athletes (N= 130) from various sports: track and field, basketball, cycling, taekwondo, soccer at three levels achievement namely District, State, National, in the age group of 18-25 years with a mean and SD of

19.57  $\pm$  1.42 from various parts of Kerala, selected at random. The variable instruments selected for this study were demographic information (age, achievement level and sports) and to assess the cognitive performance it was trail making test (TMT-A & TMT-B), Stroop test (ST-A & ST-B), and word search puzzle test (WPT). To examine the hypothesis, descriptive and comparative statistics of GLM multivariate analysis was employed. Significant difference was seen in TMT-A and TMT-B among athletes of various sport as the obtained 'F' value of 2.82 and 2.57 respectively are greater than the required value of 1.60 at 14, 115 df. In multiple comparison, mean differences were found in TMT-A between soccer players & cyclist and between cyclist & taekwondo players. In TMT-B factor, mean difference was found between cyclist & taekwondo players and between taekwondo & basketball players. In ST-B significant difference was found as the obtained 'F' value of 2.12 was greater than the required value of 1.60 at 14, 115 df. In multiple comparison of ST-B, difference was found between track & field athletes and cyclists; between soccer players & cyclists; soccer players & taekwondo players. The mean difference was tested for significance at the .05 lever. Finally, no difference was seen in word search puzzle test for all the athletes.

Brooke Castaneda & Rob Gray (2007) conducted a study on "Effects of Focus of Attention on Baseball Batting Performance in Players of Differing Skill Levels". The purpose of this study addressed the question, what should baseball players focus their attention on while batting? For this purpose Less-skilled and highly skilled (college) baseball players were participated in this study. They were assigned in four dual-task conditions in a baseball batting simulation: directed attention to skill execution, skill/external, directed attention to the environment

and environmental/external. The results of the study showed that the batting performance for highly skilled players was best in the environmental/external condition and worst in the skill/internal condition. Performance of less-skilled batters was significantly better in the two skill conditions than in either of the two environmental conditions. It was concluded that the optimal focus of attention for highly skilled batters is one that does not disrupt and permits attention to the perceptual effect of the action, whereas the optimal focus of attention for less-skilled batters is one that allows attention to the step-by-step execution of the swing.

Caterina Pesce et al. (2007) conducted a study on “Focusing of visual attention at rest and during physical exercise in soccer players” The aim of the study was to find out the focus of visual attention in expert soccer players together with the effects of acute bouts of physical exercise on performance. In this study the discriminative reaction time experiments, which were performed both at rest and under submaximal physical workload, visual attention was cued by means of spatial cues of different size followed by compound stimuli with local and global target features. The results shows that the soccer players were slower than non-athletes in reacting to local compared with global targets, but were faster in switching from local to global attending. And also the results shows that the soccer players appear to be less skilled in local attending, but better able than non-athletes to rapidly “zoom out” the focus of attention. Non-athletes generally showed faster performance under physical load, as expected according to the hypothesis of exercise-induced increases in arousal and/or activation and in resource allocation. It was concluded that the soccer players showed a more differentiated pattern of exercise-induced facilitation that selectively affects specific components of the attentional

performance and is interpreted by referring to the role played by individual expertise and cognitive effort.

Robin Jackson, Kelly Ashford & Glen Norsworthy (2006) conducted a study on “Attentional Focus, Dispositional Reinvestment, and Skilled Motor Performance under Pressure” The aim of the two studies was to examine the Attentional processes governing skilled motor behaviour. For this purpose field hockey and skilled soccer players were selected as subjects. In Experiment 1, field hockey players performed a dribbling task under single-task, dual-task, and skill-focused conditions under both low and high pressure situations. In Experiment 2, skilled soccer players performed a dribbling task under single-task, skill-focused, and process-goal conditions, again under low and high pressure situations. The Results of the study showed that that the detrimental effect of skill-focused attention and the facilitative effect of dual-task conditions on skilled performance. In addition, focusing on movement related process goals was found to adversely affect performance.

## **2.2 STUDIES RELATED TO COMPETITIVE ANXIETY**

Vallimurugan, Swaminathan & Suresh Kumar (2011) conducted a study on the influence of Psychological Skills Training on Selected Psychophysiological and Psychomotor Variables of High Level Participants. To achieve the purpose of the present study, thirty intercollegiate level players from Maruthi College of Physical Education, Coimbatore were selected as subjects at random and their ages ranged from 18 to 24 years. The subjects (n=30) were randomly assigned to two equal groups of fifteen men students each. The groups were assigned as psychological skills training (PSTG) and control group (CG) in an equivalent manner. The psychological skills training group

participated for a period of twelve weeks and the post-tests were conducted. The competitive sport anxiety inventory – 2 was used to measure cognitive anxiety, somatic anxiety and self confidence. A biomoniter was used to measure the heart rate of the subjects. An electrical mirror drawing apparatus was used to find out the hand eye coordination. A chronoscope was used to find out the reaction time. A thermometer was used to find out the body temperature. To find out the influence of selected psychological skills training on selected psychophysiological and psychomotor variables of high level participants, analysis of covariance (ANCOVA) statistical technique was used. It was concluded from the results of the study that there was a significant difference in cognitive anxiety, somatic anxiety, self confidence, heart rate, reaction time and hand eye coordination and there was a no significant difference in body temperature owing to psychological skills training.

George Mamassis & George Doganis (2004) investigated 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 posttest. 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.

Tim Woodman & Lew Hardy (2003) conducted meta-analysis ( $k = 48$ ) study that investigated two relationships in competitive sport: (1) state cognitive anxiety with performance and (2) state self-confidence with performance. The cognitive anxiety mean effect size was  $r = -0.10$  ( $P < 0.05$ ). The self-confidence mean effect size was  $r = 0.24$  ( $P < 0.001$ ). A paired-samples t-test revealed that the magnitude of the self-confidence mean effect size was significantly greater than that of the cognitive anxiety mean effect size. The moderator variables for the cognitive anxiety-performance relationship were sex and standard of competition. The mean effect size for men ( $r = -0.22$ ) was significantly greater than the mean effect size for women ( $r = -0.03$ ). The mean effect size for high-standard competition ( $r = -0.27$ ) was significantly greater than that for comparatively low-standard competition ( $r = -0.06$ ). The significant moderator variables for the self-confidence-performance relationship were sex, standard of competition and measurement. The mean effect size for men ( $r = 0.29$ ) was significantly greater than that for women ( $r = 0.04$ ) and the mean effect size for high-standard competition ( $r = 0.33$ ) was significantly greater than that for low-standard competition ( $r = 0.16$ ). The mean effect size derived from studies employing the Competitive State Anxiety Inventory-2 ( $r = 0.19$ ) was significantly smaller than the mean effect size derived from studies using other measures of self-confidence ( $r = 0.38$ ). Measurement issues are discussed and future research directions are offered in light of the results.

Sewell & Edmondson (1996) examined the relationships between precompetitive state anxiety and field position in a sample of 121 soccer and field hockey players from 11 university squads. Pregame state anxiety was measured using the Competitive State Anxiety Inventory-2 30 min before the start of a university level game. Analysis of the data revealed that goalkeepers had significantly higher levels of cognitive anxiety than players in other positions, and were also more somatically anxious and less self-confident than defenders. Of outfield players, midfield and forward players were more somatically anxious than defenders, and midfield players were less self-confident than defenders. There were no significant differences on any of the measures between midfield and forward players, nor were there any main sport effects. There were no significant gender differences on cognitive or somatic anxiety, but males were, overall, more self-confident than females.

### **2.3 STUDIES RELATED TO MOOD STATES**

Leila Zandi & Lila Sabbaghian Rad (2013) conducted a study to compare mood states profiles of winning and losing female athletes. The population of the research consisted of all the female participants in the Tenth Intercollegiate Tournaments of the medical universities of Iran in Shahrekord City. The sample includes 69 student athletes from Shahid Beheshti University of Medical Sciences. Two questionnaires were used to collect data: a demographics questionnaire and Profile of Mood States (POMS). Paired t-test was applied at 95% confidence interval to examine the reliability of the questionnaire and Kolmogorov-Smirnov test was applied to examine the normality of the data. The data



was described in tables and graphs and the hypotheses were tested using independent t-test and paired t-test. The results showed that there were 7 karatekas, 4 tennis players, 10 track-and-field athletes, 5 chess players, 5 badminton players, 12 basketball players, 7 shooters, 12 volleyball players, and 7 swimmers among the sample and their age ranged from 20 to 30. The results also showed that there is a significant difference between the mood state profiles of winning and losing athletes before and after the game. It was also revealed that the mood state profiles of winning athletes are more consistent with Morgan's iceberg profile.

Lim & Balbir (2009) conducted a study to investigate the effectiveness of three psychological intervention strategies (plus a control group) in regulating pre-competition mood states among volleyball players. The Brunel Mood Scale (BRUMS; Terry, Lane, Lane, & Keohane, 1999; Terry, Lane, & Fogarty, 2003) was employed to examine the pre-competition mood states patterning of its six sub-scales during the time leading up to competition. (One Month Before, Two Weeks Before, One Week Before and One Day Before). Subjects were the Youth State Volleyball Players (N = 96; boys = 48, girls = 48; Age: M16.35 yr., SD = .89 yr) competing in the Under 18 National School Sport Council of Malaysia Volleyball Tournament 2008. They were randomly divided into four groups: (1) Cognitive intervention group (n = 24) in which subjects went through the breathing technique & autogenic relaxation with music lasting for 30 minutes per session; (2) Somatic anxiety intervention group (n = 24) completed the progressive muscular relaxation lasting for 30 minutes; (3) The self-confidence intervention group followed the intervention with positive self-talk & goal setting exercises lasting 30 minutes; (4) A control group (n = 24). Results of this study revealed that the cognitive intervention was

the most effective intervention, followed the somatic intervention in regulating the bad mood states and facilitating the good mood state prior to competition. Similarly, the self-confidence intervention was able to facilitate the vigor sub-scale prior to competition.

Jayashree Acharya & Anil Kumar (2007) conducted a study to examine the effect of graded exercise programme on mood states of juvenile delinquents. To achieve the purpose of this study 60 male juvenile delinquents who were the residents of the juvenile home (special home), Trivandrum, kerala, between the age group of 13-18 years with a mean age of 16.10 + (or) – 1.44. The subjects were further divided into two groups for control (N=30) and experimental (N=30). The test administered for the study was profile of mood states by McNair et al (1971), which consists of 6 items i.e. Tension-Anxiety (T); Depression-Dejection (D), Anger-Hostility (H); Vigor-Activity (V); fatigue-Inertia (F); and Confusion-Bewilderment (C). The data was collected prior to training, during training and after training for both the groups. The experimental group was given graded exercise programme for a period of 6-weeks, three times per week after the pre-test. Though the control group was not given any training howsoever they were made to play some game of their own under the supervision of a physical education teacher. One-way analysis of variance was used as a measure and statistically significant ( $P > .05$ ) improvement was found in the factor of anger, depression, fatigue and confusion for experimental group reducing their score on it. In the control group significant difference was seen in the factor of confusion and bewilderment.

Lane, Lane & Firth (2002) examined the influence of post competition depressed mood on the intensity of other mood dimensions assessed by the Profile of Mood States and relationships between mood and satisfaction with performance. 195 distance runners

completed the Brunel Mood Scale which is a 24-item measure assessing anger, confusion, depression, fatigue, tension, and vigor, and a Performance Satisfaction questionnaire immediately after running a 10-mi. race. To examine the proposed moderating effect of depression, participants were separated into a No-depression group of 133 and a Depressed Mood group of 62. Multivariate analysis of variance indicated that the Depressed Mood group reported significantly higher scores on Anger, Confusion, Fatigue, and Tension and lower Vigor scores than the No-depression group *t* ratios indicated that poorer performance was associated with higher Depression scores. Standard multiple regression to predict Performance Satisfaction scores from postcompetition scores on Anger, Confusion, Fatigue, Tension, and Vigor in the No-depression group indicated that only 1% (Adj.  $R^2=.01$ ,  $p>.05$ ) of the variance was explained. By contrast, in the Depressed Mood group, the same mood dimensions predicted 27.5% of the variance in Performance Satisfaction scores (Adj.  $R^2=.275$ ,  $p<.01$ ) with Anger (Beta=.63,  $p<.001$ ), and Confusion (Beta=.44,  $p<.05$ ) being significant predictors. Present findings support the notion that depressed mood is related to the intensity of other mood dimensions assessed by the Profile of Mood States and moderates relationships between those scores and performance satisfaction.

Lane & Lovejoy (2001) conducted a study in an ecologically valid setting using participants with previous experience of aerobic dance exercise. We hypothesized that (a) exercise will be associated with improved mood regardless of depressed mood, (b) the effect of exercise on mood changes would be significantly greater among individuals that reported symptoms of depressed mood before exercise, and (c) that pre-exercise depressed mood will be associated with a mood profile comprising high anger, confusion,

fatigue, and tension, with low vigor. Participants were 80 ( $M=27.90$  years,  $SD=4.32$  years) exercisers who had attended an exercise class on a regular basis for the previous three months. Participants completed the Profile of Mood States-A 15 minutes before exercise and then immediately after an aerobic dance exercise class. To examine the proposed moderating influence of depressed mood, participants were grouped into either a no-depression group, or a depressed mood group using pre-exercise depression scores. The exercise intervention was an aerobic dance session where participants followed the moves of the instructor. The session lasted for 60 minutes including a warm-up, main session, and cool-down. Repeated measures MANOVA (time x depression/no-depression group) results indicated that anger, confusion, fatigue, tension, and vigor reduced significantly. Thus supporting the notion that exercise reduces negative mood. Results indicated that the reduction in anger, confusion, fatigue, and tension, and increase in vigor was significantly greater in the depressed mood group, hence consistent with theoretical predictions. Results demonstrated that pre-exercise depressed mood was associated with a negative mood profile as hypothesized. Findings lend support to the notion that exercise is associated with improved mood. However, findings show that this effect was significantly greater among individuals reporting symptoms of depressed mood before exercise.

Beedie Christopher, Terry Peter & Lane Andrew (2000) conducted a study of meta-analysis of 29 published studies that used the Profile of Mood States (POMS) to investigate relationships between mood and athletic achievement or between mood and performance outcome. Results showed that effect sizes (ESs) for level of achievement were minimal ( $n = 15$ , Weighted Mean ES = 0.10,  $SD = 0.07$ ), a finding consistent with a

previous meta-analysis by Rowley, Landers, Kyllö, and Etnier (1995). Larger effects were found for performance outcome ( $n = 17$ , Weighted Mean ES = 0.31, SD = 0.12). Effects were moderate for Vigor, Confusion, and Depression, small for Anger and Tension, and very small for Fatigue. All effects were in the direction predicted by Morgan's (1985) mental health model. Effects were larger in sports of short duration, in sports involving open skills, and where performance was judged using self-referenced criteria. Findings suggest that the POMS has utility in the prediction of performance outcome but not in the prediction of level of achievement.

Hassmén, Koivula & Hansson (1998) examined the relationship between pre-performance mood, measured by the Profile of Mood States inventory, and subsequent athletic performance has been the focus of considerable research. Presumably, athletes with less positive mood profiles should be outperformed by those with more favorable profiles. The results presented so far in the literature are equivocal. One possible explanation is that more stable trait characteristics might mediate mood states prior to competitive situations. In the present study, 8 male golf players, all members of the Swedish National Team, completed a number of trait inventories (Eysenck's Personality Inventory, Locus of Control, Sport Competition Anxiety Test, Self-consciousness Scale) prior to the competitive season. Subsequently, they completed the Profile of Mood States before each game played. Analysis showed that the players' pre-performance mood states differed significantly and that these differences were associated with their scores on the trait inventories. Furthermore, pre-performance mood states were significantly related to athletic performance for some individuals but not for others. Further research should also

include trait measurements to understand better the relationship between mood states and the athletic performance of individual athletes.

Peter Hassmén & Eva Blomstrand (1995) conducted a study on mood state relationship and soccer team performance. Pre-performance POMS scores of team members might therefore give a prior indication of the actual team performance. Nine female soccer players from the same team participated in the study. The players completed the POMS before, immediately after, and 2 hours after each game during a season. The outcome of the games greatly affected the players' mood states. Tension, depression, anger, and confusion scores were lower ( $p < .01$ ) and vigor was higher ( $p < .01$ ) when the team won. Prior to the games, only minor differences in POMS scores were detected, regardless of the actual outcome. Taken together, the results do not support the notion that POMS scores could be helpful in predicting team performance.

Terry Peter (1995) examined a research into the relationship between mood profiles and athletic performance has produced equivocal results. It appears that athletic populations tend to show more positive mood profiles than the general population, but that mood profiles are ineffective in differentiating between athletes of varying achievement levels. POMS appear to have greater discriminatory power among homogeneous ability groups in terms of differentiating between successful and unsuccessful performances. In this paper, a number of conditions that increase the predictive capability of pre-performance mood profiling are proposed. In addition, measurement issues, factors influencing cross-sectional and intra-individual comparisons, and proposed uses of mood profiling among elite performers are discussed. It is concluded that further research is required to fully understand how intra-individual mood

fluctuations influence athletic performance, and to understand the impact of pre-performance and intra-performance mood trends upon performance.

Simpson & Newby (1994) compared the scores on the Profile of Mood States of football players from three small football programs ( $n_s = 85, 71, \text{ and } 91$ ). Scores of athletes from the two non-scholarship programs did not conform to the "iceberg profile," differing mainly on Anger. These same players differed significantly from the scholarship athletes at a major college on all mood states. Mean total mood scores fell between those for major college scholarship athletes and high school athletes. Means for players associated with the small scholarship program more closely resembled means of major college athletes on both the individual mood states and the total mood score. The results supported the hypothesis that non-scholarship collegiate athletes differ in significant ways from those receiving scholarships.

Cockerill, Nevill & Lyons (1991) conducted an experiment using the POMS inventory as a predictor of cross-country running performance among a group of experienced male athletes. Race times from two competitive events were plotted against each of six mood factors. Using data from race 1, a multiple-regression model--incorporating the interdependence of tension, anger and depression--was able to predict rank order of finishing positions for race 2 with acceptable accuracy ( $r_s = 0.74, P \text{ less than } 0.01$ ). The present approach differs from the traditional model of mood research in sport in that it provides a prescriptive, rather than a descriptive, focus. Although the model that has been developed appears promising, it is likely that in sports where demands on athletes are very different from those made upon cross-country runners, an alternative model may be required.

Wughalter & Gondola (1991) conducted a study to develop a psychological profile of professional female athletes, specifically of elite tennis players, 16 professional female tennis players from five countries were given the Profile of Mood States to measure six mood states: tension, depression, anger, vigor, fatigue, and confusion. When age was controlled in the design, older female athletes exhibited the "iceberg profile," i.e., they scored higher on the vigor mood state and lower on all other mood states than college-age women. Younger athletes scored like college-age women. These results only partially support the 1987 work of Morgan, O'Connor, Sparling, and Pate.

Christina Lee (1990) conducted a study on "Psyching up for a muscular endurance task: Effects of image content on performance and mood state". For this purpose 194 males were selected as subjects. And they were divided in to two groups. In Experimental group I 52 males were assigned randomly and their age ranged between 18-30 years, they undergone task relevant imagery, task irrelevant imagery, or a distraction control procedure before performing an analog task. Experimental group II involved 142 males and their aged ranged between 15-30 years and included assessment of mood state following psyching up. The result of the study shows that the task relevant condition showed significantly greater improvements over baseline. Again the task relevant group showed significantly greater improvements, which were not related to mood states. Content of mental imagery was crucial in determining its effect on performance.

#### **2.4 STUDIES RELATED TO GAME SKILL AND PLAYING ABILITY**

Chandrasekaran, et al. (2012) focused on selected motor fitness components to ensure the playing ability among low and high performers of State level Football players. To achieve the purpose of this study, One hundred and fifty men Football players were



randomly selected as subjects from Tamilnadu State level men Football Tournament held at Chennai in 2008-09. Their age ranged from 20 to 25 years and the selected subjects were classified into three equal groups of each fifty members. Group 1 served as - Chennai Team, Group-II as Salem and Coimbatore Team and Group III Trichy and Madurai Team. All the subjects were oriented the purpose of the test and procedure of conducting this test. Regular activities and training were given that aplomb the player's ability to perform the game. Questionnaire preparation was also done by our Research Scholar with the reference to the review of the literature. The investigator has provided onto the following selected motor fitness variables such as Cardio-vascular Endurance, Speed, Agility and Explosive Power. The data was collected with the help of five PhD Scholars, Department of Physical Education who were well versed with the conduct of test and data collections under the direct supervision of our Research Scholar. The data were collected before and after the competition and statistically analyzed using ANOVA and DMRT. Hence the study concluded that playing ability solely depends on the physical fitness, stress free mind more than that it relates the socio-economic status to perform the better strategy of playing games.

Manoj Kumar (2012) conducted a study to find out the efficacy of specific packages of football drills with and without psych up strategies on selected physical fitness, game skill variables and playing ability among inter collegiate football players. To achieve the purpose forty five college men football players from Chennai city were randomly selected and their age ranged between 21 and 24 years. They were assigned into three equal groups. Pre test was conducted for all the forty five subjects on selected physical fitness variables namely speed, agility, explosive power, flexibility and cardio

vascular endurance and Game skill variables namely passing, shooting, dribbling, kicking for distance in left leg and kicking for distance in right leg. Playing ability was measured by experts rating. The initial test scores formed as pre test scores of the subjects. Experimental Group I was exposed to specific packages of football drills with psych-up strategies, experimental group II was exposed to specific packages of football drills without psych-up strategies, and the control group was not exposed to any experimental training other than their regular daily activities. The experimental period was for 12 weeks. After the experimental treatment, all the forty five subjects were measured on the selected physical fitness, game skill variables and playing ability. The final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using Analysis of Covariance (ANCOVA) to find out the significance among the mean differences Scheffe's Post hoc test was used. In all cases 0.05 level of significance was fixed to test hypothesis. The results of the study indicates that the specific packages of football drills with psych up strategies and specific packages of football drills without psych up strategies improved the selected physical fitness, game skill variables and playing ability among inter collegiate football players. Hence, it was concluded that the specific packages of football drills with psych up strategies was better than the specific packages of football drills without psych up strategies in improving selected physical fitness variables, game skill variables and playing ability among inter collegiate football players.

Bhaskar Reddy & Siva Sankar Reddy (2011) investigated the relationship between hockey playing ability and physical, anthropometric variables & fundamental skills of university men hockey players. The study was conducted on 100 men hockey

players of selected universities in Andhra Pradesh, who participated in inter university hockey tournament and their age ranges from 18-25years. The investigator analyzed the relationship between hockey playing ability and physical, anthropometric variables, fundamental skills. The study concluded that there was a significant relationship between criterion and independent variables.

Natarajan & Vijayaragavan (2011) conducted a study on “Prediction of handball playing ability from selected psychological variables among college level men handball players”. The purpose of the study was to predict the handball playing ability from selected psychological variables among college level handball players. To achieve the purpose of the study, the investigator selected 100 college handball players from different colleges. In this study the handball playing ability was predicted from 100 college handball players with the help of selected predictor variables namely psychological variables such as anxiety, aggression, achievement motivation and self confidence. The handball playing ability was determined by subjective rating by 3 experts and was use as the criterion variables. The backward multiple regression method was used to determine the prediction equation. Based on the limitation and delimitation of the present research study, it was concluded that the handball playing ability could be best predicted from psychological variables.

Jayachitra (2010) conducted a study on “Effects of Specific Pre-Competitive training packages with and without psych up strategy on motor fitness, physiological, psychological variables and playing ability among state level basketball players”. The objective of this study was to find out the effects of Specific Pre-Competitive training packages with and without psych up strategy on motor fitness, physiological,

psychological variables and playing ability among state level basketball players. For this purpose three groups of ten female state level basketball players in each were randomly selected and named psych up group, non psych up strategy group and control group. Psych up group was given the psych up strategy along with the basketball training during the pre competitive phase. Non psych up group was given basketball training alone during the pre competitive phase. The control group was not exposed to any training. The data were collected first at the beginning (Pre- test) and finally at the end of the experimental period of ten weeks (Post –test). The study was aimed to find out the influence of training on selected dependent variables on motor fitness, physiological, psychological variables and playing ability which includes passing, shooting accuracy and overall playing ability. The collected data were analyzed by univariate ANCOVA and post hoc test. The results of the study shows that the psych up strategy and non psych up strategy groups had improved the selected variables and significant difference was existed between the experimental groups, whereas control group had significantly insignificant as they were not subjected to any specific training.

Gabbett, Kelly & Pezet (2007) investigated the physiological, anthropometric, and skill characteristics of rugby league players and determined the relationship between physical fitness and playing ability in these athletes. Eighty-six rugby league players (mean +/- SD age, 22.5 +/- 4.9 years) underwent measurements of standard anthropometry (height, body mass, and sum of 4 skinfolds), muscular power (vertical jump), speed (10-, 20-, and 40-m sprint), agility (L run), and estimated maximal aerobic power (multistage fitness test). In addition, 2 expert coaches independently assessed the playing ability of players using standardized skill criteria. First-grade players had

significantly greater ( $p < 0.05$ ) basic passing and ball-carrying ability and superior skills under fatigue, tackling and defensive skills, and evasion skills (i.e., ability to beat a player and 2 verse 1 skills) than second-grade and third-grade players. While no significant ( $p > 0.05$ ) differences were detected among playing levels for body mass; skinfold thickness; height; 10-, 20-, or 40-m speed; agility; vertical jump height; or estimated maximal aerobic power, all the physiological and anthropometric characteristics were significantly ( $p < 0.05$ ) associated with at least 1 measure of playing ability. The results of this study demonstrate that selected skill characteristics but not physiological or anthropometric characteristics discriminate between successful and less successful rugby league players. However, all physiological and anthropometric characteristics were related to playing ability.

Kalidasan, (1999) conducted a study on “Influence of training with and without psych-up strategies on selected bio-motor, physiological, psychological and performance variable among cricket players” The purpose of the study was to investigate the influence of field training with and without psych-up strategies on selected Bio-motor, Physiological, Psychological and Performance variable among cricket players. To achieve this purpose, forty two sivaganga district cricketers were randomly selected as subjects. Their age ranged from eighteen to twenty five years. By using matching procedure on the basis of their initial cricket playing ability performance test scores, the subjects were divided into three equal groups of fourteen each. The control group was not exposed to any specific training/ conditioning. The data were collected first at the beginning (Pre- test) and finally at the end of the experimental period of ten weeks (Post -test). The study was aimed to find out the influence of training on selected dependent

variables. In addition to that, it had been analyzed if there was any difference between the groups with Psych-up and without Psych-up package on field training programme. The collected data from three groups were statistically analyzed for significant difference if any, by applying the Analysis of Covariance. The result of the study shows that the experimental groups had improved the selected bio-motor, physiological, psychological and performance variable among cricket players and significant difference was existed between the experimental groups. The subjects who had undergone ten weeks of field training with psych-up package (i.e. experimental group 'B') showed noticeable improvement in Endurance and Strength; and in case of Speed, the improvement was not statistically significant, when compared with experimental group 'A'.

Robert Stevens (1980) conducted a study on psycho-physiological variables and hockey playing ability. To achieve the purpose a variety of measures was administered to hockey players in three different categories, differentiated by age and level of play. Combinations of these measures were examined in order to select those batteries which correlated most strongly with coaches' ratings of the hockey ability of the players. The categories of players included junior (N=24), midget (N=48), and nine to 13 year old boys (N=60) attending summer hockey school. The measures employed were concentrated in four domains: anaerobic system measures, specific skill measures, psychological measures, and measures of perceptual-motor ability. Scores were obtained on 17 variables for the junior sample; these 17 variables, plus another 12 variables, produced a total of 29 scores for each player in the midget and hockey school samples. Coaches or instructors rated players on paper-and-pencil rating scales. Samples were analyzed separately and in combination. Univariate statistics were presented as were the

correlations between all pairs of variables. Regression analyses were conducted and the “best” and selected subsets were described. Discussion of batteries across subject categories was prohibited because of the finding of substantial differences between categories of subjects. When subject categories were analyzed separately, significant subsets of predictors emerged in the data for the midget and hockey school samples. In the former group, a battery or variable subset of 14 variables (derived from nine measures) produced a multiple correlation of 0.91 with hockey ability ratings (i.e.,  $R^2=0.83$ ). In the hockey school sample, a battery of five variables (derived from four measures) produced a multiple correlation of 0.68 with hockey ability ratings ( $R^2=0.46$ ). Other subsets were discussed. The findings pointed to the plausibility of the use of manageable batteries of tests for the prediction of ice hockey ability.

## **2.5 STUDIES RELATED TO RELAXATION TRAINING**

Mohsen Afrouzeh, et al. (2013), conducted a study to compare the effects of (a) physical practice with PETTLEP-based (Physical, Environmental, Task, Timing, Learning, Emotion and Perspective; Holmes & Collins, 2001) imagery, and (b) physical practice with traditional imagery interventions, on new skill learning in novice volleyball players. Thirty six novice male volleyball players (Mage = 13.2 years, SD = 0.53 years) with 6-8 months practice experience were randomly assigned to one of three groups: physical practice + PETTLEP imagery (n = 12), physical practice + traditional imagery (n = 12), and physical practice only (control group; n = 12). Participants in the PETTLEP imagery group applied the seven components of PETTLEP imagery training; whereas participants in the traditional imagery group engaged in a relaxation session before imagery and used response laden motor imagery scripts. The two groups completed 15

minutes of imagery training followed immediately by thirteen minutes of “passing” practice three times per week. The control group completed only thirteen minutes of “passing” practice three times per week. Each group performed their respective tasks for seven weeks. A pre-test took place during the first practice session in which “passing” was assessed. After the seven-week practice program, a post-test took place followed by a retention test, one “no-practice” week later. All groups improved significantly ( $p < 0.05$ ) from pre- to post-test and retention test. Nevertheless, as hypothesised the PETTLEP group improved more ( $p < 0.05$ ) than the traditional imagery and physical practice groups. The findings, therefore, support the effectiveness of PETTLEP in enhancing learning and performance of new skill when combined with physical practice.

Shaji John Kachanathu, Satish Kumar Verma & Gulshan Lal Khanna (2012) examined a study to know about the response to relaxation therapies such as of Music Therapy (MT) and Mindfulness Meditation Therapy (MMT) in sports. The purpose of this study was to estimate the contribution of MT and MMT training on shooting performance of shooters. 165 professional male shooters age of  $29.5 \pm 4.3$  years were examined in three groups Group A, B, and C, MT, MMT, and as a Control respectively,  $n = 50 \pm 3$  in each group. Duration of the study was 4 weeks. Pre and post data of quantitative Performance Score (PS) were analyzed. Results of the study showed positive correlation, highly significant ( $p < 0.0001$ ) post-intervention PS. Ultimately resulted in reduction of competition stress level and increase in PS. Comparatively Group A and B, and group A shown marginal improvement than Group B. Whereas the Control group has been shown non-significant result compare to experimental groups ( $p < 0.05$ ). Study concluded that relaxation therapies such as MT and MMT interventions along with



routine sports specific training may decrease Competition Stress (CS) level and will enhance sports performance and also found MT has been shown better effectiveness than MMT in 4 weeks of training.

Khaled Hegazy (2012) conducted a study to test specifically whether the precision of tennis serves and, similarly, penalty soccer kicks as representative closed skills can be improved through mental training. Further research questions illuminate which potential influencing variables play the biggest role in determining the efficacy of the mental training intervention in this study. These variables include imagery ability; commitment; the level of somatic fear, anxiety, and confidence; ability to concentrate; sex, and age. The study used experimental design with a pre- and post- test and a control group. Data were collected from a sample of 60 (38 male, 22 female) amateur athletes with a high skill level in tennis, ages 12 to 35 in Germany and 54 (male) soccer athletes playing in the third league, ages 14 to 22 in Germany. All subjects were registered with the state tennis and soccer federations of Baden Württemberg, Germany. The subjects for tennis and soccer each completed the questionnaire and were divided into two groups: The intervention group (IG) received both technical practice and mental training units. The control group (CG) received only technical practice (Normal training) for the same time period. Analysis of covariance showed a highly significant improvement for the mental training on tennis serving precision, while for soccer penalty kicking the effect of mental training on precision was only marginally significant ( $p=.059$ ). Findings suggest that self-confidence seems to have an impact on improving performance when the athlete has more control over his movements, such as in closed skills. Furthermore, this effect may result from more advanced players having already achieved high serving or kicking

speeds and so training focuses on accuracy; while younger players focus more on speed. Moreover, the interaction effect between time and sex is not significant, but shows a tendency, that the improvement in the women's precision was higher than that of the men. However, there is no significant correlation among imagery ability; commitment; the level of somatic fear; anxiety and the ability to concentrate.

Tahereh Bagherpour et al. (2012) examined a study to compare the effects of two different techniques, namely progressive muscle relaxation (PMR) and internal imagery on state anxiety among taekwondo players in Malaysia and Iran. The method was designed by eighty eight taekwondo players (Mean age: 12.79) were randomly assigned into 4 groups, 1) imagery exercise, 2) progressive muscle relaxation, (PMR) 3) combined imagery exercise and progressive muscle relaxation and 4) control group. The experimental sessions consisted of 2 times per week. CSAI-2R has been measured after the 8Th, 16Th, 24Th session of intervention and the measurement was repeated after the completion of 24th session of follow up (without any intervention). Using 4 (groups) x 5 (trials) repeated measured ANCOVA, the results revealed significant difference in somatic anxiety among taekwondo players in Malaysia and Iran. In somatic, cognitive anxiety and self confidence significant difference was found between experimental groups. It was concluded that these two techniques have effects on reduce somatic and cognitive anxiety and increase self confidence in Malaysian and Iranian taekwondo players.

Vishan singh Rathore & Arvind Bahadur Singh (2012) has conducted a study to assess the effect of selected relaxation skills and counselling skill on managing stress. The sample consist 25 students out of 60 student of which were selected those have high

score of personal stress sources inventory and taken their consent to go under way of activities of guidance and counselling and selected relaxation skills. Students were also participating regularly teaching and activity scheduled of department. The level of stress was measured by Personal Stress Sources Inventory (PSSI) developed by Farmer and Hekeler (1984) Pre-test and post-test was taken before and after the intervention. The progressive muscle relaxation training (PMR), Autogenic training and yoga techniques were used for 8 weeks to assess the influence of training. The descriptive statistical tool 't' test was applied to analyze the collected data. The level of significance was set at 0.05 levels. The 't' value was 12.39 while tabulated value is 2.06 which are lower than the calculated value it revealed that stress level of students markedly reduced with the help of selected intervention and guidance and counseling. On the basis of result, it was concluded that a specific pack of intervention skills was effective to reduce stress level of students and also they needs regular intervals counseling and guidance to lowering their stress during academic life.

Hairul Anuar Hashim & Hazwani Hanafi@Ahmad Yusof (2011) has designed a study to compare the effects of two different relaxation techniques, namely progressive muscle relaxation (PMR) and autogenic relaxation (AGR) on moods of young soccer players. To achieve the purpose of the study Sixteen adolescent athletes (mean age: 14.1  $\pm$  1.3) received either PMR or AGR training. Using Profile of Mood States- Adolescents, their mood states were measured one week before relaxation training, before the first relaxation session, and after the twelfth relaxation session. The results of mixed ANOVA revealed no significant interaction effects and no significant main effects in any of the subscales. However, significant main effects for testing sessions were found for

confusion, depression, fatigue, and tension subscales. Post hoc tests revealed post-intervention reductions in the confusion, depression, fatigue, and tension subscale scores. It was concluded that these two relaxation techniques induce equivalent mood responses and may be used to regulate young soccer players' mood states.

Mousavi & Abolfazl Meshkini (2011) investigated the mental imagery effect upon the reduction of athletes' anxiety during sport performance using documentary analysis method. We applied experimental method with pre-post tests and control group. The measuring tool was Kettle anxiety questionnaire (2009). Our statistical population was all tennis players in Zanjan (2010) of whom 25 were chosen as control and 25 as experimental group through Cohen sampling table. We applied descriptive and independent t-student, here. Finally, having considered the background and findings related to our topic, our results showed that the mental imagery shall considerably reduce the athletes' anxiety and improve their performance, specifically, if other psychological strategies like self-talk, relaxation and goal-setting are included and the related task is highly familiar to the individuals.

Chitra Dhiman & Harneet Shallu Bedi (2010) investigated a study to enhance the performance of the hockey players by regulating their trait anxiety level through implementing autogenic training and mental imagery. Pre- and post-test design was used for this purpose. Sample of the study included 31 hockey players of Netaji Subhas National Institute of Sports, Patiala. The trait anxiety test (Spielberger 1973) was used to assess trait anxiety of the participants in pre- and post-test conditions. In order to analyse pre- and post-test data t test was applied. The findings revealed that the trait anxiety of

the hockey players was significantly reduced, as compared to the pretest condition. The concerned coaches had observed improvement in the performance of the hockey players.

Hassan Ghrayagh Zandi & Hassan Masomi (2010) conducted a study to find out the effect of imagery in soccer players perception of anxiety during penalty kick. This study was experimental study and the researcher by simple sample randoming method selected 40 men soccer players out of 200 players, they had 18–35 years of age and measured their level of anxiety with SCAI<sub>2</sub> question mentioned. The players followed imagery programme for 10 week and 4 days every week and researcher compared the score of pretest and post-test with the ‘t’ test. With mention result of this study imagery practice had positive effect on reduce of anxiety and imagery practice with kick training had more effect on reduce of anxiety than just kick practice during penalty kick.

Hassan Sadeghi et al. (2010) conducted a study on “The Mental Skills Training of University Soccer Players” The purpose of this study was to identify the kind of mental skills training needed most by the university soccer players. For the purpose eight male university football players and their aged ranged between 25 to 36 years were selected as subjects from one large university in Kuala Lumpur. All the subjects are having 10 years of playing experience. All of them have signed the informed consent letter to be tape-recorded. The interview transcripts were then hierarchically content analyzed to identify the themes. The results of the study revealed that four themes emerged which are imagery, goal setting, self-talk, and relaxation were the most needed psychological skill training by the respondents.

Lucette Toussaint & Yannick Blandin (2010) conducted a study on “The role of imagery modalities on motor learning” The aim of the study was to examine specifically

how the sensory conditions available during physical practice of a task might influence the subsequent use of motor imagery. As a pre test, participants had to physically reproduce knee joint positions with or without vision. Second, they practised motor imagery (15 and 150 trials) with visual, kinaesthetic or visuo-kinaesthetic imagery. A control group with no imagery was included. Post-tests were then performed 10 min and 24 h after each imagery session in a sensory condition similar to that used in the pre-test. The Results showed that efficient motor imagery instructions have to take account of the sensory information available during physical experience of the task: kinaesthetic or visuo-kinaesthetic imagery in a no-vision condition, and visual imagery or, to a lesser extent, visuo-kinaesthetic imagery in a vision condition.

Maryam Karimian et al. (2010) conducted a study to find out the efficacy of relaxation training and imagery training (motivational general – mastery imagery) on self-efficacy, competitive anxiety and performance in (skate) athletes. The procedure of this study is experimental (pretest, post-test with control group). So that, 75 skate adolescence athletes in three group (relaxation training, imagery training and control group) randomly displaced. The instruments of study are self-efficacy, competitive anxiety and performance scales. For group 1 relaxation training and for group 2 imagery training applied and for group 3 not applied any training. Results of analysis of variance indicated that meaningful different between three groups in post-test scores of self efficacy, competitive anxiety and sportive performance ( $p < 0.05$ ). That means, the scores of self efficacy and performance in group 2 (mental imagery training) higher than group 1 and in group 1 higher than group 3 (control group), and the scores of competitive anxiety in group 1 lower than group 2 and in group 2 lower than group 3.

Navaneethan & Soundara rajan (2010) investigated the effect of psychological skill training techniques such as progressive muscle relaxation on competitive anxiety. The three sub-scales of competitive anxiety were also examined; cognitive anxiety, somatic anxiety and self-confidence. The study consisted of 24 male volleyball players from PSG College of Arts and Science, Coimbatore. Their age ranged from 18 to 25 years. The Competitive State Anxiety Inventory-2 (CSAI-2), also developed by Martens, Vealey, & Burton (1990) were used. Subjects were randomly assigned to either a relaxation training experimental group, or a no relaxation training control group. Both the experimental groups were given training for 3 days a week and for 6 weeks in total. Paired t-tests were used to test the effect of treatment groups individually between pre and post –tests of all the groups on variables used in the present study. The result of the study reveals that there was significant difference in 0.05 levels of competitive anxiety among the male inter-collegiate volleyball players.

Sathyanandan (2010) conducted a study on “Effect of psychological training on the selected performance related variables in shooting ball game among polytechnic college boys in Andhra Pradesh”. To achieve this purpose, 30 male students were selected as subjects from polytechnic college in Andhra Pradesh. Subjects were divided into three equal group’s namely experimental group I, experimental group II and control group. Experimental group I named as mental imagery training group consisting of 15 students and Experimental group II named as goal setting training group consisting of 15 students. Group II named as Control group consisted of 15 students. The duration of the training programme was 12 weeks. The data was collected prior and immediately after the training programme. The data was statistically analysed by using analysis of

covariance. The results of the study shows that there were significant improvement in the performance of shooting ball players due to the mental imagery training programme and goal setting training programme.

Zeidan et al. (2010) investigated a research that has found that long-term mindfulness meditation practice promotes executive functioning and the ability to sustain attention; the effects of brief mindfulness meditation training have not been fully explored. We examined whether brief meditation training affects cognition and mood when compared to an active control group. After four sessions of either meditation training or listening to a recorded book, participants with no prior meditation experience were assessed with measures of mood, verbal fluency, visual coding, and working memory. Both interventions were effective at improving mood but only brief meditation training reduced fatigue, anxiety, and increased mindfulness. Moreover, brief mindfulness training significantly improved visuo-spatial processing, working memory, and executive functioning. The findings of the study suggest that 4days of meditation training can enhance the ability to sustain attention; benefits that have previously been reported with long-term meditators.

Olsson (2008) examined one aspect of mental training namely motor imagery in his doctoral thesis. In Study I, active high jumpers were trained for 6 weeks using a motor imagery mental training program. We measured behavioral effects in motor parameters such as total height, false attempts, take off angle, and bar clearance. A significant improvement was found on the bar clearance component compared to a control group of high jumpers that did not participate in the mental training program. The results emphasize the importance of using appropriate outcome measures since mental training



may affect distinct features of the movement rather than the entire movement. Study II used fMRI (functional Magnetic Resonance Imaging) to examine the neural correlates of imagery for active high jumpers, and also how imagery training affects brain activity. Active high jumpers were compared to a control group of high jumping novices and the results showed that high jumpers were able to activate motor regions, whereas controls used parts of the visual system to perform imagery of the high jump. Thus, we were able to show how important well established motor representations are in order to achieve a neural overlap between imagery and action. In study III we examined the effects after motor, mental and combined motor and mental training on a finger tapping task. Behaviorally, even though mental training improved performance, adding mental training to motor training did not improve the results beyond only using motor training. Imaging results showed that motor and mental training engaged different neural systems, with motor training associated with motor activity and mental training with visual activity. The combination of motor and mental training activated both motor and visual systems. Additionally combining motor and mental training resulted in transfer to an untrained motor sequence and neural data indicated that cerebellum mediated the transfer. The overall findings explain how mental training can be used to improve motor performance and motor parameters. Moreover, it also illustrates that the neural processes underlying such improvements may be distinct from motor training and that the brain may react differently during mental training depending on prior physical experience of the action.

Blakeslee & Goff (2007) conducted a study on “The Effect of a Mental Skills Training Package on Equestrians”. The present study examined the effectiveness of a mental skills training package employing relaxation, imagery, goal setting, and self-talk

(strategies for improving performance and perceptions through cognitive-somatic techniques) on equestrian performance. A stratified random sample of 17 competitive collegiate horseback riders were selected as subjects. Among 17 subjects 8 subjects were selected as mental skill training group and 9 subjects were selected as control group. Riders' goal orientation was also assessed and used to determine if there might be a relationship with performance change over time. Assessment of participants via performance in 2 horse shows revealed no interaction effect for group by time in either flat or show-jumping performance. The results of the study showed that there was a significant main effect of time for performance improvement. Riders demonstrated a dominant mastery-approach goal orientation as hypothesized, but no significant correlations with performance change emerged.

Miyazaki Junichi & Koga Hajime (2007) conducted a study on "Psychological skill training for the Japanese soccer team in 2005 Universiade games in Izmir". For the purpose of the study 20 Japanese university soccer players who are having Psychological competitive ability were examined by original questionnaire and Diagnostic Inventory Psychological Competitive Ability. According to the data obtained from the original questionnaire and interview, those psychological trainings were effective for team building process. The results proved that the high psychological competitive ability with pre-test 186 points on March 2005, to post-test 192 points on August 2005. The team made great improvement in emotional stability (patience), self confidence, anticipation, and cooperative attitude through the training camps and tournament. It was concluded that the psychological supports from the mental coach such as mental training skills facilitate to enhance team relationship and team performance.

Michael Sheard & Jim Golby (2006) examined the effects of a seven-week psychological skills training (PST) program on competitive swimming performance and

positive psychological development. Thirty-six national level swimmers (13 boys, 23 girls; M = 13.9 years old) followed a PST program for 45 minutes per week. The intervention consisted of goal setting, visualization, relaxation, concentration, and thought stopping. Performance times were obtained from official meets. Participants completed seven inventories measuring quality of performance, and six positive

psychological attributes: mental toughness, hardiness, self-esteem, self-efficacy, dispositional optimism, and positive affectivity. Findings demonstrated that there was a significant post-PST program improvement in three separate swimming strokes, each over 200 m. Non-significant improvements were shown in 10 other events. There was

also an overall significant improvement in participants' post-intervention positive psychological profiles

Ortiz & Grange (2006) conducted a study on "Efficacy of relaxation techniques in increasing sport performance in women golfers" The aim of the study was to determine if progressive relaxation techniques would improve sports performance in a group of female recreational golfers. For this purpose 18 women golfer were selected as subjects. They were divided into two equal groups namely experimental group I and Control Group. The study was conducted over a 3-month period during which the experimental group regularly engaged in Progressive Relaxation Technique. Both the experimental group and the control group played their regular golf game; recording their scores, putts per round, and number of greens hit in regulation. Pre intervention measures were recorded and compared with post intervention measures. The results of the study showed

that both groups recorded significant improvement on all three measures. The amount of improvement observed for the experimental group was more than that observed for the control group. The between-group differences were not, however, significant.

Shalini Hurgobin (2006) investigated the effectiveness of Autogenic Training (AT), a relaxation technique, as a preventive measure against anxiety and as a technique to promote psychological well-being among students from the University of Zululand. It was hypothesised that AT would decrease anxiety and increase psychological well-being. A convenience sample and matched group design was used and it included an experimental group and a control group. The experimental group consisted of 11 Postgraduate psychology students who received AT weekly for a period of 10 weeks. The control group comprised of a friend of each participant in the experimental group. Questionnaires, the Beck Anxiety Inventory and the Scales of Psychological Well-being, were administered to both groups prior to and immediately after the 10 weeks intervention. At the end of the study, participants from the experimental group were asked about their subjective experiences of AT and its benefits. The impact of AT was assessed by the difference in anxiety levels and psychological well-being before and after the intervention. Data from the questionnaires were analysed quantitatively using the Statistical Package for the Social Sciences (SPSS). Participants' evaluations of their subjective experiences of AT were studied qualitatively. The results of the study showed a significant reduction in anxiety within the experimental group over time. In addition, there were significant increases in Total psychological well-being and Environmental Mastery within the same group over time. On the other hand, between groups comparisons indicated that the participants receiving AT showed a statistically significant

improvement in the subscale Positive Relations with Others. The experimental group also reported additional benefits. This included improved sleep, a feeling of being in control, increased energy levels, clarity of thoughts, and better control over emotions, deeper relaxation and improved self-awareness.

Thelwell, Greenlees & Neil Weston (2006) examined the effects of soccer, midfielder-specific psychological skills intervention comprising relaxation, imagery and self-talk on position-specific performance measures. Using a multiple-baseline-across-individuals design, five participants had three performance subcomponents assessed across nine competitive matches. The results of the study indicated the position-specific intervention to enable at least small improvements on the three dependent variables for each participant. Social validation data indicated all participants to perceive the intervention as being successful and appropriate to their needs. The findings provide further evidence to suggest the efficacy of sport, and position-specific interventions. Suggestions for future research are provided.

Eugenio Peluso et al. (2005) conducted a study on “A comparison of mental strategies during Athletic skills performance”. The purpose of the study was to examine the effects of performance enhancement techniques (PET’s) on motor skill performance. For this purpose one hundred fifty college student volunteers (Men = 41; 27.3% and Women = 109; 72.6%) were randomly assigned to one of the nine conditions: Condition 1 and 2, simultaneous, externally verbalized self-talk or imagery (e.g., participants were instructed to say “aim, back, birdie” or engaged in imagery out loud while putting); Condition 3 and 4, delayed externally verbalized self-talk or imagery (e.g., participants were instructed to say “aim, back, birdie” or engaged in imagery out loud before putting);

Condition 5 and 6, simultaneous, internally verbalized self-talk or imagery (e.g., participants were instructed to say “aim, back, birdie” or engaged in imagery silently to oneself while putting); Condition 7 and 8, delayed internally verbalized (e.g., participant were instructed to say “aim, back, birdie” or engaged in imagery silently to oneself before putting); and Condition 9, no instruction control group. All participants were asked to perform a golf-putting task. The Result shows that the participants who implemented several (performance enhancement techniques) increased their putting accuracy across overall difference score evaluations when compared to a no instruction control condition. Follow-up analyses indicated that participants who reportedly engaged in ten hours or less of athletic activities per week preferred self-talk strategies whereas participants who endorsed ten hours or more of athletic activity per week preferred imagery strategies.

Jean Fournier et al. (2005) reported of an evaluation of the effects of a 10-month PST program on performance and psychological indicators. Ten nationally ranked female gymnasts ( $M = 12$  years old) followed a psychological skills training (PST) program for

half an hour per week. The five-step intervention consisted of relaxation, self-talk, goal setting, focusing, and visualization. Performance scores were obtained using scores and rankings during two consecutive competitive seasons. The OMSAT-3 © was used to

individually assess 11 psychological indicators (Durand-Bush, 1995). Data were recorded before the intervention and after every step of the intervention, during the course of the competitive seasons. Repeated ANOVAs as well as a practical assessment of the data were completed. The PST program appeared to be most effective on imagery skills, relaxation, activation, focusing, and refocusing. On three events out of four (bars, beam,

floor), the 10 gymnasts progressed 5% more than 11 other gymnasts who did not follow this PST program.

Krista Munroe-Chandler et al. (2005) conducted a study to determine the effectiveness of a cognitive general imagery intervention on three distinct soccer strategies in a young elite female soccer team. For this purpose 13 competitive female soccer players were selected as subjects and their age ranged from 12-14 years. The selected subjects were tested on staggered multiple baseline design across behaviours. The training includes three distinct soccer strategies (defending a direct free kick, taking a direct free kick, and defending a corner kick) which were introduced at 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> week of the training period. The Results of the study indicated that cognitive general and cognitive specific imagery use as well as motivational general-arousal imagery use significantly increased from baseline to post intervention. Findings of the study shows that the execution of soccer strategies was not significantly enhanced with the implementation of a cognitive general intervention.

Chris Harwood, Jennifer Cumming & David (2004) investigated the associations between achievement goal orientations and reported psychological skill use in sport. Five hundred seventy three elite young athletes completed the Perceptions of Success Questionnaire (POSQ; Roberts, Treasure, & Balague, 1998) and the Test of Performance Strategies (TOPS; Thomas, Murphy, & Hardy, 1999). Cluster analysis revealed three distinct goal profile groups: Cluster 1—Higher-task/Moderate-ego (n = 260); Cluster 2—Lower-task/Higher-ego (n = 120); and Cluster 3—Moderate-task/Lower-ego (n = 119). A MANOVA revealed a significant multivariate effect with post hoc tests determining that higher-task/moderate-ego athletes reported using significantly more Imagery, Goal

setting, and positive Self-talk skills when compared with Lower-task/Higher-ego and/or Moderate-task/Lower-ego athletes. These findings are discussed with respect to the potential role that achievement goals play in the application and development of psychological skills in youth sport.

Claire Calmels & Christelle Berthoumieux (2004) conducted a study on “Effects of an Imagery Training Program on Selective Attention of National Softball Players” The aim of the study was to examine the effectiveness of an imagery training program in improving national softball players' selective attention. For this purpose four participants were selected as subjects. One subject remained at baseline, while the other three spent 10 min a day practicing an audio-taped imagery program composed of 28 sessions. A multiple-baseline design across individuals was used. They were tested on selective attention via a baseball/softball batting specific version stemming and also they were tested on Attentional and Interpersonal Style. The results of the study showed that the imagery training program generally enhanced the ability of softball players to integrate external stimuli without being overloaded with them and to narrow attention.

Canter & Ernst (2003) reviewed 10 randomized controlled trials (RCTs) on the effects of the Transcendental Meditation program on cognitive performance, from which it concluded that the studies showing positive effects were a result of expectation. However, the positive effects were on objective measures of cognitive performance, which could not be influenced by expectation. In the three no-effect studies, all were very small and covered a short time period. One studied learning-disabled children who might not be expected to change over a short period of time (three months). A second was on a measure that was not really cognitive (pistol shooting), and in the third the subjects did



not practice the TM technique regularly. On the other hand larger, longer studies, in which the subjects were known to meditate regularly, found clear evidence of global cognitive development. Two studies which the Canter and Ernst review classified as “largely negative” report largely positive results, not largely negative results. In addition, a wide range of confirming evidence, which was not included in the review, supports the conclusion that TM practice does improve cognitive performance.

Thirumalaikumar (2003) investigated the influence of a Specified physical Education Programme on physical fitness and psychological variables among juvenile delinquents. To achieve the purpose sixty juvenile delinquents were chosen as subjects for this study and their age ranged between fourteen to sixteen years. These subjects were chosen from the inmates of Government Special Home at Chengalpattu in Tamilnadu with the permission of the Director of Social Defence , Chennai. The chosen sixty subjects were equated on the basis of their age and Body Mass Index (BMI). Thirty delinquent children were assigned to control group and thirty were under experimental group. The investigator has used the pre test – mid test – post test equivalent group design for his study. The treatment was administered to the experimental group for a period of 12 weeks. Mid tests were taken at the end of 6<sup>th</sup> week and post tests were administered at the end of 12<sup>th</sup> week to all the groups. The computer software package SYSTAT version 8.0, as recommended by Indian Council for Medical Research (ICMR), Chennai was used to analyse the collected data. It was concluded that the specified physical education programme (which includes yogasana, Citizenship training, progressive muscular relaxation training, social skills training and cognitive restructuring) had improved the selected fitness variables (namely speed, Abdominal Strength, Power,

Agility, Shoulder Strength, flexibility & endurance) and psychological variables (namely personality dimensions & anger dimensions) of the juvenile delinquents. In physical fitness, even though there was slight improvement shown in the mean value, there was no significant improvement on their fitness as a whole.

Cherie Abma et al. (2002) conducted a study on how high and low trait sport confident track and field athletes differed in their imagery content and imagery ability. NCAA Division I track and field athletes 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.

Jennifer Cumming & Craig Hall (2002) conducted a study to examine mental imagery within the context of the deliberate practice framework. Altogether, 159 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.

Marc Jones et al. (2002) conducted a study on to examine the impact of an imagery script intervention on the levels of perceived stress, self-efficacy and climbing performance of volunteer female participants. Novice climbers were randomly assigned to either a control group, or to an imagery intervention group. Each participant attended four sessions, during which they practiced basic climbing techniques and took part in either a light exercise program (control group) or a scripted imagery training program (experimental group). The imagery script comprised both motivational general-mastery and motivational general-arousal types of imagery. During the testing session the participants climbed a 5.1 meter climbing wall following a designated route. Pre-climb levels of self-efficacy and perceived stress were measured. Perceived stress levels were also assessed on three occasions during the climb itself; the experimental group reported significantly lower levels of perceived stress before and during the climb and higher levels of self-efficacy in their ability to execute the correct technique during the climb. There was no significant difference in climbing performance between groups. The results are consistent with the propositions of Martin, Moritz and Hall's (1999) conceptual model of mental imagery use in sport and suggest that motivational general-mastery and motivational general-arousal types of imagery can be effective in controlling emotions during athletic activity and may also enhance self-efficacy.

Mark Beauchamp, Steven Bray & John Albinson (2002) examined the relationships between self-efficacy, pre-competition imagery use and performance. A modified version of the Sport Imagery Questionnaire was used to assess both the motivational and cognitive functions of imagery used by 51 varsity golfers during the hour before a Provincial University Golf Championship. In line with Martin and co-workers' model of imagery use in sport, it was hypothesized that self-efficacy would be positively related to motivational general-mastery imagery use and motivational general mastery imagery use would be predictive of golf performance. Also, consistent with theorizing by Bandura, it was hypothesized that self-efficacy would predict golf performance, but that the relationship between self-efficacy and performance would be mediated by imagery use. The results of hierarchical multiple regression analyses revealed that pre-competition motivational general-mastery imagery accounted for significant variance in both self-efficacy (adjusted  $R^2 = 0.26$ ,  $P < 0.01$ ) and performance (adjusted  $R^2 = 0.31$ ,  $P < 0.01$ ). The results also indicated that self-efficacy was predictive of golf performance and that motivational general-mastery imagery use mediated the relationship between self-efficacy and performance. The results are discussed in relation to athletes' pre-competition preparation and intervention.

Callow & Hardy (2001) conducted a study to explore 2 aspects of the applied model: the relationship between imagery type and confidence, and 2 possible moderating variables, skill level of the athlete and sport type. One hundred and twenty-three female county netball players participated in the study; 55 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.

So & Orme-Johnson (2001) experimented a study in which randomly allocated 154 Chinese high school students who had attended an introductory lecture and showed an interest in learning the Transcendental Meditation technique to either learn and practice the technique for 6 months or spend an equivalent time napping. The TM group improved significantly compared to napping controls in tests of field independence, speed of information processing and creativity. There was no significant difference between TM and napping in IQ scores on the Culture Fair intelligence Test. Not mentioned by Canter and Ernst was that the TM group also improve significantly compared to the napping group on practical intelligence, and decreased more on state and trait anxiety. These measures definitely impact on cognitive performance, and should not be ignored. In addition, Experiment 1 also found that the TM group improved significantly on all measures compared to a no-treatment control group, who were not interested in learning to meditate. This included a significant increase in IQ, unlike to comparison of the TM technique with napping controls. The napping group, by contrast, did not improve on any measure compared to the not-interested group. This is an important piece of evidence,

which a fair review would report. Canter and Ernst also eliminated Experiments 2 and 3 studying high schools students in Taiwan from their review on the basis that the subjects were randomized by class, rather than by individual. Arguably, randomization by class controls for self-selection to treatment. Although there could conceivably be systematic difference between the classes that could confound the results, the fact that a true RCT in Experiment 1 found positive results makes this highly unlikely. Experiments 2 and 3 were both large studies (N = 118, and 99, respectively) over longer periods of time (six months and one year, respectively), and are important replications that should be considered. In these three studies, the mediators were known to practice the technique regularly.

Kaia Thiese & Sharon Huddleston (1999) conducted a study on to investigate the use of psychological skills by female collegiate swimmers. A secondary purpose was to investigate use differences between athletes specializing in different swim events. Female collegiate swimmers (N = 147) from ten Midwestern universities were surveyed with a researcher-generated questionnaire, the Athlete's Mental Survey. The means indicated that goal setting, positive self talk, and music for psych-up were the skills found to be utilized "almost always" by the subjects. Also, more than 50% of the sample reported "never" using autohypnosis, autogenic training, blank meditation, bracing, color, cue words, mantra meditation, and Transcendental Meditation (C). The sample was split into two groups including sprinters (n = 105) and long distance swimmers (n = 42). MANOVA showed no significant differences between the skills used by the swimmers and the distance swam by the athletes. Results are discussed in relation to the need for

coaches to educate and encourage athletes' use of psychological skills for performance enhancement.

Eva Vadoa, Craig Hall & Sandra Moritz (1997) explored the relationship between imagery use, imagery ability, competitive anxiety and performance. Fifty-seven Junior North American Roller Skating Championship competitors completed the revised Movement Imagery Questionnaire (MIQ-R), the Sport Imagery Questionnaire (SIQ), and the Competitive State Anxiety Inventory—2 (CSAI-2). Results from stepwise multiple regression analyses revealed visual imagery ability and motivational arousal imagery to be predictors of cognitive state anxiety. Visual imagery ability also predicted somatic state anxiety, while motivational mastery imagery was a predictor of self-confidence. With respect to the relationship between imagery use and imagery ability, high imagery ability was associated with higher imagery use. Finally, self-confidence and kinesthetic imagery ability scores correctly classified a majority of the subjects as medalists versus non-medalists. These results suggest that imagery can be used to help control competitive anxiety levels and enhance self-confidence.

Solberg (1996) examined a study on effects of meditation on the shooting performance. To achieve the purpose of the study 25 elite shooters were investigated in an independent groups design. The results in standardized test shootings indoors and in ordinary competitions outdoors were assessed before and after regular meditation training for the experimental group. The experience of tension during the test shootings was self recorded on a visual analogue scale (VAS). The competition results in the outdoor season (1993), just after the meditation training period, compared with the results the previous season (1992), were better in the meditation group ( $P < 0.05$ ). No significant difference

between the groups was observed in the test shootings before and after the relaxation intervention. A significant association was shown between low tension and the results in the test shootings (correlation  $r = 0.42$ ,  $P < 0.0001$ ; Wilcoxon rank sum test,  $z = -3.36$ ,  $P < 0.001$ ); 18% ( $= r^2$ ) of the variance in performance was explained by tension. It is concluded that the meditation may enhance competitive shooting performance.

Blumenstein, Bar-Eli & Tenenbaum (1995) conducted a study, that three psychoregulative procedures of relaxation and excitation were provided in combination with biofeedback to examine their role on physiological and athletic performance variables. Thirty-nine college students were randomly assigned to three groups of psychoregulatory treatment (autogenic and imagery training, AT+IT; music and imagery training, M+IT; autogenic, music and imagery training, AT+M+IT), one placebo group and the control group. Imagery was related to a 100-m run. The treatment and control conditions lasted 13 sessions of 20 min each. During the first seven sessions, the subjects in the treatment groups underwent 10 min of relaxation followed by 10 min of excitation. During the last six sessions, similar treatment was provided accompanied by frontalis EMG biofeedback. Heart rate, the galvanic skin response, EMG and breathing frequency (fb) were recorded three times during each session. In addition, an athletic task (100-m run) was examined at the outset, after seven sessions (no biofeedback) and after an additional six sessions (with biofeedback). Biofeedback was found to have a significant augmenting effect on physiological components and athletic performance when accompanied by autogenic, imagery and music training. Soft music was found to be as beneficial as other relaxation techniques. The results are compared with similar studies



applying mental techniques with biofeedback, and new directions of investigation in the psychophysiological domain are suggested.

Andrea Blair, Craig Hall & Glynn Leyshon (1993) conducted a study to investigate the effect of an imagery training programme on the performance of a soccer task by skilled and novice players. For this purpose 22 skilled and 22 novice players were selected and randomly assigned to either a control or an experimental group. The experimental group was given an imagery training programme consisting of both visual and kinaesthetic imagery, and in which both internal and external imagery perspectives were included. They were tested on the performance on the soccer task. The training programme lasted for 6 weeks, with the subjects attending bi-weekly sessions of approximately 15 min each. The control group developed a competitive strategy that was totally unrelated to the performance task. Similar to the experimental group, the controls did this over a 6 week period, attending bi-weekly sessions of 15 min duration. Two performance measures were recorded response time (the time to complete the soccer task) and performance accuracy (errors in performing the soccer task recorded in the form of time penalties) after the training period. The result shows that the performance on the posttest as measured by response time revealed a significant improvement for both the skilled and novice players in the imagery group. The control group failed to show any such improvement and no effects were found for performance accuracy.

David Onestak, (1991) studied the development and implementation of 3 strategies (progressive relaxation, mental practice, and hypnosis) to facilitate athletic performance to correct dysfunctional thought, behavior, and emotion to help athletes reach their full potential. Topics highlighted include (1) the relationship between anxiety

and athletic performance, (2) theoretical explanations for mental practice effects, (3) the important parameters of the mental practice procedure, (4) the use of hypnosis in athletics, and (5) theoretical explanations of the suggested effects of hypnosis on athletic performance.

Deschaumes-Molinaro, Dittmar & Vernet-Maury (1991) carried out an experiment in the field during precision shooting competitions and in the laboratory for imagery activity, on 22 subjects. Results show that there is similarity of ANS response in the three situations: the period of concentration prior to shooting, actual shooting and mental representation of shooting. The ratio formed by ANS response during concentration and imagery of actual firing tends towards the value one, therefore towards some identity. All subjects may be classified around this value; it is worth noting that subject distribution around this value corresponds to performance value. It seems that the better the subject, the closer his concentration/shooting or imagery/actual shooting ratio is to the theoretical value one. These results show the utmost importance of the quality of mental representation for performance improvement. It can be supposed that subject classification above the theoretical value one corresponds to overflowing emotional reactivity in one of the two phases and that this interferes with accuracy; a placing below the theoretical value one shows a lack of similarity between mental representation and the action.

Hall & Hardy (1991) reported that Transcendental Meditation practice did not improve pistol shooting in ten 18-23 year old students over a four-month period. One could question whether pistol shooting qualifies as a “cognitive” measure. It usually would be classified as a perceptual-motor task. In any event, the small number of subjects

gives the study very little statistical power, and it is not clear how regular the subjects were in their meditation practice. On a personal note, my rifle marksmanship improved markedly after learning to meditate, but was only “post-tested” after a few years of regular practice.

Desiraju (1990) studied through EEG that claims that Transcendental Meditation has no special effects. It in no way shows or implies that the Transcendental Meditation technique has negative effects. His results appear to be due to a lack of understanding that the practice of the Transcendental Meditation technique is a dynamic process, not a single state. It has different phases: thoughts, inner silence (transcendental consciousness), sometimes sleep and dream states. When these different phases are averaged, no special effects might be seen. However, many researchers that have discriminated between the different phases of Transcendental Meditation practice have found unique effects, particularly during the transcendental consciousness phase.

Gail Kendall et al. (1990) examined a study to investigate the effects of an imagery rehearsal, relaxation, and self-talk package on the performance of a specific defensive basketball skill during competition. For this purpose four female intercollegiate basketball players were selected as subjects. The subjects were evaluated on a single-subject multiple baseline across individuals design. The result of the study shows that the intervention package was clearly effective in enhancing a basketball skill during games, and social validity measures were very positive.

Hall, Rodger & Barr (1990) investigated a study on “The use of imagery by athletes in selected sports”. For this purpose 381 male and female participants from six sports were selected as subjects. The sample comprised competitors in the sports of

football, ice hockey, soccer, squash, gymnastics, and figure skating. The subjects were assessed by administering a 37-item questionnaire regarding the use of imagery in their respective sports. As the result athletes reported using imagery more in conjunction with competition than with practice. The motivational function of imagery was found to be important, but no substantial differences were evident between how athletes employ visual and kinesthetic imagery or how they use internal and external imagery perspectives. Athletes also indicated that they do not have very structured or regular imagery sessions. The level at which athletes were competing was found to influence imagery use. The higher the competitive level, the more often the athletes reported using imagery in practice, in competition, and before an event.

Alexander et al. (1989) randomly allocated 73 elderly volunteers from residential homes, a nursing home and a housing complex for the elderly to four treatment groups using stratification by Dementia Screening Test (DST) scores. For 3 months volunteers practiced TM, mindfulness training (MF) comprising structured and creative mental activities, mental relaxation (MR) involving sitting with eyes closed and repeating a self chosen syllable, or no treatment waiting-list controls. Planned comparisons indicated that the TM group improved the most, followed by MF, in contrast to relaxation and no treatment groups, on paired associate learning; two measures of cognitive flexibility; mental health; systolic blood pressure; and ratings of behavioral flexibility, aging, and treatment efficacy. The MF group improved the most followed by TM, on perceived control and Word fluency. After three years, survival rate was 100% for TM and 87.5% for MF in contrast to lower rates for other groups. The Canter and Ernst review classified this study as being "largely negative in outcome" based on non-significant pair-wise

comparisons between TM and the MR or MF groups. However, planned comparisons are statistically more powerful than pair-wise comparisons, because they predict a specific pattern of outcomes, and use all of the data in a holistic way. The fact that planned comparisons showed a highly consistent, positive effects for the TM group on cognitive measures, as well as in health-related measures, indicates that far from being "largely negative," this study was largely positive. In the very least, a fair review would have reported the outcomes from the planned comparisons.

Kember P (1985) randomly assigned 20 first year postgraduate engineering students to either a TM or a no-treatment control group and compared exam results before and after 6 months of practicing the technique. At pretest, the mean score of the experimental group was greater than the control group in four of nine subjects (44.4%), while at posttest the experimental group attained a higher average on 10 of the 12 subjects (83.3%). The posttest difference was statistically significant ( $p < .02$ ). When standard scores were considered, there were no significant differences between groups at pretest, but at posttest significantly more standard scores for the experimental group were greater than two standard deviations above the mean; five scores of the experimental group, compared with none for the control group;  $p = .03$ . Although this is small study, these are significant results, not "largely negative". In conclusion, on the whole, the randomized controlled trainings (RCTs) indicate very favorable effects of the Transcendental Meditation program on cognitive ability.

Robert Woolfolk, Mark Parrish & Shane Murphy (1985) conducted a study on "The effects of positive and negative imagery on motor skill performance". To achieve the purpose thirty college students were selected as subjects and they were tested on their

putting ability and randomly assigned into one of three experimental conditions: (a) positive imagery, (b) negative imagery, and (c) control. The subjects in the two imagery conditions were given the identical instructions for imagining the backswing and putting stroke. In the positive imagery group, subjects imagined the ball going into the cup, while subjects using negative imagery visualized the ball narrowly missing the cup. Subjects in the control group putted without instructions. On each of 6 consecutive days a 10-putt trial was conducted for each subject. All the collected data were analyzed through analysis of variance followed by post hoc test. The result of the study shows that there was a significant main effect on performance improvement for the experimental manipulation. Post hoc analyses showed significant differences among all groups, with positive imagery producing the most improvement, the control condition producing less, and negative imagery was resulting in performance deterioration.

Holmes (1984) studied a qualitative review of several meditation techniques combined together, claiming that meditation did not reduce somatic arousal any more than ordinary rest. A meta-analysis specifically on the Transcendental Meditation technique found that the technique differed significantly from ordinary rest on a number of physiological parameters (Dillbeck & Orme-Johnson, 1987).

Dillbeck (1982) investigated the effects of regular practice of the Transcendental Meditation technique on habitual patterns of visual perception and problem solving. The study was on 69 college students who were randomly assigned to two groups, one that waited two weeks before learning TM, and one that practiced passive relaxation twice daily for two weeks before beginning the TM technique. The third group, which was not randomly assigned, consisted of subjects from a psychology course who neither relaxed

nor practice the TM technique. This group served as a control for practice effects due to repeated measures of the task. It was specifically hypothesized that the TM technique involves a reduction of habitual patterns of perception and conceptual activation, resulting in (1) more effective application of schemata to new information and (2) less distracting mental activity during performance. This was predicted to result in improved task performance on task conditions in which either (1) habitual patterns of performance hinder or do not aid performance, or (2) habitual patterns aid performance. Subjects began the TM technique, relaxed, or added nothing to their daily schedules for a two-week period. The general hypothesis was supported for tasks of tachistoscopic identification of card and letter sequence stimuli, but not for the verbal problem-solving task of analog solutions. The results overall are consistent with the hypothesis that a reduction of conceptually driven mental activity during the TM technique results in improvement both on task conditions in which habitual perceptual schemata aid performance and on task conditions in which they either do not aid or actually hinder performance. Evidence was found for this effect both immediately after meditation and over a two-week period for the perceptual tasks.

Martha 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.

Yuille & Sereda (1980) did not find significant change on a variety of cognitive measures after three months of TM practice in 37 university student, compared to controls. However, there was a high drop out from the study. 43% of the TM subjects dropped out, leaving 21 remaining in the study, and of these only 61.9% were classified as "good" meditators, leaving only 13 good TM subjects. In addition, "good" was defined as practicing meditation only 60% or more of the time. Because of the small number of subjects who actually practiced the TM technique with any regularity, the study had very low chances of finding a result, if there had been one.

Mengel (1978) reported that Transcendental Meditation (TM) practice did not improve reading achievement in learning-disabled 10-15 year-old boys over a three-month period. This was a very small study (14 subjects practicing the TM technique) so it had very little power to detect a change if there were to be one (low statistical power). It is also not clear how regularly the students practiced TM. Also, three months is a very short time to expect change on such a higher order cognitive task as reading achievement, especially in learning disabled subjects, whose nervous systems may not have the



flexibility to change quickly. The authors actually state that more time may be needed to see a result. It was concluded: “As a result of a trend discerned from the data, extension in future studies beyond twelve weeks’ duration was recommended to further clarify and distill any potential effects which TM might have on reading achievements.”

Smith (1976) studied the effects on reducing trait anxiety. The investigator suggested that the person’s expectation of reduced anxiety, plus sitting with eyes closed reduced anxiety. However, a meta-analysis of over 149 studies by Eppley et al, 1989, which included the Smith study, and controlled for expectation and demand characteristics, found that the Transcendental Meditation program had more than twice the effect size in reducing anxiety as Progressive Relaxation, Benson's technique, concentration meditation, Sanskrit mantra meditation with permissive attitude, EMG biofeedback, and placebo techniques. This study also controlled for a number of other possible confounding variables, including amount of time meditating, regularity of meditation, population, age, sex, experimental design, duration and hours of treatment, pretest anxiety, experimenter attitude, type of publication, and attrition. These controls did not alter the overall conclusions. The difference in effect size between the Transcendental Meditation program and other treatments was maintained both when only published studies were included and when only studies with the strongest design were included.

Pelletier (1974) randomized 40 volunteers at a TM introductory meeting to either meditation or a sitting quietly control group. All subjects wanted to start TM and the controls agreed to delay learning the technique for three months. The Auto-kinetic Test measures the apparent (illusory) movement in a small point of light which subjects view

through a tube, and which they are required to draw. The Embedded Figures Test requires subjects to discriminate a simple figure embedded in a more complex one. The Rod and Frame test measures the ability to orientate a rod to the vertical when viewed in a tilted square frame, in a darkened room. The three tests are designed to place subjects on the continuum of field independence – field dependence, a measure of cognitive style. Field independence is characterized as an analytic style of perception, associated with greater cognitive clarity and a greater ability to structure experience. After 3 months of practice, mediators showed increased field independence on all three tests. This effect on field independence was replicated by So and Orme-Johnson (2001).

Reddy, Lakshmi & Rao (1974) experimented RCT was with young Indian athletes during pre-season training at a coaching center. From 34 athletes who attended an introductory lecture and showed an interest in learning TM, 15 were randomized to the experimental group who learned and practiced TM twice daily for 6 weeks, and 15 to a control group who spent a daily equivalent time in eyes-closed or supine rest according to their own preference. The meditators improved significantly on intelligence compared to controls ( $p < .001$ ). They also improved significantly compared to controls on agility, running speed, standing broad jump, reaction time, cardiovascular efficiency, respiratory efficiency, systolic and diastolic blood pressure, and hemoglobin count. His pistol shooting can be considered a cognitive task, so could such measures as agility and reaction time. In this study, the meditators were known to practice the TM technique regularly.

Miskiman (1973) randomly assigned 120 students present at a TM introductory lecture to either learn and practice the TM technique or practice eyes-closed rest for 40

days. Groups were compared pre- and post- treatment for their ability to conceptually organize words (metals, professions, fruits, animals) during free recall, after an intervening period spent doing arithmetic. A greater degree of secondary organization was assumed if related items were recalled sequentially and clustered. Each of the 2 groups was further subdivided to have items presented in either a clustered or random order, and with 2, 4 or 6 minute delays before recall. The assessor was blinded to list type and group assignment of the subjects. There were no significant differences between groups at pre-test but after 40 days of practice, the TM group showed significantly higher clustering in recalled items, and better performance in the intervening arithmetic tasks. The mean Index of Clustering over the 6 test conditions increased by 45% from pre-test to post-test in the TM group compared to 9% in controls. The difference between groups was more marked for the randomly presented lists and with longer delays. Mean scores for the arithmetic filler task increased by 12% in meditators compared to 1% in controls.

## **2.6 STUDIES RELATED TO PSYCHOLOGICAL SKILL OF HOCKEY PLAYERS**

Wimshurst, Sowden, & Cardinale. (2012) conducted a study to assess visual skills of Olympic hockey players and analyze differences by playing position, and to analyze improvement of visual skills after training, 21 Olympic field hockey players were pre-and post-tested on 11 visual tasks following a 10-wk. visual training program consisting of computer-based visual exercises. There were no mean differences at pre-test between players of different positions, suggesting that performance on these visual skills was independent of playing position. However, after training, an improvement was seen in all players (when scores were averaged across all 11 visual tasks) with goalkeepers

improving significantly more than any other position. This suggests the possibility of improving visual skills even in an elite population.

Eloff, Monyeki & Grobbelaar. (2011) conducted a study to determine student field hockey players' perceived need for mental skills training (MST), and their perceptions regarding their ability to prepare psychologically for matches, as well as to compile a general profile of their psychological skills for the total group and by gender. A total of 197 (91 men and 106 women) South African field hockey players at tertiary institutions who participated in the University Sport of South Africa (USSA) tournament, took part in the study. The subjects completed two standardized sport psychological questionnaires (the Psychological Skills Inventory (PSI) and the Ottawa Mental Skills Assessment Tool-3 (OMSAT-3). Descriptive statistics, t-tests and frequency analyses were calculated using SPSS for Windows (Version 3.1). The results from the PSI questionnaire showed poor values for skills such as goal directedness, activation control, maintaining self-confidence, concentration and imagery among the total group. Significant gender differences in which the male subjects performed better than the females were observed for concentration, achievement motivation and activation control. The highest mean scores on the OMSAT-3 were found for goal setting, self-confidence and commitment. Significant gender differences were observed for goal setting and commitment (in which the females performed better than the males), whilst the males fared better than the females in stress reaction. The participants in the study perceived MST as an important tool to enhance performance in field hockey. From these results, it can be recommended that sport psychologists and other role players in field hockey pay more attention to the development and implementation of MST programmes.

Mark Holland et al. (2010) focused on a study with two aims: (a) to examine the perceptions held by youth athletes regarding the mental qualities they need to facilitate their development and (b) to investigate the mental techniques used by these athletes. Forty-three male youth rugby players participated in a series of focus groups. Inductive content analysis revealed 11 categories of psychological qualities, including enjoyment, responsibility, adaptability, squad spirit, self-aware learner, determination, confidence, optimal performance state, game sense, attentional focus, and mental toughness. Techniques employed included personal performance strategies, reflection on action, taking advantage of a supportive climate, and team-based strategies. Findings are discussed in relation to their implications for mental skills training program development and evaluation in the case of youth elite team sport athletes.

Osborn, Blanton, & Schwebel DC (2009) conducted a study on the roles of individual differences in personality and temperament on athletic injury has lagged. We hypothesized that professional athletes with high sensation-seeking and extraversion scores, and with low effortful control scores, would experience more injuries over the course of a season, would have more severe injuries, and would miss more total days of play. The methodology adopted was Prospective design with questionnaire report at time one and injury tracking throughout an 18-week athletic season. Setting: Professional hockey team in the United States. To achieve the purpose eighteen professional hockey players (ages 21-33) were selected. Players completed self-report personality (Sensation-Seeking Scale, Form V) and temperament (the Adult Temperament Questionnaire) measures. Quantity and severity of injury, as well as playing time missed, were tracked for 18 weeks. The results shows that, on

average, players experienced almost 6 injuries causing a loss of 10 playing days through the season. Those players scoring high on Boredom Susceptibility and Total Sensation-Seeking incurred more total injuries. Those scoring high on temperamental neutral perceptual sensitivity suffered more severe injuries. It was concluded that athletes who suffered more injuries reported a preference for stimulating environments and boredom with non-stimulating environments. Injury severity was not correlated with sensation-seeking but was related to temperamental perceptual sensitivity. Implications for identification of injury-prone athletes, pre-injury training, and post-injury treatment are discussed.

Carre, et al. (2006) investigated a study on pre-competition physiological and psychological states of elite hockey players in the home and away venues. Physiological measures included salivary cortisol and testosterone, which were assessed using enzyme immunoassays. In addition, pre-competition psychological states were assessed using the Competitive State Anxiety Inventory-2. Physiological measures indicated that the players had significantly higher pre-game testosterone when playing in their home venue as compared to their opponents' venue ( $t(13)=2.29$ ,  $p=0.04$ ); however, this difference was not due to a pre-game rise in testosterone while competing at home. Furthermore, players showed a trend toward higher pre-game cortisol when playing in their home venue ( $t(13)=1.96$ ,  $p=0.07$ ). Psychological measures indicated that players were more self-confident when playing in their home venue ( $t(13)=2.8$ ,  $p=0.008$ ) and also had higher somatic ( $t(13)=2.3$ ,  $p=0.02$ ) and cognitive anxiety ( $t(13)=1.87$ ,  $p=0.04$ ) when playing in their opponents' venue. The present study supports the notion that there are differences in pre-

competition hormonal and psychological states that may play a key role in the "home advantage".

Sunderland et al. (2006) conducted a study on test retest reliability of field hockey skill test. Thirty-nine (20 male and 19 female) well-trained university field hockey players volunteered to participate in the study. The reliability of the in house designed test was determined by repeating the test (3 - 14 days later) following full familiarisation. The validity was assessed by comparing coaches ranks of players with ranked performance on the skill test. The mean difference and confidence limits in overall skill test performance was 0.0 +/- 1.0 % and the standard error (confidence limits) was 2.1 % (1.7 to 2.8 %). The mean difference and confidence limits for the "decision making" time was 0.0 +/- 1.0 % and the standard error (confidence limits) was 4.5 % (3.6 to 6.2 %). The validity correlation (Pearson) was  $r = 0.83$  and  $r = 0.73$  for female players and  $r = 0.61$  and  $r = 0.70$  for male players for overall time and "decision making" time respectively. It was concluded that the field hockey skill test is a reliable measure of skill performance and that it is valid as a predictor of coach-assessed hockey performance, but the validity is greater for female players.

Jones, Mace & Williams (2000) examined the relationship between the emotions experienced by 15 international hockey players, both immediately before and during competition, and their performance levels. Data were collected on the players' emotional states using a revised version of the Feelings Scale of Butler, which was completed retrospectively after the match was played. Players reported more annoyance and less tension during the match than before. A logistic regression correctly classified 70.2% of players from the emotional ratings immediately before the match and 85.1% of the

players from the ratings during the match as either a good or poor performer. Those individuals who performed well retrospectively reported feeling Nervous and 'Quick/Alert/Active' before the game and Confident and Relaxed during the game. The results indicate that emotions fluctuate over the competition period, and in long duration sports assessment of emotion during competition predicts variation in performance better than assessment prior to competition.

Bakker & Kayser (1994) studied the effect of a mental training programme on several psychological variables and field hockey performance (penalty stroke) was evaluated in this study. Twenty-nine female hockey players, playing at subnational level, were divided into an experimental, a placebo-control and a control group. Subjects in the experimental group received instruction on how to relax, concentrate and imagine making penalty strokes. They also received an audio tape containing these mental training instructions, and were asked to listen to it every day for about 10 minutes over a period of seven weeks. The hockey performance of the experimental group was significantly better on the third test occasion than that of both control groups. Competitive state anxiety prior to performing penalty strokes did not differ between the three groups. However, at the end of the experiment, the experimental group reported feeling more confident, more relaxed and better concentrated when making penalty strokes than subjects in either placebo-control or control group. Subjects in the experimental group attributed their feelings to listening to the audio tapes.

Hermiston, Gratto & Teno (1979) investigated a study to compare the test result times of 3 different hockey skills with the individual player ratings of coaches. By making these comparisons to the control rating, each test was evaluated as a predictor



of hockey ability. The hockey players were all between the ages of 12 and 20 years of age and all 90 players were competitive team players. The three hockey skills tests were: the Illinois Agility Skate, the Finnish Skills Test, and the Hermiston Hockey Ability Test. Each player was allowed 3 trials and the best times were recorded in all cases. The preliminary results indicate that the Hermiston Hockey Ability Test was the best predictor ( $r = .7$ ) with the results of the other two tests showing a coefficient of correlation of approximately 0.5. It was therefore concluded that in a competitive team of hockey, players' ability can best be assessed by using the Hermiston Hockey Ability Test. The two other tests were not as successful in their prediction of ability when compared to the criterion variable of coaches' ratings.

## **2.7 SUMMARY OF THE LITERATURE**

The collected literature shows that there was a significant change in cognitive abilities, competitive anxiety, mood states, game skill and playing ability due to psychological trainings. From the review of related literature, it was found that there was a scope for research in choosing the relaxation trainings on selected cognitive abilities, competitive anxiety, mood states, game skill and playing ability among inter collegiate hockey players. Based on the experience gained, the investigator formulated suitable methodology to be adopted in this research, which is presented in chapter-III.