Design

Experimental design was used to examine the influence of mental imagery on psychological attributes i.e. flow states, intrinsic motivation, sport confidence, concentration as well as on sport performance. Two comparable groups had been formed and were randomly assigned to experimental and control group. The experimental group was made to undergo mental imagery package, whereas control group did not receive any intervention. Since, the study has been conducted on four different group of subjects i.e. two football and two hockey groups, each group of subjects was divided into two equivalent groups on the basis of odd and even ranks.

Sample

Sample of the study included 52 football and 47 hockey players (N=99) who were screened out of 122 players (65 football & 57 hockey players) on the basis of their ability to imagine, using movement imagery questionnaire (Hall & Martin, 1997). Only the players with adequate ability to imagine were included in the final sample and then their individual ranking was obtained from their coach on the basis of their past performance and skill level. After ranking all the players, odd and even ranks were split into two groups and then both the groups were randomly assigned to experimental (n = 49) and control group (n = 50). The football group (1) included 20 players (screened from 26 players) and the football group (2) included 32 football players (screened from 39 players). The hockey group (1) included
25 players (screened from 30 players) and the hockey group (2) included 22 players (screened from 27 players).

**Figure C - Sample specification**

**Tools Used**

**Movement Imagery Questionnaire – Revised** (Hall & Martin, 1997) was used to assess each participant's ability to imagine. It is a 7-point rating scale ranging from 7= 'very easy to see' to 1= 'very hard to see' on visual imagery subscale ranging from 7= 'very easy to feel' to 1 = 'very hard to feel' on kinesthetic imagery subscale. High scores indicated high ability to visualize and to actually feel the movement being imagined. The test-retest coefficient for the MIQ is .83 for a 1-week interval (Hall, Pongrac, & Buckolz, 1985). Similarly, Atienza et al. (1994) reported internal
consistency of .89 for the visual subscale and .88 for the kinesthetic subscale of the MIQ.

**The Flow State Scale** (Jackson & Marsh, 1996) was used to assess the intensity of the flow state experienced. It is a 36-item questionnaire based on a 5-point Likert type scale ranging from 1 = ‘strongly disagree’ to 5 = ‘strongly agree’ on nine subscales of flow state. Internal consistency estimates for the nine subscales were reasonable (alpha M = .83) for administration of the scale to 394 athletes. Confirmatory factor analyses supported the validity of nine subscales in measuring flow state.

**The Carolina Sport Confidence Inventory** (Manzo, Silva & Mink, 2001) consists of 20 items designed to assess sport confidence. A four choice structured response is used, ranging from 4= ‘very true for me’ to 1= ‘somewhat true for me’. Each response choice is assigned a numeric value 1 to 4. The test-retest reliability after three weeks of initial administration of CSCI was 0.94. The evidence for convergent validity is indicated through its correlation with Vealey’s (1986) trait sport confidence inventory, r = 0.77, p < 0.01.

**Intrinsic Motivation Inventory** (McAuley, Duncan, and Tammen, 1989) 37-item version of the inventory was used to assess participants’ intrinsic motivation, with four subscales: interest/enjoyment, perceived competence, effort, and pressure/tension. The pressure/tension scoring was reversed in order to calculate the composite scores because the sub-scale is negatively
related to intrinsic motivation. It measures intrinsic motivation on 7 point Likert type scale ranging from 1 = 'not at all true' to 7 = 'very true'. McAuley, Duncan, and Tammen (1989) did a study to examine the validity of the IMI and found strong support for its reliability and validity.

**Thought Occurrence Questionnaire** (Sarason et al., 1986) was used to assess the amount of distracting thoughts while performing which hamper the level of concentration. It consists of 28 items which are measured on 5 point Likert type scale ranging from A = ‘never’ to E = ‘very often’. TOQ has acceptable factorial validity and the reliability coefficients ranged from 0.77 to 0.88 among the adolescent individual and team athletes.

**Post Experimental Questionnaire (PEQ):** - Post experimental questionnaire was designed to assess the perceived effectiveness of experimental manipulations.

**Skill & Performance Measurements:** - McDonald Soccer Skill Test (1951) was used to assess accurate kicking, ball control and judgment of a moving ball in soccer. The test was constructed on college men and the validity coefficient of the test ranged from 0.63 to 0.94. Friedel Field Hockey Skill Test (1956) was used to assess hockey skills like pass receiving, fielding and drive while moving. The reliability coefficient of the test ranged from 0.77 to 0.90.

In order to assess performance of the participants, football and hockey matches were organized between the imagery and control groups
separately for each group of subjects. Since there were two football and two hockey groups, two football and two hockey matches were organized. There were three criteria for performance measurement, (I) the number of times each group’s team crossed the line and entered into the oppositions half along with the ball. (II) Number of times the players carried the ball near to the opposition’s goal area. (III) Finally, number of goals scored by each team.

**Procedure**

Experimental design was used in order to examine the impact of mental imagery package on sport performance and psychological attributes i.e. flow states, intrinsic motivation, sport confidence and concentration. The study was conducted on four different groups including two groups of football players and two groups of hockey players at four different places.

Football group (1) was obtained from the department of physical education, Punjabi University, Patiala. Initially 26 players were contacted into the ground. Their coach introduced the experimenter to the players. After taking their consent, movement imagery questionnaire was administered in order to assess their ability to imagine. Before second visit a list of 20 screened players was prepared. The list was discussed with their coach and the coach was requested to rank all the 20 screened players keeping in view their previous performances.
Football group (2) was obtained from the Physical Education College, Patiala. Their coach introduced the experimenter to 39 players. Their consent for participation in the research work was taken and the movement imagery questionnaire was administered in order to assess their ability to imagine. A list of 32 screened players was prepared and it was discussed with their coach so that he may rank all the 32 screened players according to their previous performances.

Both the screened groups were divided into two comparable groups by taking odd rank players in one group and even ranks in another group and then randomly assigned to control and experimental group. They were assessed on their soccer skills using soccer skill test, as an additional measure, in order to cross check and have clear view of the comparability of both the groups on the basis of their soccer skills (refer to Table 5).

Hockey group (1) was obtained from the Khalsa College, Patiala. In the beginning 30 players were asked to come to the ground and they were introduced to the experimenter. Their consent for participation in the research work was taken and the experimenter administered them movement imagery questionnaire in order to assess their ability to imagine. 25 players were screened and the coach was requested to rank them on the basis of their previous performances.

Hockey group (2) consisted of 27 players and it was obtained from the National Institute of Sports, Patiala. Their coach introduced the
experimenter to the players. The players were asked for their consent to participate in the research. Their ability to imagine was assessed through movement imagery questionnaire. A list of 22 screened players was prepared before second visit. The coach ranked these 22 screened players depending upon their previous performances.

In order to make comparable groups, all the screened hockey players were divided into two groups through taking odd and even rank players and then randomly assigned to control and experimental group. Each player from both the groups was assessed on their hockey skills using hockey skill test, as an additional measure, in order to cross check the comparability of both the groups on the basis of their hockey skills (refer to Table 5).

The players were told by their respective coaches that we have made two teams i.e. team A & team B. There would be competition between both the teams after few days and asked both the team to meet the experimenter. The experimental group was asked to come to the relaxation room daily in the evening. The experimental group was exposed to mental imagery package of 15 to 25 minutes duration daily for 10 to 15 sessions. Most of the players participated daily, minimum of 10 and maximum of 15 sessions were attended by each participant.

The imagery script was finalized through conducting a pilot study. During the pilot study after every imagery session, players were encouraged to provide feedback without any hesitation about how was their experience.
About any word which hampered the flow of their imagination or any word which they could not understand during the session, about the speed of instructions, appropriateness of the duration of pauses used during instructions and subsequent changes were made accordingly in the final imagery script. There were four phases of the mental imagery package.

**Phase I** was designed to produce relaxation through deep breathing. Players were asked to remove their shoes and lay down on the carpet. The duration of the phase I ranged from 2 to 5 minutes. During this phase the participants were instructed as “*Get into a comfortable position and close your eyes. Focus on the center of your body and take deep breath. With each inhalation imagine that you are pulling all the tension from your body into your lungs. With each exhalation, imagine that you are releasing all of the tension and negative thoughts from your body. Continue this breathing, becoming more focused and confident (60 seconds)*…” The whole process was demonstrated to the players and they were made to relax comfortably.

**Phase II** was designed to induce imagination related to warm up activities as “*imagine that you are going toward a ground to take part in a competition. Other players are also entering into the ground. Ground is full of green grass. There is coolness in the air. You hear the audiences’ noise. They are cheering the players. All the players of your team are getting ready for the match. Players are doing warm up exercises. Presently you are doing intensive warm up activities for a while (60 seconds)*…”
**Phase III** of the mental imagery package was designed in such a way so as to provide imagination of their game/event, simultaneously improving their psychological strengths i.e. flow states, intrinsic motivation, sport confidence and concentration. Players were instructed during phase III as “imagine that your coach is giving final instructions to the team before the beginning of the match. All the players are going towards the centre line. Both the teams are standing in front of each other. Players are shaking hands with the players of opposite team and taking their respective positions into the ground. The match referee is standing in the centre of the ground holding a ball in his hands. The coin is tossed to decide which team will kick/hit the ball first. The referee is putting the ball on the centre of the ground. The moment the referee whistles, the toss winning captain kicks/hits the ball hard and the game has started... Good, you are playing the game with enthusiasm and confidence. You are enjoying each moment of the game. See the ball moving from one player to the other and audience enjoying the game by clapping and supporting their respective team... Good, now your team mate passes the ball to you. You receive the ball while running. The opponent is trying to take away the ball from you. You are fighting hard while believing in yourself that you can beat him. You have successfully carried the ball forward beating the opponent. You feel lot of energy in yourself. The moment two opponent players try to attack you for the ball, you quickly sense the situation and shift your attention toward the nearest team
mate and pass the ball to him. He carries the ball forward towards the goal, and you are running parallel to him. He is confronted by the opponent defenders and quickly releases the ball towards you. You focus your attention on the goal keeper and the players around and kick/hit the ball with lot of power a bit away from the goal keeper right into the goal.

The whole ground is thrilled with your kick/hit. You are running into the ground with lot of excitement, spreading your arms around, your team mates are running towards you to cheer you up. They are jumping into the ground and hugging you. You are filled with full of confidence and satisfaction. Imagine those pleasant moments for a while (30 seconds)... That’s nice; feel that you are totally involved into the game. You are feeling as if the time has stopped. You are thinking only and only about the game. You are kicking/hitting the ball with lot of confidence. You are feeling a great sense of control over your movements. You are feeling as if your movements are performed automatically. You are feeling as if your skills are matching up to the challenges that you are facing. You are really enjoying participating in the game.

Good, now the opponent player is running with the ball near to you, you attack him with full force and take away the ball from him. You are running fast with the ball, suddenly one opponent kicks/hits the ball away from you. For a while you get tensed, but you take a deep breath and remind your self to stay focused, and refocus your attention on the game. You are
again playing with same intensity and freshness. One of your team mates passes the ball towards you, opponent player tries to come in front of you, you get alert and run forward to receive the ball and do it successfully. You are running forward along with the ball, again one player suddenly attacks you, this time you kick/hit the ball towards your team mate before the opponent could do any thing. You are running fast just near to the opposition’s goal area, but four opponent players are around you. Your team mate kicks/hits the ball with full force toward the goal, but the ball is moving towards the goal keeper’s hands. You come forward and slightly change the angle of the ball with soft flick of feet / of your stick. Now, the ball is moving quickly near to the pool and entering into the goal. That’s great! Your team has done it again.

(Insert - The whole ground is thrilled with your kick/hit ……………. You are really enjoying participating in the game).

Very good, now the ball is near to your goal. Opponents are trying hard to score a goal. You are trying to save the goal. You are fighting hard with the opponent and kick/hit the ball high in the air to other half of the ground. There your team mates carry the ball near to opposition’s goal. The pressure is suddenly, shifted from your team to the opposition. Your team mate is fighting hard to score a goal near to goal area. As he kicks/hits the ball towards the goal one of the opponents kicks/hits it out near to the goal area while trying to save the goal. Your team has received a penalty corner.
One of your team mates is standing at the corner to play that penalty kick/hit. You are standing just in front of the goal surrounded by opponent players. Your team has got another opportunity to score a goal. These are last few minutes of the game. Your team mate kicks the ball very hard at head height towards the goal from the corner and you jump into the air to move the ball into the goal with a beautiful header / Your team mate hits the ball towards you from the corner, one of your team mates stop the ball and you hit the ball beautifully with full power into the goal. That’s awesome! You have done it.

(Insert - The whole ground is thrilled with your kick/hit .................. You are really enjoying participating in the game). Good, take a deep breath and slowly open your eyes”

**Phase IV** involved taking feedback from the participants regarding the extent to which they felt sense of relaxation during the process of mental imagery. They were asked about how much the intervention helped them in perceiving a balance between their skills and the challenges they have. They were inquired regarding how mental practice is contributing towards their interest into their game. They were also asked to provide feedback regarding the extent to which mental imagery facilitated their concentration and confidence.

After three weeks a football/ hockey match, separately for all the four groups, was organized between both teams in the presence of their coach.
Required readings were taken during the match. At the end of the match both groups were asked to complete four measures that were aimed at assessing their flow state, intrinsic motivation, confidence, and concentration. At the end of the experiment they were asked to fill Post Experimental Questionnaire and were debriefed about the purpose of the experiment.

Multivariate Analysis of Variance (MANOVA) was applied to analyze the significance of difference between experimental and control group on dependent measures i.e. flow states, intrinsic motivation, sport confidence and concentration. Significance of difference (t-test) between experimental and control group on the items of the post-experimental questionnaire was analyzed to see as to what extent experimental manipulations were successfully made. Chi-square test was used to analyze the performance differences between experimental and control group. Football and Hockey skills were analyzed through t-test.