Researchers’ interest in mental imagery is as old as the beginning of research in psychology. The great philosopher Aristotle referred to the Greek word *phantasia* as synonymous to imagery. In a brief discussion dedicated to imagination, Aristotle identified it as “*that in virtue of which an image occurs in us*”, that he used for referring to a broad range of activities involved in thoughts, dreams, and memories. James (1890) observed that, *through imagination, people can learn to skate in the summer and swim in winters.*

However, way back in the beginning of 20th century, known psychologist J. B. Watson regarded mental images to nothing more than “mere ghosts of sensations” (Watson, 1913). He questioned the scientific reality of imagery. His judgment and behavioristic orientation led to relegation of mental imagery and other mentalistic concepts to the background of the psychological scene. Between about 1920 and 1960, imagery received minimal scientific attention. Working in the rival phenomenological philosophical tradition, Jean-Paul Sartre (1948) questioned the cognitive role of imagery and the notion of mental pictures. He argued that an image "teaches nothing".

A revival of research on imagery was an important element of the cognitive revolution of 1960s and 70s, contributing greatly to the rising scientific interest in mental representations. Seemingly, this revival initially stemmed largely from applied psychology research on sensory deprivation and on hallucinogenic drugs (Holt, 1964). Another important catalyst was
Yates' (1966) seminal historical work on the significance of imagery. Once the powerful mnemonic properties of imagery were experimentally confirmed (Paivio, 1971), imagery could no longer be dismissed by psychologists. Interest was heightened during 1970s, by the stunning "mental rotation" experiments of Shepard and his students (Shepard and Cooper, 1982), and experiments by Kosslyn (1980) demonstrating "mental scanning" and related effects. This work was taken to show that imagery is involved in visual-spatial reasoning, and has inherently spatial properties. For the sake of present research the related literature has been reviewed under following headings:-

**Factors influencing mental imagery.**

- **Personal factors.**
  - Imagery perspective.
  - Ability to imagine.
  - Expertise level.
  - Speed of imagination.
  - Personality type.

- **Contextual factors.**
  - Level of competition.
  - Imagery direction.

- **Environmental factors.**
  - Season.
Factors influenced by mental imagery.

• Psycho-physiological factors.
  - Muscular activity.
  - Spinal activity.
  - Autonomic Nervous System activity.
  - Areas of brain.
  - Heart rate.

• Sport performance related factors.
  - Acquisition of skills.
  - Sport performance.

• Psychological factors.
  - Anxiety.
  - Self efficacy.
  - Flow state.
  - Intrinsic motivation.
  - Concentration.
  - Sport confidence.

Researches found various personal, contextual, and environmental factors which influence effectiveness and use of mental imagery in sports. Researchers explored various personal factors like internal versus external
perspective, ability to imagine, expertise level, and speed of imagination to influence the outcome of mental imagery.

**Imagery perspective:** Adopting either internal or external perspective during imagination could influence the outcome of mental practice on sport performance (Harris & Robinson, 1986; Spittle & Morris, 2007; Nordin and Cumming, 2008). Harris & Robinson (1986) designed a study for 36 karate students to determine if muscular innervations during imagery were specific to muscles needed for actual performance and if individuals of different skill levels utilizing two imagery perspectives (internal/external) demonstrated differing amount of muscular activity. It was found that skill level influenced muscle innervations during imagery and these innervations appeared specific to the muscle group necessary to execute the task. Internal imagery produced more EMG activity than external imagery. Spittle & Morris (2007) explored use of internal and external imagery perspectives during imagery of open and closed sports skills using Imagery Use Questionnaire on 41 physical education students. Participants experienced more internal imagery than external imagery while imagining, but there was no significant difference between perspective use on the open and closed skills. Nordin and Cumming (2008) examined the moderating effect of imagery perspective on perceived effectiveness of five imagery types in serving specific functions on 155 athletes from 32 sports. It was found that MG-M imagery was perceived to be the most effective imagery type for
motivational functions. The relationship between frequency and effectiveness was not moderated by imagery perspective, however, athletes who imagined more frequently found imagery more effective and easier to do.

**Ability to imagine:** Researches revealed that ability to imagine influenced the outcomes of mental imagery (Campos, Pérez-Fabello & González, 1999; Robin, et al., 2007; Hare, Evans, & Callow, 2008). Campos, Pérez-Fabello & González (1999) investigated 283 subjects to explore the effect of ability to imagine on the frequency of using mental images. Subjects with high self-assessed ability to form images used mental imagery spontaneously more often than those with low self-assessed imaging ability. Robin, et al. (2007) examined how ability to imagine could affect motor improvement following motor imagery training in tennis using pre-post design. Results indicated that motor imagery improved service return, and that this improvement was better in good imagers than in poor imagers. Hare, Evans, & Callow (2008) explored the perceived effect of personal and situational variables, perception of pain, and ability to imagine on the function and outcome of an Olympic athlete’s use of imagery through Semi-structured interviews. Findings highlighted the perceived effect of personal and situational variables and ability to imagine on the athletes’ response to injury.

**Expertise level:** Munzert et al. (2008) studied accuracy of mental duration as a function of expertise level in a total of 45 participants of varying
expertise (novices, intermediates, and experts from national leagues). Results indicated a systematic reduction of mental duration for all expertise levels. Although task experience reduced mental timing errors, this did not depend on expertise itself. It was argued that exact mental durations of badminton rallies were not an essential part of the mental routines used by athletes, because varying conditions offered visual cues that could be used to anticipate play.

**Speed of imagination:** Researchers realized that motor imagery (MI) duration is closely linked to actual motor action duration. Louis et al. (2008) in 2 experiments investigated the effect of changing motor imagery speed on actual movement duration over a 3-week training period. Findings revealed that athletes increased/decreased their well-rehearsed actual movement times after MI training at a slow/fast speed. The effect of MI on actual speed execution supported the ideomotor theory because anticipation of sensory consequences of actions was mentally represented.

**Type A Behavior Pattern:** Howton, Lindoerfer & Marriott (1998) explored the relationship between Type A Behavior Pattern, visual imagery, and ability for time estimation in 115 subjects. Subjects with training in visual imagery representation estimated time accurately; Type A subjects with training in visual imaginary representation were the most accurate. All subjects improved over the four trials, with greatest improvement following
training in visual imaginary representation. The most consistent improvement in time estimates occurred in Type A subjects.

Researchers focused on contextual factors like level of competition (Hall, Rodgers, & Barr, 1990; Cumming & Hall, 2002; Nordin et al., 2006; Watt, Spittle, Jaakkola, & Morris, 2008) & imagery direction (MacIntyre & Moran, 2007) as a source to moderate the effectiveness of mental imagery in sport settings.

**Level of competition:** Hall, Rodgers, & Barr (1990) examined the use of imagery in relation to level of competition in sports with the sample of 381 male and female participants from six sports. Athletes reported using imagery more in conjunction with competition than with practice. The higher the competitive level, the more often the athletes reported using imagery in practice, in competition, and before an event. Cumming & Hall (2002) examined the influence of competitive level on 324 athletes’ use of mental imagery. The results indicated that national athletes perceived imagery to be more relevant to performing and reported using more imagery than regional level athletes. Nordin et al. (2006) examined imagery use by athletes within the deliberate practice framework. 150 athletes from three competitive levels (recreational, intermediate, and elite) were studied. It was found that elite and intermediate athletes used imagery more frequently and deliberately and perceived imagery to be more relevant and requiring more concentration than recreational athletes. Watt, Spittle, Jaakkola, &
Morris (2008) investigated use of imagery by 484 athletes at different levels of competition. A one-way multivariate analysis of variance revealed that there were significant differences among the four competitive levels on imagery use with the district level participants reporting significantly higher use of MG-A imagery than state and national level participants and national level participants reporting higher use of CS imagery than recreational level participants.

**Imagery direction:** MacIntyre & Moran (2007) used qualitative methodology to explore imagery direction (i.e., facilitative or debilitative) in elite sports performers. The sample comprised 7 participants from motor-sport, rugby, fencing and golf. Elite sample's experience of imagery direction seemed to be more complex than had previously been believed. For example, some athletes reported deliberately imagining errors in order to prepare for "worst-case" scenarios in competition.

**Environmental factors** were found to influence the effectiveness of mental imagery through *season and time* (Munroe, Hall, Simms, Weinberg, 1998; Weinberg et al., 2003).

**Season:** Munroe, Hall, Simms, Weinberg (1998) examined the influence of time of season (early vs. late) on athletes' use of imagery. Male and female varsity athletes representing 10 sports were studied. Results indicated that CS imagery significantly increased for fencing, field hockey, rugby, soccer, and wrestling. MS, MG-M, and MG-A imagery showed a significant increase
from times 1 to 2 for rugby, soccer, and wrestling. Most sports demonstrated a significant increase in MS imagery. For all sports, except badminton, CG imagery increased. Thus, imagery use changes during the competitive season, but this depends on the sport.

**Time:** Weinberg et al. (2003) studied 523 athletes to check when, and under what conditions, imagery was employed more frequently. Findings revealed that athletes used imagery predominantly before competition and in tough situations where pressure was high.

Mental imagery was found to influence different factors related to sport performance and related literature could be broadly categorized under three headings i.e. psycho-physiological researches, performance based researches, and psychological researches.

**Psycho-physiological researches**

Psycho-physiological researches mainly focused on the effect of imagery on the **muscular activity** (Jacobson, 1930; Hale, 1982; Tremblay, Tremblay, and Colcer, 2001; Hu & Wan, 2003; Pfurtscheller et al., 2006; Guillot et al., 2007; Lebon, Rouffet, Collet, & Guillot, 2008; Pfurtscheller et al., 2009), **Spinal activity** (Oishi, Kimura, Yasukawa, Yonedra, and maeshima, 1994; Kasai, Kawai, Kawanishi, and Yahagi, 1997; Bonnet, Decety, Jeanerod, and Requin, 1997; Slade et al. 2002; Hall, Raglin, and Koceja, 2003), and **autonomic nervous system activity** (Roure et al, 1998; Lotze, Scheler, Ten, Braun, and Birbaumer, 2003; Clark et al., 2004; Fourkas, Ionta, &
Aglioti, 2006; Crews & Kamen, 2006), different areas of brain (Romero et al., 2000; Lacourse, Orr, Cramer, & Cohen, 2005; Munzert, Zentgraf, Stark, & Vaitl, 2008; Lorey et al., 2009; Munzert, Lorey, & Zentgraf, 2009), and heart rate (Cumming, Olphin, & Law, 2007; Papadelis et al., 2007).

Muscular activity: Psycho-physiological research on the muscular activity that occurs during imagery has long history in sport psychology, and many studies have investigated it during imagery of motor tasks. In early 1930s Jacobson (1930) conducted series of studies comparing muscular activity during various imagined and executed activities, such as bending the arm, sweeping, climbing a rope, rowing, boxing, scratching, the chin, plucking a flower, combing hair, playing the piano and performing a biceps curl. He concluded that movement imagery produced increased activity of the muscles specific to the movement being imagined, but noted that the level of activity was considerably less than during actual movement. Hale (1982) attempted to replicate Jacobson’s findings by measuring EMG activity in the biceps brachial muscle and dominant-eye EOG activity during imagery of performing a biceps curl with a 25 lb weight. He found that internal imagery produced more biceps activity than external imagery. There was no significant effect for EOG activity. Tremblay, Tremblay, and Colcer (2001) found increased EMG and motor-evoked potential (MEP) activity in the quadriceps (agonist) but not biceps femoris (antagonist) during imagery of a leg extension, indicating that imagery was specific to the agonist muscle.
According to psychoneuro-muscular theory imagery produced muscular activity in the concerned muscle because imagery resembled to the actual movement in some respect.

Hu & Wan (2003) studied how imagined emotional valence could produce specific facial EMG activity. 36 subjects' facial electromyographic (EMG) activity at the zygomatic, corrugator, and levator labii (superioris/alaeque nasi) muscle regions were recorded while they were acting self-generated emotions of happiness, anger, fear, sadness, disgust, and surprise. It was observed that the negative self-generated emotions (e.g. anger, sadness, and fear) were associated with increased EMG activity of corrugator muscles and positive self-generating emotions (e.g. happiness and Surprise) with increased EMG activity of zygomatic muscles. Pfurtscheller et al. (2006) examined the reactivity of EEG rhythms (mu rhythms) in association with the imagination of right hand, left hand, foot, and tongue movement with 60 EEG electrodes in nine able-bodied subjects. During hand motor imagery, the hand mu rhythm blocked or desynchronized in all subjects, whereas an enhancement of the hand area mu rhythm was observed during foot or tongue motor imagery in the majority of the subjects. The discrimination between the four motor imagery tasks based on classification of single EEG trials improved when, in addition to event-related desynchronization (ERD), event-related synchronization (ERS) patterns were induced in at least one or two tasks.
Guillot et al. (2007) designed a study to gain insight into the mechanisms underlying motor imagery (MI). Thirty right-handed volunteers were asked to lift or to imagine lifting a weighted dumbbell using different types of muscle contraction, i.e. heavy concentric, light concentric, isometric and eccentric contractions. A significant increased pattern of EMG activity was recorded in all muscles during MI, when compared to the rest condition. The magnitude of this activation was found to be correlated to the mental effort required to lift a weight mentally, as more EMG activity was recorded during imaginary lifting of heavy than light concentric contractions. Lebon, Rouffet, Collet, & Guillot (2008) studied modulation of EMG power spectrum frequency during motor imagery. Thirty right-handed participants were asked to lift or to imagine lifting a weighted dumbbell under 3 types of muscular contractions, i.e. concentric, isometric and eccentric. The median frequency (MF) of EMG was significantly higher during the MI sessions than during the resting condition while the participants remained strictly motionless. Moreover, the MF during imagined concentric contraction was significantly higher than during the eccentric. Pfurtscheller et al. (2009) investigated the EEG of 15 patients with complete spinal cord injury during imagined right hand, left hand, and feet movements. Pair-wise discrimination functions were studied between the 3 types of motor imagery. The amount of accuracy obtained in all three types of imagery groups was; left versus right hand 65.03%, left hand
versus feet 68.19%, and right hand versus feet 65.05%. In 5 out of 8 paralegic patients, the discrimination accuracy was greater than 70% but in only 1 out of 7 tetraplagic patients.

**Spinal activity:** Studies had shown that imagery decreased spinal excitability (Oishi, Kimura, Yasukawa, Yoneda, and maeshima, 1994), had no significant effect on it (Kasai, Kawai, Kawanishi, and Yahagi, 1997), and increased it (Bonnet, Decety, Jeanerod, and Requin, 1997). Bonnet et al. (1997) measured spinal reflex and EMG activity during imagery and performance of putting pressure on a pedal with the foot. Imagery resulted in greater increase in spinal reflex and EMG activity in the movement leg than in the contra-lateral leg. At the spinal level the research is inconsistent (Slade et al. 2002). Hall, Raglin, and Koceja (2003) found that during imagery of planter flexion of the right leg, changes in reflex and EMG did not reflect the percent of maximal contraction being imagined. The reason for inconsistent findings of research related to spinal activity could be that imagery resembled the actual movement in some respect at muscular level but might not resemble that much at spinal level or it might need more specific information about the spinal activity which could be focused on during imagery session.

**Autonomic nervous system activity:** Recent researches focused on the effect of imagery on autonomic nervous system activity. In an experiment Roure et al, (1998) found six specific autonomic nervous system (ANS)
responses that correlated with mental rehearsal, thereby improving sports performance. The results revealed a strong correlation between the response in the actual physical tasks (both pre and post-test volleyball) and during the mental imagery sessions. There existed a difference in the skills between the imagery and the control group, the former being the better. In addition, no clear difference was present between the pre and post tests in the control group. This study showed that mental imagery induced a specific pattern of autonomic response. These included decreased amplitude, shorter duration and negative skin potentials when compared to the control group. As a consequence of the ANS, the imagery group was associated with better performance. In light of this experiment, Roure suggested that mental imagery might have helped in the construction of schema which could be reproduced, without thinking, in actual practice. Lotze, Scheler, Ten, Braun, and Birbaumer (2003) found that professional musicians generated higher EMG amplitude and greater activity in the primary sensory-motor cortex, parietal lobes, cerebellum, and right primary auditory cortex during actual movement. In imagery, professionals also had greater activation in motor areas; however the auditory-motor loop was not involved. So, during actual performance auditory motor systems were co-activated, but in imagery only the motor system was activated. Thus, during imagery almost similar kinds of motor evoked potential and muscular activity was generated as did during the actual motor
performance. Active imitation, imagery and observation produced motor evoked potentials (MEPs) facilitation (Clark et al., 2004). Fourkas, Ionta, & Aglioti (2006) investigated the influence of imagined posture and imagery modality on corticospinal excitability. Participants were asked to imagine the thumb-palm opposition movement. Facilitation of potentials recorded from hand muscle was higher during imagery carried out in mentally congruent than incongruent postures. However, Crews & Kamen (2006) investigated whether mental imagery training could reduce the detrimental effects produced by limb disuse and found that limb immobilization produces a decrement in the area of motor cortex dedicated to this muscle as a result of disuse. Imagery failed to ameliorate the disuse-related changes.

**Brain areas:** Recent researches explored how different type of imagery created activities in different brain areas. Romero et al. (2000) tested the functional equivalence hypothesis and found that patterns of electro-cortical activity associated with variations in the parameters of executed action were similar during motor imagery at supplementary motor/pre-motor area (SMA/PMA). Lacourse, Orr, Cramer, & Cohen (2005) designed an experiment to compare functional neuroanatomy associated with executed and imagined hand movements in novel and skilled learning phases using fMRI. In the novel phase, activations were more extensive during execution than imagery in primary and secondary cortical motor
volumes and the cerebellum, while during imagery activations were greater in the striatum. In the skilled phase, activation features within these same volumes became increasingly similar for execution and imagery.

Munzert, Zentgraf, Stark, & Vaitl (2008) compared activation overlap and differential activation during mental simulation (motor imagery) with that while observing gymnastic movements. A direct contrast between the motor imagery and observation conditions revealed stronger activation for imagery in the posterior insula and the anterior cingulate gyrus. The hippocampus, the superior parietal lobe, and the cerebellar areas were differentially activated in the observation condition. Lorey et al. (2009) investigated whether proprioceptive information on hand position is integrated similarly in first-person perspective (1PP) and third-person perspective (3PP) imagery of hand movements through fMRI scanning 20 right-handed female students. Results indicated stronger activation in left hemisphere motor and motor-related structures, especially the inferior parietal lobe, on 1PP compared with 3PP trials. Activation in the left inferior parietal lobe (parietal operculum, SII) and the insula was stronger in 1PP trials with compatible compared with incompatible posture. Thus, proprioceptive information on actual body posture was more relevant for 1PP imagery processes.

Munzert, Lorey, & Zentgraf (2009) viewed motor imagery as a window to cognitive motor processes and particularly to motor control. Mental
simulation theory (Jeannerod, 2001) stressed that cognitive motor processes such as motor imagery and action observation shared the same representations as motor execution. In general, behavioral data as well as fMRI data demonstrated that motor areas in the brain played an important role in motor imagery.

**Heart rate:** Cumming, Olphin, & Law (2007) examined self-reported psychological states and physiological responses (heart rate) experienced during different motivational general imagery scenarios of 40 competitive athletes. A significant increase in heart rate from baseline to imagery was found for the anxiety, psyching-up, and coping imagery scripts. Furthermore, the intensity of cognitive and somatic anxiety was greater and perceived as being more debilitative following the anxiety imagery script. Papadelis et al. (2007) evaluated effects of imagery training on cognitive performance and physiological parameters of 20 volunteers. The results revealed significantly higher performance level of the imagery-training group than the control group. Heart rate and respiratory rate significantly increased during imagery sessions compared to rest. A slight electromyographic activity was observed during the imagination of movement. The findings supported Lang's (1977) proposal that images containing response propositions, i.e. the response to the scene, could have produced a physiological response (i.e., increase heart rate). Moreover, coping imagery might have enabled the athletes to simultaneously
experience elevated levels of anxiety intensity and thoughts and feelings they perceived as helpful.

**Performance based researches**


**Motor skill learning:** Ryan & Simons (1981) examined cognitive demand, imagery, and frequency of mental rehearsal as factors influencing acquisition of motor skill learning. 39 male college students were assigned to physical practice (PP), mental practice (MP), or no practice (NP) groups. Results showed no difference in learning between MP and NP groups on the predominantly motor task, with the PP group significantly superior to both. On the predominantly cognitive task, however, the MP group performed as well as the PP group, and both were significantly superior to the NP group. Zecker (1982) examined the role of mental practice and knowledge of results (KR) in motor skill learning. Results suggested that (a) knowledge of
results is not always essential for improved performance; (b) mental practice was most beneficial following sufficient experience with the task; and (c) mental practice could be best suited for a massed practice learning situation. Brouziyne & Molinaro (2005) examined the usefulness of mental imagery for teaching golf technique to 23 beginner players. Analysis explored that the beginners’ approach shot performance improved most in the group combining physical practice and mental imagery when compared with the group just physically practicing the approach shot. Thus, it was established that mental training could be used effectively to improve performance even with beginners.

Gentili, Papaxanthis, & Pozzo (2006) studied 40 subjects and compared the improvement and generalization of arm motor performance after physical or mental training in a motor task. Findings had shown that after both physical and mental training on the right path (training path), hand movement duration decreased and peak acceleration increased for this path. However, motor performance improvement was greater after physical compared with mental practice. Fontani et al. (2007) tested the effect of imagery in the training of skilled movements. 30 subjects were instructed to perform an action (Ura-Shuto-Uchi) either by overt action or by mental imagery of the action that they had not previously learned. Findings revealed that in the action trained group, training had an effect on reactivity and movement speed, with a reduction of EMG activation and
reaction times. Moreover, muscle strength, power, and work increased significantly. The Mental Imagery group showed the same effects on muscle strength, power, and work, but changes in reactivity were not observed.

Caliari (2008) designed a study to explore whether mental practice is an effective preparation for performing a forehand task in table tennis. Results showed that the mental practice group that was focused on an external effect (e.g., the trajectory of the racket) of the movement directly related to the movement technique was more effective rather than on a more distant effect (e.g., the anticipated trajectory of the ball). Shoenfelt & Griffith (2008) implemented pre-season mental skills program for serving performance for the 11 members of an intercollegiate volleyball team. Reported use of imagery was significantly correlated with Good Serve Percentage. Serve-specific self-efficacy significantly increased from the pre-training program to the end of the season. Results indicated that implementing the mental skills training program was associated with enhanced service performance.

**Sport performance:** Weinberg, Seabourne, & Jackson (1981) attempted to determine whether imagery combined with relaxation was more effective in facilitating karate performance than either imagery or relaxation alone. Relaxation group exhibited better performance than all other groups. Lee (1990) attempted to determine what was more crucial for mental imagery to enhance performance (a) imagining of the task (b) or the positive aspect of
mental image. Findings suggested that the specific content of mental imagery was crucial in determining its effect on performance. The effect did not appear to depend on alterations of mood state and could operate through cognitive preparation. Van-Gyn, Wenger, & Gaul (1990) studied 40 subjects and investigated the effect of engaging in imagery in conjunction with nonspecific training on the transfer of the training to performance. The results indicated that imagery coupled with nonspecific training contributed to the enhancement of subsequent performance significantly better than did nonspecific training alone.

Porretta & Surburg (1995) examined the effect of imagery practice in conjunction with physical practice on the performance of 32 adolescents, anticipating a coincidence (striking), with mild mental retardation. The physical practice plus imagery group performed with significantly greater accuracy and less variability than subjects in the physical practice only group, and subjects regardless of group affiliation were able to reduce error and variability over the study. Thus, it provided the evidence that the subjects having mild mental retardation could also be benefited with imagery. Etnier & Landers (1996) studied 153 subjects to examine the influence of the order of presentation of mental practice (MP) and physical practice (PP) and of the duration of MP on subsequent performance. Results indicated that the order of presentation of MP and PP significantly impacted performance, such that groups who received MP first improved more than
did PP-first groups. The duration of the MP period also impacted performance, such that groups who received 1 minute or 3 minute of MP improved more than the control group or groups who received 5 minute or 7 minute of MP. Taylor and Shaw (2002) explored the effects of positive and negative outcome imagery on golf-putting performance. It was found that negative outcome imagery was detrimental to putting performance. However, performance in the positive outcome imagery condition was no better than performance in the control condition. Thus, negative imagery could have negative effect on performance.

Researchers had also found that athletes exhibiting moderate to high levels of task orientation become more invested in imagery use, in turn increasing how often they practiced imagery and had its performance enhancement benefits (Harwood, Cumming, & Hall, 2003). Magill, (2007) stated that athletes with lower imagery ability might not reap full performance-enhancement benefits from imagery training. Any individual, regardless of imagery ability, could benefit from imagery practice, although those with lower ability might continue to experience greater difficulty in creating and controlling vivid imagery. Marchant, Clough, and Crawshaw (2007) studied effect of external or internal focus on performance. Participants who were using the external and control instructions, performed significantly more accurately than those using the internal focus instructions. Furthermore, the control instructions were rated as

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significantly easier and less mentally demanding to use than the external instructions. Coelho et al. (2007) assessed use of imagery intervention in performance of 48 tennis players. Findings suggested that imaging a positive outcome could be more powerful in improving performance of closed skill movements than of open skill movements.

Olsson, Jonsson, & Nyberg (2008) examined whether the use of internal imagery would affect high jumping performance for active high jumping athletes. There was a significant improvement on bar clearance for the group that trained imagery but not for the control group. Ramsey, Cumming, and Edwards (2008) investigated a modified conceptualization of imagery direction and its subsequent effects on golf putting performance of 75 golfers. Findings suggested that a non-persuasive conceptualization of debilitative imagery could result in disparate effects on performance compared to facilitative imagery. Krista & Munroe-Chandler (2008) tested the timing element of the PETTLEP approach to motor imagery on the performance of a soccer dribbling task. 97 participants were randomly assigned to 1 of 5 conditions: real-time imagery, slow-motion imagery, slow motion concluded with real-time imagery, physical practice, or control. Results indicated that all 4 experimental groups significantly improved time and error performance to the same degree after the intervention. The control group significantly improved time but not error performance from
pre to post intervention. They provided inconclusive findings related to the timing element of the PETTLEP approach to motor imagery.

Thus, different researchers had used different imagery categories to enhance performance in different sport disciplines and found favorable results. Reasons could be explained within the framework of symbolic learning theory (Sackett, 1934) which suggested that imagery could have presented the imager with the opportunity to rehearse the sequence of movements as symbolic components of the task and provided practice of the movement through imagery. Another reason could be that appropriate imagery might have acted to prepare the performer for action (Lee, 1990).

**Psychological researches**

Researchers examined the effect of imagery on psychological variables like competitive anxiety, self-efficacy, flow state, intrinsic motivation, concentration, and confidence.

**Competitive anxiety:** Studies investigated that competitive anxiety could be manipulated through imagery in order to improve performance (Carter and Kelly 1997; Hale and whitehouse 1998; Page, Sime, and Nordell, 1999; Mamassis & Doganis, 2004; Magill, 2007). Carter & Kelly (1997) explored the moderating effect of psychological reactance on the success of traditional and paradoxical mental imagery treatments that were aimed at reducing anxiety in 73 college basketball players. It was found that, in the paradoxical condition, high-reactant athletes reported having significantly
lower somatic state anxiety and significantly higher state self-confidence than did low-reactant athletes. Results suggested that reactance moderated the effect of the success of traditional and paradoxical imagery treatments for reducing athletes' anxiety. Hale & Whitehouse (1998) attempted to manipulate 24 experienced soccer players’ facilitative or debilitative appraisal of competitive anxiety through imagery-based interventions. It was found that for intensity and direction scores, the challenge condition produced less cognitive anxiety, less somatic anxiety, and more self-confidence than the pressure situation. This finding suggested that a challenge appraisal manipulation taught by applied sport psychologists might benefit athletes' performance.

Page et al. (1999) examined the influence of imagery on intercollegiate female swimmers’ perception of competitive anxiety. The participants took part in 30 minute imagery session and were requested to practice the imagery between the session and somatic anxiety was noted, positive change occurred in the swimmers’ self-confidence along with large positive change in their perceptions of the anxiety. Mamassis & Doganis (2004) investigated the impact of a season-long Mental Training Program (MTP) on two elite junior tennis players. The results indicated an increase in the direction dimension of the somatic anxiety, cognitive anxiety and self-confidence for the intervention group at the post-test. Moreover, the intensity of self-confidence, as well as the overall tennis performance, was
greater for all the participants of the intervention group after the MTP. The research record demonstrated that imagery could be used to control anxiety and to enhance both the strategies and physical movements that could be employed in performing a skill (Magill, 2007). The reason could be that imagery was used as a tool to provide relaxation to the players and that was how it regulated their arousal level in order to reduce their anxiety.

**Self-efficacy:** Imagery had been effective in increasing self-efficacy of the players (Feltz and Riessinger, 1990; Callery and Morris, 1997; She and Morris, 1997) for a motor task (McKenzie and Howe, 1997), for a muscular-endurance task (Feltz and Riessinger, 1990), and for sport skill at an elite level (Callery and Morris, 1997; She and Morris, 1997). Feltz & Riessinger (1990) conducted an experiment to investigate the relative merits of in-vivo emotive imagery and performance feedback in enhancing self-efficacy beliefs of 120 college students. Imagery subjects had significantly higher efficacy scores than feedback alone or control subjects after each performance trial. Using a single subject, multiple–baseline design, Callery and Morris (1997) conducted 20-minute imagery rehearsal sessions 3 times per week with 8 elite football players. For all players, both performance and front and center self-efficacy were higher during the treatment phase than they had throughout the preceding baseline phase. In a similar single case, multiple baseline design study, She and Morris (1997) found that an imagery program for nine male elite baseball players was effective in
improving their batting averages, self-efficacy related to batting, and the state self-efficacy related to batting, and the state self-confidence in their batting ability. Only one player showed no improvement on any of the measures, which might have been due to recurring injuries and an accompanying lack of form. These findings could be explained with the help of social learning theory (Bandura, 1977) which proposed that imagery could stimulate interest in the participants and might have motivated to perform, or created expectations of superior performance which ultimately increased self-efficacy.

**Flow state:** Researchers made few attempts to enhance flow state (Pates & Maynard, 2000; Pates, Karageorghis, Fryer, & Maynard, 2003; Lindsay et al., 2005; Nicholls, Polman, & Holt, 2005; Singh & Sharma, 2009) using imagery. Pates & Maynard (2000) examined the effects of psychological intervention on flow states and golf-chipping performance of 3 participants. Two participants experienced higher flow during the intervention phase and much lower flow during baselines 1, the 3 participants increased their mean golf-chipping performance. Finally, participants indicated the intervention seemed useful in keeping them confident, relaxed, and in control. Pates et al. (2003) investigated the effect of imagery and self-selected music on flow and performance. Participants were three college netball players. they were instructed to first recall images and experiences, and, then, to rehearse this image of flow and their performance from an
internal perspective. The results indicated that flow increased in two out of three participants.

Lindsay et al. (2005) using a single-subject multiple baseline design, combined with assessments of participants’ internal experience, the efficacy of a psychological intervention on flow state and competitive cycling performance was assessed in three elite cyclists. Intervention involved relaxation, imagery, hypnotic induction, hypnotic regression, and the conditioning of an unconscious trigger associated with the emotions of past peak performance. Findings suggested that hypnotic interventions improved elite competitive cycling performance and increased the feelings and cognitions associated with flow. Nicholls, Polman, & Holt (2005) investigated the effects of an imagery intervention on the intensity and frequency of flow states and golf performance. Adopting a single subject ABA research design, individualized imagery interventions were delivered over a 12-week period to four high-performance amateur golfers. Results suggested that three of the four participants increased mean global flow intensity, and all four golfers increased mean global flow frequency and performance during the intervention and post intervention period in comparison to baseline. Singh & Sharma (2009) studied 20 football players using control and experimental group design. Experimental group was exposed to mental imagery package for 15 sessions. The findings revealed
that experimental group had shown higher level of flow state and performance.

The findings could be because the flow literature (Csikszentmihalyi, 1990; Jackson & Csikszentmihalyi, 1999; Jackson, 1995) indicated that skills-balance appraisal by the athlete was the most important factor for achieving flow states. Motivational general-mastery (MG-M) imagery represented images of having the skills or ability to achieve or master different challenges. This type of imagery could therefore be closely related to the skill-challenge balance aspect of flow. A match between situation and personal characteristics would lead to an increase in systematic information processing, whereas a mismatch would debilitate systematic information processing (Sorrentino & Roney, 2000).

Contextual, environmental, and cognitive factors had been investigated to facilitate, disrupt, and prevent the experience of flow state. Researches explored contextual factors (Rathunde, 1988; Kimiecik and Stein, 1992; Morris, Spittle, and Watt, 2005) Social support (Rees and Hardy, 2004) that facilitated flow state and environmental condition (Jackson, 1995; Young, 2000; Russell, 2001) that disrupted flow state.

According to Rathunde (1988) proposed the context that could facilitate flow was characterized by five factors. These factors were clarity of a stimulus field, meaningful challenge, perceived choice, centering focus on the task, and commitment. For flow to occur in a family context, all factors
need to be experienced within a balance between rigidity and looseness. Teenagers in families who were frequently under or over emphasizing these variables experienced states of anxiety or boredom. This suggested a bell-shaped relationship between flow experience and environmental factors, with flow experiences being lower when the family context offered too much or too little emphasis on these variables. Kimiecik and Stein (1992) concluded that, for flow to occur in sport settings, the way the coach structured the practice and game environment had far reaching implications for whether or not his or her athletes would experience flow. This discussion emphasized that the experience of flow was based on a highly individual perception of the environment, including task characteristics and the behavior of significant others, such as coach and team mates. Morris, Spittle, and Watt (2005) advocated that imagery which is specifically directed at the antecedents in a particular sport context enhanced the experience of flow.

Rees and Hardy (2004) examined the influence of social support dimensions, such as emotional, informational, esteem, and tangible support on competitive pressure and flow. Participants were 130 advanced tennis players. Those Participants, who reported a high level of pressure during competition, but simultaneously stated that they had strong emotional support, experienced higher levels of flow. “It is apparent that the
potentially negative effect of competition pressure on flow was ‘buffered’ for those with high emotional support”.

However, number of researchers (Jackson, 1995; Young, 2000; Russell, 2001) found that athletes’ flow experience is most frequently disrupted by external conditions that are related to the environmental conditions. Jackson (1995) found that non-optimal environmental and situational conditions were the major factor in preventing flow experiences, as reported by the participants. In his study non-optimal environmental and situational conditions contributed 64% of variance. Russell (2001) found environmental factors were related primarily to weather conditions, whereas situational factors involved aspects, such as mechanical failure, negative feedback from coach, negative referee decision, and stoppage of play. Crowd response, on the other hand, could be an environmental (e.g., home versus away competition) or situational factor (e.g., single incident that the crowd responded to during the competition). In general, the results indicated that flow investigations in settings with high ecological validity, such as competitions, need to take into account that external factors (environmental and situational factors) might represent a main cause for interfering with and disrupting athletes’ flow experience.

**cognitive factors** had been found significantly important in facilitating flow state (Csikszentmihalyi, 1975; Csikszentmihalyi, 1990; Kimiecik and Stein, 1992; Jackson, 1995; Csikszentmihalyi, 1999; Young,
2000; Jackson et al., 2001; Russell, 2001; Sugiyama & Inomata, 2005; Fullagar & Mills, 2008; Moreno et al., 2008) and preventing flow state (Csikszentmihalyi, 1975, 1988; Jackson, 1995; Young, 2000; Russell, 2001; Stavrou & Zervas, 2004; Lindsay et al., 2005).

Csikszentmihalyi (1975) and Kimiecik and Stein (1992) proposed that confidence found to be one of the main factor underlying flow state. Trait confidence seemed to be a particularly important variable to experience flow because highly confident athletes might find it easier to match their skills to current situational challenges to get into flow than athletes low in confidence. Psychological skills such as the ability to control attention might be required to attain flow states (Csikszentmihalyi, 1990) because concentrating on the task at hand was another important dimension of flow state.

Jackson (1995) examined factors facilitating flow in 28 elite athletes from a range of team and individual sports. The findings revealed that attainment of flow state was accounted through pre-competitive plans and preparation (64%), confidence and positive attitude (64%), optimal physical preparation and readiness (57%), and achieving optimal arousal level before competing (57%). The study concluded that confidence, preparedness, and optimal arousal were key aspects to attain flow state.

An important aspect of the experience of flow in an activity or a competition had been the perception of personal performance. In addition,
Jackson and Csikszentmihalyi (1999) argued that the preparation for a sport event, which culminated in physical and mental readiness, was important for the experience of flow. Jackson and Csikszentmihalyi (1999) encapsulated the importance of being prepared to experience flow because it could have added to ones involvement into the game.

Similarly, Young (2000) found several dimensions that helped female tennis players to get into flow. Participants reported physical and mental preparation (77%), positive mood (77%), experience and control of arousal (65%), and motivation (58%) as the most frequent factors that accompanied their flow experiences. Thus, findings explored that mental preparation, positive mood, adequate arousal, and motivation led tennis players to experience flow state. Jackson et al. (2001) examined psychological factors of potential relevance to athletic flow experience. Competitive athletes across three sports completed dispositional assessments of athletic self-concept, psychological skills, and flow. Positive relationships were found between flow and aspects of self-concept, and the relationships between flow and psychological skill's use were also in the expected directions. Replicating and extending qualitative examinations on the experience of flow in sport, Russell (2001) extracted nine factors facilitating flow in 42 college athletes. The most frequent statements were related to optimal pre-competitive plans (52.4%), optimal physical preparation (84%), and confidence and positive thinking (48%).
Researchers had analyzed interview data to investigate participants’ perception of being able to control the flow state (Sugiyama & Inomata, 2005). In addition, in a qualitative study, Sugiyama and Inomata (2005) examined psychological states related to pre-competition experience and its influence on flow. Sugiyama & Inomata (2005) studied 29 Japanese athletes, competing in individual sports on a national level competition. Main characteristics during flow were relaxation, confidence, and motivation. With regard to the overall results, confidence and optimal preparation, in terms of mental and physical preparation, and competition plans, appeared to be key aspects that facilitated flow. Fullagar & Mills (2008) investigated the relation between motivation and flow in a sample of 327 architecture students. Results indicated a significant relation between flow experiences in academic activities and the more self-determined forms of intrinsic motivation, but not for extrinsic motivation. The need for autonomy moderated the relation between flow and intrinsic motivation.

Moreno et al. (2008) examined the relationships among perceived motivational climate, individuals’ goal orientations, and dispositional flow, with attention to possible gender differences. A sample of 413 young athletes was studied. It was found that task orientation and ego orientation were positively related to flow state, males represented higher ego orientation and lower task orientation as compared to females.
However, researches also found cognitive factors to disrupt flow state (Jackson, 1995; Young, 2000; and Russell, 2001). Jackson (1995) generated nine general dimensions from the sample responses, reporting that non-optimal preparation and readiness (75%) were most frequently reported to prevent flow. Other general dimensions that frequently prevented flow experiences, as reported by the participants, were non-optimal environmental and situational conditions (64%), lacking confidence and negative attitude (43%), and inappropriate focus (36%). Young (2000) outlined that three factors of inappropriate focus (58%), preparation problems (55%), and non-optimal mood (55%) had the strongest effect on preventing flow in tennis. Russell (2001) found similar factors preventing college athletes from getting into flow, including factors of non-optimal physical preparation and readiness (48%), inappropriate focus (40%), and non-optimal environment/situation (21%), and non-optimal confidence/positive thinking (17%). Even though there were differences in participants’ skill level, Jackson (1995) and Russell (2001) reported similar dimensions preventing flow experiences.

With regard to personality variables, two inherent aspects of flow were found to be related to motivation and anxiety (Csikszentmihalyi, 1975, 1988; Stavrou & Zervas, 2004). Csikszentmihalyi (1975, 1988) proposed that intrinsic motivation was one of the main psychological variables to induce flow, whereas anxiety, as the antithesis of flow, would be a critical
variable to prevent flow. Research on personality variables influencing flow has mainly examined the relationships between flow and anxiety (Stavrou & Zervas, 2004).

Lindsay et al. (2005) argued that individuals, who would lacked a positive attitude towards the intervention and demonstrated limited ability to generate images. They could not gain the same performance improvements from the intervention as other participants. These findings provided critical evidence for aspects, such as confidence, and physical and mental preparation, that need to be accounted for in future intervention studies to facilitate and increase flow state.

To conclude, flow state depends upon various contextual, environmental, and psychological factors. The present research is an attempt to enhance flow state of the football and hockey players through imagery intervention while focusing on the contextual, environmental, and psychological factors.

**Intrinsic motivation:** Intrinsic motivation is another concept in recent times which is increasingly getting attention of sport psychologists and researchers. Researchers work hard to develop new intervention strategies to enhance intrinsic motivation of the players, so that players can be involved into their game for its own sake in the current competitive sport activities where the real spirit of sport is being increasingly over powered by the materialistic gains through sports (Martin & Hall, 1995). Researches
used imagery to enhance the intrinsic motivation of the athletes (Martin & Hall, 1995; Sorrentino, Walker, Hodson, & Roney, 2001; Singh & Sharma, 2007).

Martin & Hall (1995) tested who would spend more time practicing a golf putting task and who would result in having higher self efficacy. 39 beginner golfers were grouped into an imagery or control group. For 3 sessions, both groups were taught how to hit golf balls. The imagery group practiced in an imagery training session designed for this specific golf skill. As a result, the imagery group spent significantly more time practicing the golf putting task than the control group. In addition, the subjects in the imagery group had more realistic self-expectation, set higher goals to achieve, and adhered more to their training programs outside the experimental setting. Sorrentio, Walker, Hodson, and Roney (2001) proposed that a match between situation and personal characteristics had an important influence on individuals’ motivation and information processing. During imagery when players imagined themselves performing and saw positive things happening, that could have provided them with sense of internal satisfaction which in tern enhanced their intrinsic motivation. Gradually, they started enjoying while taking part in actual performance because performing on that task was associated with the state of relaxation, satisfaction and positive moments (Singh & Sharma, 2007).
Researches revealed that **perceived ability** (Roberts & Duda, 1984), **perceived motivational climate and goal orientation** (Kavussanu & Roberts, 1996; Goudas, 1998; Yoo, 1999; Brunel, 1999), **scholarship status** (Amorose & Horn, 2001), **social factors, individual differences** (Ferrer-Caja & Weiss, 2000) **perceived competence, autonomy and relatedness, competitive and recreational sport structures, gender, individual and team sports, and level of competition**, (Standage, Duda, & Ntoumanis, 2003; Hollembeak & Amorose, 2005; McDonough & Crocker, 2007; Gillet & Rosnet, 2008), **personality traits** (Tanaka et al., 2009) influenced intrinsic motivation of the players.

Roberts & Duda (1984) examined how **perceived ability** mediate motivation in sport and the importance of being able to assign ability to self in interpreting outcomes as success or failure in a sport context. A field study was conducted with men and women racquetball players. Findings revealed that perception of demonstrated ability was significantly related to perceptions of success and failure for both men and women.

Kavussanu & Roberts (1996) examined the relationship between **perceived motivational climate** and intrinsic motivation to determine the role of goal orientation and perceived motivational climate in predicting intrinsic motivation. The findings revealed that Perceptions of mastery climate were positively associated with enjoyment, effort, perceived competence and were inversely related to tension. In males, dispositional
goal orientation and perceived motivational climate emerged as equally important predictors of intrinsic motivation. In females, performance motivational climate was the strongest predictor of intrinsic motivation. Perceived normative ability accounted for a substantial amount of unique variance in intrinsic motivation. Goudas (1998) examined the relationship between motivational climate and intrinsic motivation for 100 athletes with high and low perceived competence. Findings concluded that there was no significant interaction between perceived competence and perceptions of motivational climate. Scores for perceptions of a task-involving climate were significantly correlated with intrinsic motivation. Yoo (1999) investigated how goal orientation (task and ego) and perceived motivational climate (mastery and performance) was related to intrinsic motivation. The results indicated that the task goal orientation and perceived motivational climate were positively associated with intrinsic motivation. Brunel (1999) examined the relationship of perceived motivational climate and goal orientation to indices of intrinsic, extrinsic motivation and amotivation. Results of Pearson correlation analyses indicated that students who perceived their class climate as emphasizing mastery were more likely to feel self-determined. Hierarchical regression analyses revealed that perceived motivational climate was a better predictor of all indices of motivation than goal orientations.
Amorose & Horn (2001) examined whether the intrinsic motivation levels of 72 first-year college athletes changed from pre-season to post-season as a function of their scholarship status or their perceptions of their coaches' behavior. Contrary to predictions, results revealed that neither scholarship status nor time affected the athletes' level of intrinsic motivation. However, strong support emerged for the relationship between athletes' perceptions of their coaches' behavior and changes in athletes' level of intrinsic motivation over the season.

Ferrer-Caja & Weiss (2000) examined the relationships among social factors, individual differences, intrinsic motivation, effort, and persistence of 407 the physical education students using cognitive evaluation theory as a framework. Results revealed that perceived competence and goal orientations directly predicted intrinsic motivation and mediated the effects of motivational climate and teaching style on intrinsic motivation. Intrinsic motivation directly predicted effort and persistence. The strongest predictors of intrinsic motivation, effort, and persistence were task goal orientation, perceived competence, and learning climate. Standage, Duda, & Ntoumanis (2003) examined the main and interactive effects of students' goal orientations, perceived competence and perceptions of the motivational climate on the motivational styles advanced by self-determination theory. Participants were 328 British secondary school students. The results indicated (1) for students endorsing a high
task orientation, the perception that the class climate was high in mastery
cues was associated with increased intrinsic motivation; and (2) for
students high in ego orientation, the belief that one was competent
increased, while perceptions of incompetence attenuated intrinsic
motivation.

Hollembek & Amorose (2005) tested whether perceived competence, autonomy and relatedness mediated the relationships between perceived coaching behaviors and athletes’ intrinsic motivation. 280 male and female college athletes participated. Results indicated that all of the coaching behaviors, with the exception of social support, significantly predicted perceived competence, autonomy and relatedness, which, in turn, predicted intrinsic motivation. McDonough & Crocker (2007) tested the hypothesis that intrinsic motivation (self-determined motivation) would mediate the relationship between psychological need fulfillment and affective and behavioral outcomes. Competence, relatedness, and autonomy all significantly predicted self-determined motivation, but self-determined motivation only partially mediated their relationship with positive and negative affect. These findings demonstrated the importance of all three needs in adult activity motivation. Gillet & Rosnet (2008) revealed that female athletes felt less competent and demonstrated less external regulation than males, while exhibiting more intrinsic motivation. In addition, they showed that recreational athletes felt more autonomous and
had fewer scores on external regulation than competitive athletes. Differences in the levels of competition also emerged. Specifically, athletes at the district level displayed less intrinsic motivation and less external regulation than athletes at the regional level. District level athletes also exhibited less intrinsic motivation and less external regulation than national level athletes.

Tanaka et al. (2009) examined the relationships between personality traits and intrinsic motivation. 119 medical students were studied. It was revealed that persistence, self-directedness, cooperativeness and self-transcendence were positively associated with intrinsic motivation.

**Concentration:** It is an essential mental skill for optimal performance. Concentration is being in the present, not analyzing or focusing on what happened one second ago or will happen one second from now. But formidable obstacles stand in the way of attentiveness or concentration. Players used psychological techniques to learn concentration skills. Imagery was found to be effective for improving concentration skills (Posner, 1975; Thomas and Fogarty, 1997; Singh & Sharma, 2007).

It was explored that imagery training positively affects concentration (Posner, 1975). Thomas and Fogarty (1997) explored the power of imagery combined with positive self-talk in improving not only putting performance, but psychological factors as well. Concentration was considered as cognitive phenomena which could be enhanced through practicing mental
imagery. During imagery players imagined themselves focusing on relevant cues while ignoring distractions which could have reduced any inhibition to action and improved the attention of the performer to cues for motor response. It also involved imagining oneself responding to multiple cues in a rapidly changing environment of particular sport activities (Singh & Sharma, 2007).

Researchers found favorable performance outcomes as result of manipulating athlete’s attentional focus in competitive situations (Mallet & Hanrahan, 1997; Morgan, 2000). Individuals’ concentration skills were dependent on the individuals' motivation to maintain them (Porter, 2003).

Researches explored different factors e.g. anxiety/threat (Li, Wang, Poliakoff, & Luo, 2007; Wilson, Chattington, Marple-Horvat, & Smith, 2007; Nieuwenhuys, Pijpers, Oudejans, & Bakker, 2008; Wilson, Vine, & Wood, 2009), skill level (Castaneda & Gray, 2007), behavioral and situational factors (Silva, 1979), experience (Fontani, Lodi, Felici, Migliorini, & Corradeschi, 2006) contextual interference (Keller, Li, Weiss, & Relyea, 2006) preparation (Moran, 1996; Lidor and Singer, 2004; Moran, 2005) which had influenced attention and concentration processes within the sport’s arena.

Li, Wang, Poliakoff, & Luo (2007) studied how anxiety or threat influenced attentional processes. For this purpose, extremely threatening pictures were used as predictive location cues in a cue-target task. Threat
cues produced greater facilitation effects than neutral cues, but this was not moderated by anxiety. This suggested that both high and low anxious individuals might have difficulties disengaging their attention from threat-cued locations when the threat value was large enough. Wilson, Chattington, Marple-Horvat, & Smith (2007) examined attentional processes underlying skilled motor performance in threatening situations. The results revealed little change in performance in the high-threat explicit monitoring task condition, compared with either the low-threat or the high-threat distraction conditions. Mental effort increased, however, in all high-as opposed to low-threat conditions. Nieuwenhuys, Pijpers, Oudejans, & Bakker (2008) investigated anxiety-induced changes in movement and its effect on visual attention in climbing wall. Climbing times and movement times increased under anxiety. These changes were accompanied by similar changes in total and average fixation duration and the number of fixations, which were primarily aimed at the holds used for climbing. Wilson, Vine, & Wood (2009) tested the predictions of attentional control theory among 10 basketball players. The manipulation of anxiety resulted in significant reductions in the duration of the quiet eye period and free throw success rate, thus supported the predictions of attentional control theory.

Another factor that determined attentional focus of the athletes was their skill level. Castaneda & Gray (2007) explored attentional focus of Less skilled and highly skilled (college) baseball players. Batting
performance for highly skilled players was best when they had external focus (e. g. environment) and worst when they had internal focus (e. g. execution of the skill). However, the findings were visa versa in case of less skilled players. Thus, the optimal focus of attention for less-skilled batters was one that allows attention to the step-by-step execution of the swing.

Silva (1979) studied behavioral and situational factors affecting concentration and skill performance by analyzing the self-reported concentration levels of volunteer undergraduate students ($N = 122$). Concentration was negatively affected by aroused, angry behavior and by a social environmental setting of considerable complexity and stress. Subject performance was superior in situations where concentration levels were elevated.

Fontani, Lodi, Felici, Migliorini, & Corradeschi (2006) examined differences in attentional style of athletes engaged in two open skill sports requiring high reactivity (karate and volleyball) in groups with high or low experience. Karateka of high experience reacted faster than those of low experience on the simple RT test, while on the divided attention test, the high experience subjects performed more poorly and committed more mistakes. Young volleyball players of low experience reacted faster than colleagues of high experience but committed more errors. Volleyball athletes of high experience showed higher attention and stability in complex reactions than the group with low experience.
Keller, Li, Weiss, & Relyea (2006) examined the effects of contextual interference on attention and learning pistol-shooting skills. 12 participants were randomly assigned into one of two practice conditions, blocked (10 trials continuously) v/s serial (5 trails twice). Findings concluded that practicing in the serial schedule depressed attention and performance during initial training but maintained the performance better at retention, relative to the blocked practice.

Concentration largely depends upon athlete’s preparation to perform. Moran (1996) emphasized the importance of a clear pre-performance routine for attention and the ability to refocus during competition. Many sport psychologists found that having a clear routine before, during, and after a race could help you keep your focus on the task at hand. Focusing attention before the execution of the task was characterized by narrowed concentration, trying to intensify the focus on the most relevant performance cues. Lidor and Singer (2004) proposed that an increase in focus would alleviate distractions caused from within or outside. Lidor and Singer (2004) proposed that preparation towards a self-paced task should have led athletes to execute the performance with a quiet mind, signifying the disengagement from conscious thought processes in the task at hand, which was also reflected in episodes of flow. Moran (2005) advocated that internalized pre-performance routines included the development of an action plan prior to the performance, which could be
increased attention and simultaneously blocked external distractions and prevented negative thoughts.

**Confidence:** Confidence is the key to success in today’s competitive sport (Martin, Moritz, & Hall, 1999; Callow & Hardy, 2001). Confident athletes believe their ability to acquire the necessary skills and competencies to reach their potential. Researchers used imagery to enhance the confidence of the sport persons and found it effective (Moritz, Martin, Hall, & Vadocz, 1996; Vadoa, Hall, & Moritz, 1997; Garza & Feltz, 1998; Callow & Hardy, 2001; Callow, Hardy, & Hall, 2001; Callow, Roberts, and Fawkes, 2006; Hall et al., 2009).

Moritz, Martin, Hall, & Vadocz (1996) studied specific image content of 57 confident elite competitive roller skaters. High sport-confident athletes used more mastery and arousal imagery, and had better kinesthetic and visual imagery ability than low sport-confident athletes had. Vadoa, Hall, & Moritz (1997) explored the relationship between imagery use, self-confidence and performance among 57 junior roller skating players. Motivational mastery imagery was revealed as a predictor of self-confidence. Furthermore, self-confidence and kinesthetic imagery ability scores correctly classified majority of the subjects as medalists versus non-medalists. Garza & Feltz (1998) examined the effectiveness of mental practice techniques for improving figure skating performance, self-efficacy, and self-confidence of 27 figure skating players for competition. Results
indicated that the mental practice group significantly improved performance ratings (in jumps and spins) and competition confidence compared to the stretching control group.

Callow & Hardy, (2001) investigated the relationship between imagery type and confidence, and 2 possible moderating variables, skill level of the athlete and sport type. Hierarchical multiple regression analyses reflected 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. Callow, Hardy, & Hall (2001) used a multiple-baseline across-participants design to examine the effects of a Motivational General-Mastery imagery intervention on the sport confidence of 4 high-level junior badminton players. Results explored significant increase in sport confidence for Participants 1 and 2, a significant reduction in sport confidence for Participant 3, and a delayed increase in sport confidence for Participant 4. Callow, Roberts, and Fawkes (2006) examined the effects of dynamic and static imagery on the vividness of imagery, down-hill slalom performance, and confidence of 24 race-standard skiers. The dynamic group had higher vividness and confidence than the static group. Moreover, the dynamic group completed the task in the quickest time. Hall
et al. (2009) investigated 345 athletes' use of observational learning and imagery for practice and at competition and how this was related to sport confidence. The athletes reported using each of the different functions of observational learning and imagery in both practice and competition situations. Nearly, all of the imagery functions were more frequently used at competition. Majority of observational learning functions were used more for practice.

Researchers found performance feedback (Corbin, Stewart, & Blair, 1981), anxiety (Lox, 1992; Ferreira, Chatzisarantis, Gaspar, & Campos, 2007), social support (Rees & Freeman, 2007) to influence confidence of the sport persons. Corbin, Stewart, & Blair (1981) studied 40 children, 20 of each sex, to determine if the self-confidence of young females in their motor performance abilities was affected by performance feedback. Results indicated that when performing a task perceived to be "neutral" the self-confidence of young girls did not differ from young boys. Furthermore, girls did not seem to lack self-confidence nor did they seem to be more dependent on performance feedback than boys.

Lox (1992) studied the relationship among perceived threat and state responses of anxiety, confidence, and efficacy in 52 intercollegiate female volleyball players. Somatic anxiety was significantly correlated with perception of importance of both outcome and personal performance while uncertainty regarding personal performance was significantly related to
cognitive anxiety. In addition, perceived threat was significantly related to state self-confidence and self-efficacy. Ferreira, Chatzisarantis, Gaspar, & Campos (2007) examined the pre-competition temporal patterning of competitive anxiety components in 42 athletes with disability. Analysis suggested that for cognitive and somatic dimensions athletes with disabilities indicated a similar pre-competition anxiety response than athletes without disability. However, there appeared to be some differences, particularly in the intensity of self-confidence, as athletes with disability reported a reduction of self-confidence just prior to competition.

Furthermore, social support also found to influence confidence of the sport persons. Rees & Freeman (2007) investigated a sample of 222 university athletes who completed a measure of perceived support 2 weeks before an important competition or match. On the day before the competition or match, the athletes completed measures of stress, received support, and self-confidence. Results demonstrated the beneficial impact of social support on self-confidence, both directly and by reducing the negative effect of stress on self-confidence.

To summarize, Researches indicated that mental imagery has the potential to influence various psychological factors which are related to sport performance. Thus, sport performance could be enhanced though altering the psychological states of the players. The present study is an attempted to enhance sport performance through enhancing the
psychological attributes of the players i.e. flow state, intrinsic motivation, concentration, and sport confidence because these psychological attributes are deeply related to sport performance.