Chapter-2

Review of related studies
Review of related studies

During the past fifty years, in the physiological, psychological and physical education laboratories of many universities in the world, numerous studies have been conducted regarding the reaction time of sportsmen. Some studies have been done to relate reaction time with the sex and age, types of games, sports performance and many other variables. Out of these studies, which are relevant to the present problem are being discussed below.

Sex Differences in Reaction Time

In recent years, may investigators have directed their attention to the measurement of reaction time and speed of movement of athletes. Some studies have been concerned primarily with the relationship between these two factors (Lois, 1959; Willard, 1959; Wilson, 1959; Willard, 1960; Franklin 1960; Franklin, Willard, Leon, 1962), while others have been directed towards determining the influence of some other factors on the reaction time and speed of movement. Out of these factor, sex has been reported to be one factor which affects RT.

Studies concerning physical performance and
discriminative reaction time (Noble, Baker and Jones, 1964), reaction time (Goodenough, 1935, Seashore and Seashore 1941; Tiichner, 1954; Hodgkins, 1962), and movement time (Hodgkins, 1962) have shown males to be generally superior to females. It would be logical to hypothesize that, if males and females differ in reaction time, movement time (MT) and discrimination reaction time, because of prior experiences, such differences would be minimised if the male and female participants had similar physical performance experiences. But the experimental evidence has supported the supposition that men react and move faster than women and that athletes react and move faster than non-athletes in tests of simple reaction time and movement time. A sex-linked difference in RT and Mt have been reported in favour of males over females (Bellis, 1933; Goodenough, 1935; Teichner, 1954; Henry, 1960; Hodgkins, 1963; Botwinick and Thompson, 1966; Ferguson, 1974; Coles, Porges, Duncan, 1975).

Crabbe and Johnson (1979) studied the male and female choice reaction time performance of different age groups during face to face competition. The hypothesis of this study was that boys and girls who have similar experiences in competitive physical activity perform similarly in a competitive choice
reaction time situation. It was found that there were no differences in the performance of males and females either in choice reaction time or total response time. However, the males performed faster than females in movement time.

Yandell and Spirduo (1981) investigated the effects of sex and athletic status on reaction latencies and movement time. Result did not support the classic finding of male superiority over females in RT/MT or athletes superiority over non-athletes. Sex was predominant factor in consistency with males being less viable in RT performance than females. No sex differences were found in MT consistency.

Singh (1986), in one of his studies on “psychological characteristics of top level Indian sportsmen” found no sex differences in the visual and auditory RT in the athletic group, and on auditory RT in the hockey group. Where as sex difference were found on the visual RT in the hockey group, the males having less reaction time. In another study, he (1987) found significant sex differences in the case of visual RT of the top level Indian hockey players, the males having less Visual RT as compared to the females in case of centres and back players, where as the forwards
were not found to differ significantly on the visual RT on the basis of sex, but, no significant differences were found on the auditory RT between the males and females hockey players playing at different places.

**Reaction time as a correlate of age**

A few studies have been directed towards finding the influence of age on the reaction time and speed of movement (Hubbard, 1956; Franklin, 1961; Yoshizaki, 1964; Onishi, 1965; Botwinick and Thompson, 1968). The evidence of decrement in speed of reaction has been demonstrated by Hodgkins (1962) who studied 480 girls and women ranging in age from 6 to 84 to determine the influence of age on speed of reaction and speed of movement. She noted that movement time improved up to age 15, remained constant to age 19 and decelerated thereafter, reaction time improved with age up to 19 year, remained constant to age 26 and then decelerated.

As reported by Hodgkins (1962), simple reaction time decrease progressively to at least age 19 years, the greatest improvements being seen from age 6 to 12. Discriminant reaction time also showed a decrease throughout childhood, the boys
gaining an advantage over the girls in their late teen years (Noble et al. 1964). There is again a progressive decrease in the total response time for more complex tasks, although there is little improvement in the accuracy of performance. Singer (1969) tested discriminant reaction time, figure reproduction and pursuit rotor tracking. He found that grade 6 children performed better than grade 3 children or all of these tests.

Ardavan (1982) compared fractioned reaction time and movement time in males across selected age and physical activity levels. Results indicated that age generally was a significant factor in total reaction time, in pre-motor time, in motor-time associated with foot choice reaction time and in movement time. Active males and less active males were not significantly different from each other in terms of these variables.

**Reaction time of sportsmen of different games**

Guyton (1971) suggested that some auditory impulses arise at the cortex well ahead of others even though they might have originated are exactly the same time which may be the reason for the auditory reaction time to be faster than visual reaction time. Auditory and visual reaction time being an index
of a better neuro-muscular coordination helps the weightlifters in lifting the capacity weight successfully. The lifting of weight of the maximum capacity naturally produce, stress on the body and a person with a faster reaction time, will be able to tide over this stress in the shortest time.

Bhanot and Sidhu (1979) found that national junior and combined university hockey players were significantly faster than N.I.S. trainees in visual and auditory reaction time of hand and foot both. National junior hockey players were faster in auditory but slower in visual reaction times of hand and foot both. Visual and auditory reaction times of hand were faster than those of foot. Auditory reaction time of hand and foot was faster than the corresponding visual reaction time.

In another study, Bhanot and Sidhu (1980) conducted a comparative study of reaction time of Indian sportsmen specialising in hockey, volleyball, weightlifting and gymnastics. The weightlifters were found to be significantly faster than hockey players, volleyballers, and gymnasts for both visual and auditory reaction time of hand and foot. Hockey players were faster than volleyballers and gymnasts in visual and auditory reaction times
of hand and foot, but the difference was significant only in auditory reaction time of hand and foot both. Volleyball players were faster than gymnasts, but the difference is not significant, visual and auditory reaction times of hand were faster than those of foot in players of all the four events. Auditory reaction time of hand and foot was faster than the corresponding visual reaction time.

In another investigation, Bhanot and Sidhu (1980) studied the reaction time of hockey players with reference to their field positions. In this study, visual and auditory reaction times of the right hand and right foot of 92 hockey players were studied. The results show that the backs are significantly fastest and half backs slowest. In foot reaction time, the goalkeepers followed the former, but in hand reaction time, forwards followed the goalkeeper, Right-backs were significantly faster than left backs among the backs. In half line players, the centre halves were fastest followed by left halves, while the left halves were the slowest. Among the forwards, the left-out were the fastest, whereas in auditory reaction time, they were followed by centre-forwards, while in visual reaction time, they were followed by left-ins. But, right-ins were the slowest in all the reaction times. Visual and
auditory reaction times of hand were faster than corresponding reaction times of foot. Auditory reaction times of hand and foot were faster than corresponding visual reaction times.

Bhanot (1986) investigated the positional differences in reaction times of hand and foot in football players. He found that the goalkeepers possessed the fastest RTs of hand and were followed by backs, whereas the backs possessed the fastest RTs of foot and were followed by goalkeepers. Forward line players were faster than half-line players in all the RTs. Out of the backs, right and right inside backs had better RTs than left-inside and left backs. Left backs were the slowest among the backs. In half line players, the left half backs possessed better reflexes of hand and foot than right half backs. Among forward line players, outside forwards were faster than corresponding inside-forwards in all the RTs. Left-outs were better than right outs in all the reflexes. Thus, the RTs or the reflexes in football players differed from one field position to another.

In one of his recent studies conducted by the singh (1986) found significant differences between the players of individual events and group games on visual RT in case of males
and auditory RT in case of females, whereas no significant differences were found between athletes and hockey players on auditory RT in case of males and visual RT in case of females; the hockey players having less RT than the athletes, whether males or females. In another study (1986b) he found that (1) the hockey players of both sexes were faster on both visual and auditory RT than the tract and field players, (ii) the top level Indian athletes and hockey players were faster on visual RT than on auditory RT.

Shrama, Khan and Butchiramaiah (1986) concluded that the competitive volleyball players responded more quickly to the visual and auditory stimuli when compared to the recreational volleyball players. The national level volleyball players in visual and auditory reaction times.

**Reaction Time and Sports performance**

Though there are many factors associated with skilled performance in sport activities, speediness of physical movement and reaction time are undoubtedly the most important ones. The successful participation in sports is closely related to reaction time (Elbel, 1940; Keller, 1942; Lois, 1959; Ogawa et al, 1964; Bhanot and Sidhu, 1980). According to Burpee and Stroll
(1936) and Tweit et al. (1963), successful participation in athletics activity is also closely related to reaction time.

A number of researcher of sports science have been engaged in the problems of reaction time to make clear the skilled performance in practical sports situation. Individuals who are physically active or who participate in athletics have been shown to perform faster in RT and MT tasks than those who have not had such experiences (Keller, 1942; Olson, 1956; Youngman, 1959; Knapp, 1961; Botwinick and Thompson, 1966; Cooper, 1969; Spirduso, 1975; Spirduso and Clifford, 1978). The reaction time has also been observed to improve with the increasing level of representation. Bhanot and Sidhu (1979) have reported that reaction time improves with level of participation in the game of hockey.

Uppal and Singh (1983) studied the relationship of reaction time and speed of movement to performance in 100-metre run and between speed of movement to performance in long jump and shot put. They found that auditory reaction time does not contribute significantly to performance in 100-metre run and performance in long jump and shot put are not significantly
influences by speed of movement. They suggested that as reaction time performance in 100-metre run, speed of movement and performance in 100-metre run, long jump and shot-put are not significantly related, therefore, during training session greater emphasis should be laid on components of physical and motor fitness and improvement of techniques to improve performance in the track and field events.

Singh (1985) in one of his studies on reaction time—an important psychological factor of top level Indian male athletes, concluded that (i) the high performers in athletics had quick reaction time on both visual and auditory RT as compared to the low performers, especially in case of short distance runners; (ii) short distance runners gave less visual RT and more auditory RT as compared to middle and long distance runners; (iii) jumpers in case of visual RT and throwers in case of auditory RT gave less reaction time as compared to all other categories of athletes; (iv) auditory RT was shorter than the visual RT.

Singh (1987) also found significant differences on the visual RT of the hockey players with respect to their playing positions, the backs being fastest on visual RT than the centres.
and forwards; and the forwards being slowest on visual RT than other groups. However, no significant differences were found on the auditory RT of the hockey players classified on the basis of their playing positions. Khan and Khan (1987) observed a clear-cut difference between high and low level performers among the elite Indian hockey players on visual and auditory reaction times.

**Effect of Exercise on Reaction Time**

The researches carried out in the study of the relationship between exercise and reaction time and movement time show a trend in which MT has been found to improve with exercise. But on the other hand, the results are contradictory as regards RT. In some cases, some studies have confirmed that with exercise MT improves (Sage, 1977), whereas some other studies (Elbel, 1940; Philips, 1963), have contradicted this, who have shown no change in MT after an exercise of moderate intensity.

Roce (1980) found the effects of warming up in reaction time and movement in an action of the lateral displacement of the feet resulting in significant changes in the reduction of RT, MT and the variance of the response in the right foot—initially slower than the left, while the left foot remained
with non-significant variation.

Lofthus and Hanson (1980) investigated simultaneous bilateral fractionated hand grip reaction time performance before and after fatiguing exercise. The results indicated that the pre-motor time component increased significantly post-exercise for both the preferred and non-preferred limbs, while differential effects occurred between limbs for motor time and total reaction time. They found that swimmers and tennis players performed in a similar fashion.

Role of Personality in sports

In recent years, a great deal of attention has been paid to the relationship of psychological factors especially personality variables with sports performance. Most of this work has been concerned with delineating personality traits of athletes, differentiating among individuals by sport, level of success etc. In fact, a major dimension of the study of psychological aspects of sports is concerned with inquiries into the personality of sportsmen and sportswomen. There are numerous theories about the personality of athletes. But only a limited amount of research has been undertaken to support these theories. Here those studies
would be presented which are related with the (i) sex differences in personality traits of sportsmen, (ii) differences in the personality traits of athletes and non-athletes, (iii) personality traits of sportsmen of individual and team games, (iv) personality traits the players of the various game (v) relationship between personality and sports performance.

**Sex Differences in Personality Traits of Sportsmen**

Effect of sex and group behaviour on personality of athlete have been revealed in a number of studies (e.g. Peterson et al. 1967; Rushall. 1967; Meredith and Harris, 1969; Foster, 1972) Rushall (1967) while comparing personality characteristics of male swimmers with female swimmers found that females were socially bold, noisy and unrestrained in their behaviour, whereas males appeared to be self-centred and individualistic. It was also found that novice female swimmers were, in general, more introverted than a control group of female athletes, not primarily engaged in swimming (Meredith and Harris, 1969). Rushall (1970) concluded that personality is not related with success in swimming.

Gruber and Parkins (1978) found women who
competed in inter-collegiate competition to be significantly higher on the factors F (sober), and I (tough-minded) when compared to the non-participant group. Williams (1978) reported that selected personality traits are frequently associated with the elite female athletes, and specifically, that the successful female competitor generally tends to be more assertive, dominant, self-sufficient, independent, aggressive, reserved achievement-oriented and have average to low emotionality than the un成功fully female competitors. Evans and Quarterman (1983) found that the female basketball players (successful and unsuccessful) scored significantly lower on factor I than the non-athletic female group towards the tough-minded side of the scale. On factor L, the unsuccessful basketball players scored significantly lower than the successful players, indicating the unsuccessful players are more trusting group.

By considering team sports separately by categorising athletes into one of three classes i.e. offensive, centre and defensive players, Kirkcaldy (1982) found that males in attacking positions (offensive players) were substantially higher in psychoticism (tough-minded, dominant, aggressive) and extraversion as compared to mid-field (centre), players, there
being no difference between offensive and defensive participants. The attacking player was significantly more defensive player. The forward offensive players were less easily differentiated from defensive players, the later group exhibiting a more emotionally stable pattern than the offensive athlete. In females, the trend was somewhat reversed i.e. attacking players were less extraverted and more neurotic than players from other positions. No significant differences were found to exist in the personality profiles of female athletes between different positions. The investigator (1986) also found no sex difference in extraversion and neuroticism traits of personality in the athletic as well as hockey group.

Uppal and Gill (1986) found that highly skilled male badminton players were more suspicious, neither less intelligent nor more intelligent and neither tough-minded nor tender-minded as compared to poorly skilled male badminton players who were less intelligent, tough-minded and neither trusting nor suspicious. On the other hand, highly skilled female badminton players were tough-minded, suspicious and hard to fool as compared with poorly skilled female badminton players who were neither tough-minded nor tender-minded and neither trusting nor suspicious.
Personality Traits of Athletes and Non-athletes.

Several investigation have tried to find personality differences between athletes and non-athletes. Currently, many Sports Scientists are also trying to differentiate between athletes and non-athletes with regard to their personality traits. In fact, the major portion of the research literature on personality structure in the field of sports psychology is related with the comparison between athletes and non-athletes (Sperling, 1942; Slusher, 1964; Cooper, 1969). Majority of the investigation have indicated that athletes differ from non-athletes on a number of personality traits.

Many studies in general tend to agree that differences do exist between athletes and non-athletes. Booth (1958) using MMPI investigated the differences in the personality of football athletes and non-athletes. His results revealed that the athletes from the various sport groups and non-athletes differed significantly on several of the MMPI scales. Also an analysis of the 550 MMPI questions revealed that 22 of the items discriminated between poor and good competitors. Slusher (1964) investigated differences in personality characteristics of high school athletes and non-athletes. He found that athletes and non-
athletes differed on all the MMPI scales except the M (hypomania) and K (validity). Person (1964) revealed that champion swimmers differed from the average population in 15 of the 16 factors of Cattell 16 PF and the champion swimmers apparently possessed extreme scores on personality factors.

William et al (1970) found that the female athlete, like the male athlete, tends to differ from the non-athlete on a number of personality factors. Also female athletes from different sub-groups tended to differ on various dimensions of personality. Goles (1971), however, found athletes to be significantly more extroverted than the non-athletes, and the sport groups did not differ on E-dimension. Also, none of the groups differed on the neuroticism, stability dimension.

Rusch (1972) found that adult female athletes to be more reserved and tough-minded than the non-athletes. However, Gooch (1973) found variations in personality between successful and non-successful women athletes and between inter-collegiate and non-inter-collegiate women athletes. Evidence also indicated that there was relationship between personality and physical performance. Yeater (1977) showed that a group of inter-
collegiate basketball players were more tough-minded and group dependent than non-athletes. Mohan et al. (1979) found that the players were more extroverted than non-players and low on neuroticism implying more stability of emotionality.

Many other investigators have also reported that athletes could be differentiated from non-athletes with respect to their self-control (Bird, 1970), self-sufficient (Ogilvie, 1968), extraversion (Peterson et al., 1967; Bushan and Aggarwal, 1978), dominance (Ammodt et al. 1982). locus of control (McKelvie and Hushand, 1980), death anxiety (Kumar et al. 1985), self-esteem (Kumar et al. 1985) and mental health (Kumar et al. 1985).

Thakur and Thakur (1980) studied personality characteristics of the athlete and non-athlete Indian college males using projective method of personality assessment and found that the characteristics associated with the athletes were happiness, cordial and affectionate, anxiety, achievement, dominance and superior organisation capacity, whereas the characteristics associated with the non-athletes were guilt, acquisition, passivity, rejection, superior imagination.

Thakur and Ojha (1981), Vallianet et al. (1981), Dowd
and Innes (1981), Ammodt, Alexander and Kimbrough (1982) found football players and track team members to be more dominant and less patient than the non-athletes. Daino (1985) found that tennis players were more extroverted as compared to the normal population. Sharma and Shukla (1986) also concluded that athletes in various sports specialities tend to be outgoing, socially confident, emotionally stable, happy go lucky, conscientious (rules bound), ventures, self-reliant, rigorous, confident, self-sufficient, controlled and relaxed. On the other hand, the non-athletes are reserved, less intelligent, affected by feeling, weak super ego, shy, tender-mindedness, suspicious, doubting, indisciplined and tense:

Kumar and Thakur (1986) found that athletes were not anxious, tender-minded and worrying persons, but had outgoing personality in comparison to non-athletes. These results support the finding of Eysenck et al. (1982) who reported that athletes tended to be low in neuroticism or anxiety and tended to be extraverted than the non-athletes, Singh and Singh (1986) found that the neuroticism tendency was significantly higher in the non-sports groups of students, whereas, no significant differences was
observed in extraversion scores between the two groups. Shanker
(1986) found that the position winner gymnasts and non-position
winner gymnasts of various universities of India are almost
equally stable and extraverts in their psychological make-up of the
personality scales. However, the gymnasts differ from non-
athletes on both the dimensions of personality. Hence, gymnasts
are better equipped mentally for successful performance and
achievement in sports than non-athletes. Dureha (1987) concluded
that the sportsmen and non-sportsmen differ in their personality
characteristics in some factors like “emotional stability and
realism about life, cheerfulness and frankness, tender-mindedness
and practicability and great control over emotions and greater
regards for self-respect and social reputation.”

**Personality Traits of sportsmen of individual and Team Games.**

The results regarding differences in the personality
traits of players of individual and team games are unequivocal.
Some studies have failed to be able to find difference between
team and individual athletes (Lakie, 1962; Ikegam, 1968; Pyeche,
1970). But some studies have shown that athletes in group sports
tend to be extroverted and self-confident, while those participating in an individual sports are more inclined to be introverted, stable and confident. Kane (1967) had questioned whether a single "personality type" exists for athletes. Some sports may show significant differences in personality profiles of its participants in cases where a sufficiently wide range of sports are selected (representing many team of individual sports), it is doubtful whether such clear-cut differences persist. Of course, the popular belief holds that individual sport contestants are more introverted and self-centred than team sportsmen who are more extrovert and team-oriented.

Hein (1954) found team sports participants to be more extraverted than those participating in individual sports. He also found that participants in individual and dual sports possessed less amount of self-assurance. But Niblock (1960) found that the individual and team sports participants scored higher on ascendency than did non-participants. Rushall (1967) demonstrated that male swimmers (individual sport) were to be more individualistic and self-centred. Peterson et al. (1967) reported that woman athletes who participated in individual sports when compared to women competition in team sports were more
dominant, adventurous, sensitive, radical, imaginative, self-sufficient, and more forthright. They also found team sport female athletes to be intellectually brighter and more conscientious and aggressive than the normative group of equivalent age and education. Thus, the athletes from the individual sports were more introverted than the team sport athletes but both groups were characterised by emotional stability.

Malumphy (1968) and Ogilvie (1968) also conducted a related investigation, where four groups of female athletes i.e. athletes in team sports, in individual sports, team-individual sports, subjectively judged sports and the non-athletes, who differed on various factors. The athletes from individual sports were more extroverted than those athletes from team and team-individual groups. This seemed to be in disagreement with the findings of Peterson, Weber and Trousdale (1967). Malumphy also found that the team sport group was less extroverted than the non-athletes. However, he found individual female athletes to be more anxious, venturesome, tough-minded, extraverted, while team athletes were lower in leadership, less venturesome and extraverted. But Kirkcaldy (1982) found no significant differences regarding the personality dimension of team and
individual athletes. However, Sharma and Shukla (1986) found that the individual sports athletes were higher on conscientiousness, outgoing, super-ego, strength, vigorous, relaxed and tough-mindedness.

Shing (1986) found that the players of individual events and team games differed significantly on the extraversion and neuroticism traits of personality. In the case of both males and females, the athletic group was more extrovert and more neurotic than the hockey group. Sandhu, Mann and Brar (1987) found that the team players and wrestlers were equally extraverted.

**Personality Traits of Sportsmen of Various Games.**

The area of personality and athletic has resulted in a great deal of contradictory claims as to whether or not athletes exhibit a characteristics personality profile (Likie, 1962; Schendel, 1965; Werner and Gottheil, 1966, Kroll and Carlson, 1967; Singer, 1968; Rushall, 1968; Newmann, 1968; Berger and Litterfield, 1969; Hammer, 1969; Neele, Sanstroem and Metz, 1969). Researchers in sports psychology are trying to identify the hidden factors behind success in a particular sport. Several
researchers are studying the relationship of extraversion, neuroticism and other personality traits with specific sports events.

By comparing 154 young competitive swimmers with a control of 103 “non-competitive”, Gabler (1972) found swimmers to be characterised by a “dominance” and higher “autonomy” as well as being higher on achievement motivation. In another study conducted in West German, Sack (1975) revealed that middle and long distance runners when compared to handball and football players were different along the dimensions of dominance, introversion-extraversion and body build.

Kane (1970) found a rather complex relationship between the second order personality variable “extraversion” and performance of “track athletes” (sprinters), and “throwers were found to be frequently more extraverted than middle distance runners. He claimed that as the distance increases, there was a trend towards introversion. Johnson (1972) demonstrated differences between female athletes participating in such sports as basketball, bowling, field hockey and golf, as did Kroll and Crenshaw (1968) between footballers, wrestlers and gymnasts.
Personality trait of basketball and softball women athletes have also been studied and reported in the literature (Foster, 1972), Maul and Voigt (1972) found that aggression varies as a function of the position in the team for volleyball. Friedman (1973) could not replicate these findings, Kruse (1977) found difference in personality and the position played in football.

College wrestlers and experienced marathoners have been found to score significantly lower than the population average or anxiety (Morgan and Hammer, 1971; Morgan and Costill, 1972). Also American world-class wrestlers were found to be more extroverted than the normal population and marathoners, who in turn were more introverted than the normal population and most other athletic sub-groups (Morgan, 1968; Morgan and Costill, 1972). Indeed, American wrestlers were noted to be extremely stable even when tested 24 to 48 hours before competition in a world tournament (Morgan, 1968 a). It may well be that stability is a pre-requisite for high level competition. Yanada and Hirata (1970) reported that those students who continued in their sports clubs were less neurotic, less depressive and more hypomanic than those who dropped out.
Thakur and Ojha (1981) found football players as possessing A+, B-, H+, I-, O+, Q1+, Q2-, whereas table-tennis and the badminton players appeared to have almost similar characteristics except on a few factors viz. factors B, 1 and 0.

Daino (1985) found that, in general, tennis players scored significantly higher in extraversion and will to win and exhibit a less “neuroticism” (emotionally unstable), anxiety apprehension, obsession and depression. Singh (1986) found that the champion boxers of All India Inter-varsity level were emotionally more stable, Possessed stronger super-ego strength, self-reliant, practical, confident, experimenting, self-sufficient, highly self-concept and unfrustrated. On the other hand, non-champion boxers of All India Inter-varsity level were dependent, imaginative, depressive, emotionally less stable, humble, weaker super-ego strength, conservative and frustrated. Singh and Brar (1987) found that both male and female handball players were just ambiverts. They, however, suggested that these studies need to be extended further to know the personality traits of the athletes in different sports events in Indian condition.
**Personality and Sports Performance**

Several investigators have directed their attention towards and understanding of the relationship between personality and level of performance e.g. Johnson, Hutton and Johnson (1954) found that the outstanding athletes were found to possess several distinguishing characteristics like “extreme aggressiveness, a freedom from great emotional inhibition, high and generalised anxiety, high level of intellectual aspiration and feelings of exceptional self-assurance”. LaPlace (1954) also investigated that the outstanding athletes were better adjusted than the outstanding athletes were better adjusted than the “unsuccessful group”. Singer (1969) compared the basketball players and tennis players on EPPS norms and also the highest and lowest ranked athletes in both sports. The baseball team scored significantly higher than the other two groups on the abasement factor, significantly lower than the other two groups, on the intraception variable, lower than the tennis group on the achievement variable, lower than the norm group on autonomy and lower than the tennis group on the achievement variable, lower than the norm group on autonomy and lower than the tennis group on dominance. Both the baseball and tennis groups scored significantly higher than the norm group on
the aggression factor. No differences were noted between high and low rated baseball players.

Persons (1964) administered the 16 PF to champion swimmers and found that they differed from the population on 15 of the 16 factors. However, those swimmers in the champion group who were selected to participate on 1962 Canadian team did not differ from those swimmers who were not selected.

Kane (1964) who reviewed the literature pertaining to personality and physical ability came to the conclusion that a positive relationship exists between “athletic ability and stability as opposed to anxiety, athletic ability and extraversion as opposed to introversion”. The results of the investigations conducted since Kane’s (1964) review have been equivocal as provided by considerable evidence showing that success in sports is dependent upon certain physical capacities. Kane (1964) also examined the relationships between various physical abilities, personality factors, physique, and sociometric status. He found, (i) that a high level of physical ability favours extravert development, (ii) that among those of high physical ability, only those achieve high standards in competitive conditions who rate highly in extravert,
and (iii) that size supports stability.

In a study conducted by Acampora (1971), on women field hockey players at the high school, college and club level, it was found that the higher the level of competition, the more favourable the score on traits such as self confidence, determination, emotional control, conscientiousness, trust and leadership.

The findings of Singh (1979) supported that high skilled players, irrespective of the game they played were more extrovert and less neurotic than the low skilled players. His results further confirmed the findings of some previous investigations conducted by Sperling (1942), Johnson, Hutton and Johnson (1954), Yanada and Hirata (1970), Foster (1972), Sandhu (1976), Shokeen (1977), Gruber and Parkins (1978).

Recently, interest in the relationship between “sports and personality” has once more received a boost (Kirkcaldly et al. 1983; Bachleitner, 1984), while there are some researchers who have established an obvious relationship between athletic performance and personality traits (Eysenck, 1982; Kirkcaldly, 1982), there are other who deny such a correlation mainly
because the results provide contradictory findings (Sack, 1982; Mummendry, 1983).

**Role of Competitive Anxiety in Sports.**

A considerable amount of research has been done to ascertain the effect of anxiety and psychological stress on the learning and performance of motor skills. Most of the researches pertaining to relationship between anxiety and sports is concerned with the questions as to how A-trait and A-state affect sports performance and how sports affects A-trait and A-state. There are a very few studies that have compared various groups of sports participants to determine the differences in general A-trait. If we assume that sports participants are higher in A-trait than non-participants, or if participants in one sports are higher than participants in another sport. or if there are differences in A-trait or A-state on the basis of sex of participants, sports psychologists will have a reliable basis for investigating parameters of the sports environment to establish the causes for higher A-trait.

**Sex Differences in Competitive Anxiety.**

The commonly accepted contention that women in athletics are more anxious seems to be borne out by research
evidence. A number of studies have indicated that female athletes are significantly more anxious than other women. In comparing women track and swimming athletes to a norm group, Kane (1966) found athletes to be more anxious. Similar findings resulted from a comparision of women physical education majors to both a norm group and to men compared to the norm women, the physical education students scored low on emotional stability nad were more anxious, and compared to males they were significantly more tense and less composed. Malumphy (1968) found female team athletes to be significantly more anxious than individual players and non-participants. Kane (1972) has reported that in general, anxiety is higher for women than for men, although there are many exceptions. He further reported that British women athletes are significantly less anxious than their female counterparts in the USA. in part because the British are more generally accepting of females in athletics than are Americans.

Ikponmwosa (1981) examined the relationship between sex-role standards and anxiety in competitive sports situations. It was hypothesised that biological sex differences and liking or disliking of competitive sports were insufficient to
adequately explain observed patterns of sex differences in competitive sport. These differences were explained as being a reflection of social perception of the sex type appropriate for competitive sports. The results obtained in this study are consistent with those of Cosentino and Heilbrum (1964) and Gall (1969).

Sanderson and Ashton (1981) investigated pre-match and post-match anxiety states of males and females as well as match winners and losers during a badminton tournament. Results revealed a significant decrease in the female players' anxiety after winning matches as compared to the male players.

Singh (1985) found significant sex differences in the competitive anxiety of the Indian athletes, the females having more anxiety than the males. In another study, he (1986) found significant differences in the anxiety scores of the athletes and the hockey players on the basis of sex, the males having less competitive anxiety than females.

**Competitive Anxiety of Athletes and Non-Athletes**

The study of individual differences in anxiety responses to competitive situations has been an important area of
sport personality research. There are a few studies which have compared the anxiety level of the superior athletes and non-athletes.

Perhaps the most persuasive evidence for the existence of relationship between sports competence and A-trait was provided by Ogilvie (1968) who reviewed the sports personality literature. On the basis of this review, he concluded that athletes, particularly superior athletes, have unique and identifiable personality profiles. Superior athletes are emotionally more stable, have lower levels of A-trait, and greater resistance to emotional stress. He did not qualify this for any specific sport or the sex of the participant. More recently, Cooper (1969), Husman (1969), Jonson and Cofer (1974), Kroll (1970), Martens (1975a, 1975b), Morgan (1972) and Rushall (1972) failed to concur with Ogilvie (1968). Each of these reviewers have concluded that there are no consistent differences in A-trait among participants when compared with non-participants or between participants of different skill.

According to Mertens (1977), that if differences exist in general A-trait between athletes and non-athletes, they are
minimal. General A-trait is a measure of the tendency to become aroused in a wide class of situations. It is difficult to explain why athletes should be higher or lower in A-trait than non-athletes for all types of situations. This, however, may not be true when considering a person’s tendency to become anxious in competitive sports.

Hardman (1973) compared A-trait among 42 different samples of athletes. He found that most male athletes were within the normal range of A-trait on the Cattle. 16 PF using the derived anxiety factor. Hence, most athletes tended to have A-trait levels similar to the general population. He also suggested that superior athletes are less anxious than average-ability players, while displaying higher levels of (A-trait than the population mean. Singh and Singh (1986) found the level of anxiety to be significantly higher in the non-sports group of students.

**Competitive Anxiety of Sportsman Belonging to Different Types of Games.**

Several investigators have attempted to identify anxiety level as a correlate of good performance of the athletes of different types of games. Tutko (1971) stated that anxiety is
greater in individual sportsmen than in team sportsmen. In an individual sports, success of failure lies solely with the individual participant. The individual stands alone when he fails and must singly accept the repercussions of losing. In the team games, errors usually go unnoticed because of the general activity of the contest, and moreover, success and failure are commonly shared. But, according to Spielberger, Corsuch and Luschene (1970), there is no apparent trend showing individual or team sport athletes differ in A-traits.

Huddleston and Gill (1981) using Marten’s CSAI attempted, among other things, to examine whether there was a difference in A-state between two groups of female track and field athletes based on skill level. They felt that their lack of significant results may have been partially due to the small numbers of subjects in the study and due to the fact that the skill differences between the two groups was not great.

Finn and Sprauge (1981) made a comparison of competitive trait anxiety levels of 9-12 years old participants in little league and neighbourhood baseball. Results showed significant differences in the mean anxiety scores: (a) among
test-trial conditions for the little league group as well as the
neighbourhood sample, (b) among test-trial conditions for the 9,
10 and 12 years old age-group, and (c) between the little league
and neighbourhood participants during pre-season, mid-season and
post season conditions. The results were: (a) exposure to a
competitive experiences influenced the A-trait of the children, (b)
age as a pertinent factor regarding A-trait scoring, and (c) the
organizational type of competitive situation affected the A-trait
results of the little league and neighbourhood groups.

By administering Martens’ SCAT, Power (1982) made an analysis of anxiety levels in track and field athletes of
varying ages and abilities. He found: (i) a significant tendency for
anxiety to increase with age, (ii) the significant differences
existed between the competition sub-groupings, and (iii) CTA
seemed to be a significant problem as far as track and field
athletes and as such levels of CTA were found to be detrimental
to performance.

Soustroem and Bernardo (1982) studied intra-
individuval pre-game state anxiety with basketball performance and
found significant A-state effects for both composite game
performance (PERF) and total point (TP). Although A-trait predicted absolute A-state levels extremely well, it failed to achieve a significant relationship with performance. Moreover, high A-state scores were found to be associated with poorest performance in all the three trait groups.

Raviv and Rotstein (1982) studied trait anxiety, state anxiety and self-control in marathon runners. The findings of this study revealed significance differences between the marathon runners group, the team sports athletes and individual sports groups. The marathon runners were characterised by a lower level of state anxiety before competition and higher level of self-control. It was reported that a high level of self-control which is typical of marathon runners, makes it possible for the marathoners to endure the pain and other difficulties which arise throughout the long run and to overcome them.

Using SCAT, Smith (1983) found that all-star athletes had significantly lower anxiety scores than playing substitutes and this agrees with the concept that team sport athletes of higher status were less threatened by competitive situations than athletes of lower playing status.
Singh (1986) found significant differences in the competitive anxiety between the athletes and hockey players, whether males or females or combined, the athletes having more competitive anxiety than the hockey players. He also found players of the team games had less competitive anxiety. Verma (1987) found that as compared to athletics and non-sportswomen, sportswomen from team games such as basketball, hockey and volleyball had higher level of anxiety. Sportswomen from individual sports such as athletics, wrestling, cycling etc. which are of an independent nature tended to reduce anxiety level and inculcate the tendency of introversion.

**Effect of Anxiety on sports performance.**

Research dealing with anxiety and sports performance has produced conflicting results. It has to be seen as to how A-trait and A-state influence sports performance. Almost insignificant applied research in sport contexts has been conducted on this topic. Reed (1960) found that both high and low levels of anxiety tended to disrupt the learning process, whereas, moderate levels of anxiety created an ideal atmosphere for learning and performance. But his suggestion that top class
athletes are lower in A-trait was not supported.

Hollingsworth (1965) investigated the relationship between levels of trait anxiety, state anxiety and the performance of gross motor skill. A strong relationship was found to exist between state and trait anxiety. It was also found that as the performance level increased with practice, the anxiety level tended to decrease.

Thirer and Doukell (1980) examined pre-competitive anxiety level and its influence on athletic performance. They found no relationship between players' anxiety level an the coaches' assessment of performance in a game. This suggests that the coaches' ratings may not be reliable as pre-competition anxiety levels were consistent with the perceived importance of each contest.

Weinberg and Genuchi (1980) examined the relationship between competitive trait anxiety, state anxiety and golf performance in a field setting. Results indicated a significant CTA main effect with low CTA subjects displaying lower state anxiety than moderate or high CTA subjects.

The competition main effect and performance results
were also significant.

In the area of competitive sports, the relationship of performance to state-trait anxiety has also been studied by many investigators including Carron and Bennet (1976), Hanin (1980), Cratty and Hanin (1980), because in the stressful setting provided by competitive sports, it is not unusual to observe an athlete whose fears at least interfere with the effective performance.

Singh (1985) in one of his studies concluded that (i) the competitive anxiety decreases with the increase in age in the case of the male athletes, but it increases in the case of female athletes, (ii) in the case of male and female athletes, the competitive anxiety in the Indian athletes has no relationship with their experience of participation in competition, (iii) the Indian athletes have moderate level of competitive anxiety as compared to the sample norms proving the inverted U-shape relationship between performance and anxiety. In another study, he (1986) found that there were no significant differences in the anxiety scores of athletes, whether males or females on the basis of four different categories of athletes i.e. sprinters, middle and long distance runners, throwers and jumpers. Also there were no
no significant differences in the anxiety scores of hockey players whether males or females on the basis of their playing positions i.e. forwards, centre and backs.

**Traits and State Anxiety in Sports.**

Recently, a number of research efforts have been directed at finding a relationship between competitive trait anxiety (CTA) and state anxiety. These studies provide data concerning factors related to inducing stress in competitive sports and give more insight into the relationship between various state anxiety level. While attempting to predict various levels of state anxiety, most research has concentrated on using only one independent variable.

The major question before the researchers has been as to how A-state change during the competitive process, particularly pre-game A-state. The question is whether or not individuals actually change in A-state as they approach a competitive sports contest and if this change differ for persons high in A-trait as compared to those low in A-trait. Spielberger’s trait-state theory of anxiety (1972) predicts that high A-trait subjects manifest greater increases in A-state than low A-trait
subjects when the situation is perceived as threatening. Based on Spielberger’s (1966) state-trait anxiety theory, McAdoo (1970) reported that subjects high on A-trait respond to threatening situations with greater levels of A-state than persons Low on A-trait. It was also shown that success reduces, while failure increases A-state more in high A-trait than in low A-trait subjects.

Several researches have examined changes in A-state as a function of time to compete. Research by Martens and his co-workers (Martens, Gill, Simon and Scanlaan, 1975; Martens and Gill, 1976; Martens, 1977) indicated that state anxiety levels are higher at pre-competition and mid-competition than at baseline measures. With the exception of Margan’s (1970) found that the pre-match anxiety scores were lower than the pre-season scores, but there was no differences in the anxiety scores between easy and difficult matches.

Further, some studies showed greater threat and higher state anxiety as evidenced by high trait-anxious people. (Hodges, 1968; McAdoo, 1970). Recent investigations indicate that competitive trait anxiety is an important intra-personal determinant of perceived threat when people are anticipating
participation in a competitive experience. The results of these studies showed that higher competitive trait-anxious adults and children exhibit higher elevation in state anxiety than do low competitive trait anxious persons when facing competitions (Scanlan, 1975; Martens and Gill, 1976; Martens and Simon, 1976; Martens, 1977).

Klavora (1975) used State-Trait Anxiety Inventory developed by Spielberger et al. (1970) with 300 high school basketball and football players. They found out that high A-trait players in both samples were higher in A-state for all three A-state measures i.e. one week prior to a game in a practice session, 1/2 hour before a regular season game and again 1/2 hour before a tournament play off game. Both the high and low A-trait groups showed substantial increased in A-state just prior to both contests when compared to the practice A-state level. No. difference was found between the regular season game and play off game.

Navaczyk (1977) investigated the differences in trait and state anxiety levels among individuals participating in three divisions of junior high school competitive ice hockey. There were significant differences among competitive situations and
between pre-test and post-test situations. Cannell (1977) found
A-states being reduced after winning but increased after losing in
women's inter-collegiate basketball. Morgan and Hammer (1977)
found significant change in A-state of college wrestlers. It was
also found that pre-meet A-state rose significantly from a base-
line level and post-match. A-state levels were significantly lower
than pre-match.

Research findings by Martens and Gill (1976); Martens (1977); Scanlan and Passer (1978) have indicated
consistently that high A-trait individuals manifest greater A-state
just prior to engaging in competition than low A-trait individuals.
However, little is known about the manner in which competitive
trait anxiety influences perceived threat during actual competition
with an opponent of equal ability. One related study (Martens and
Gill, 1976) examined A-state level at mid-competition and found
that high A-trait children evidence greater A-state than low A-trait
children. Martens (1977) found that the mean scores increased
from the basal level through tournament first and second round
competition. This result indicated that state anxiety increased
throughout the competitive process.
In another study by Scanlan (1978), the A-state of extreme high and low A-trait men were assessed while performing in a minimally evaluative non-competitive situation and again, during competition with an opponent of demonstrated equal ability. It was hypothesised that between A-trait groups no A-state differences would be evidenced, while performing in the non-competitive situation, but that high A-trait man would manifest greater A-state researches have shown that CTA is effective in predicting various levels of state anxiety (Martens, 1977; Martens, Rivkin, Burton, 1979), however the strength of these relationships are inconclusive.

Some researches supporting the findings that state anxiety increases with failure and decreases with success are available (Mc. Adoo, 1970; Guaderey and Poole, 1972; Gill, 1976; Martens and Gill, 1976; Scanlan, 1977). Most of this work has dealt with the immediate impact of winning and losing upon post-competitive state anxiety levels.

Burton (1976) also studied the relationship between trait and state anxiety with movement satisfactory and participation in physical activities. He found that the high A-trait
subjects had higher. A-state scores along with lower movement satisfaction scores than did the low A-trait subjects on both pre-tests and post-tests. No change was found in the A-state level of the low A-trait group, but the A-state level of the high A-trait group decreased significantly over the treatment period.

Martens and Gill (1976) reported that subjects’ A-state levels on the Spielberger STAI increased as a number of games won on a motor maze task decreased. Both high and low A-trait subjects increased in A-state after failure, but remained relatively low in A-state after success. Scanlan (1977) contended that successful outcomes reduce threat of potential negative evaluation, whereas failure outcomes maximise threat. His investigation of attribution of high Vs low A-trait subjects relative to success-failure on a competitive moto maze task clearly indicated that success-failure was an important factor affecting the perception of threat, as measured by A-state levels. Hall (1980) reported that externals were significantly higher on A-trait than intervals, and there was a significant relationships for A-trait and pre-and post-performance A-state, as well as for relationship of post-performance A-state to number of internal attributions.
Scanlan and Passer (1978) found CTA to correlate significantly with basal and pre-competitive state anxiety scores among youth male soccer players. Weinberg and Genuchi’s (1980) investigation of male college golfers concluded that CTA was a significantly predictor of first round. competition scores only. Gruber and Bearucamp (1979) in their study on “Relevancy of the Competitive State Anxiety Inventory in a sport Environment”, found changes in anxiety states before and after competition, where state anxiety was significantly reduced after all games that were won but remained high after all three games that were lost. The girls were found to be significantly more anxious before the crucial games when compared to the easy games.

Koyama, Imomata and Takeda (1980) found significant difference in three different sessions on state anxiety inventor (SAI), while Trait Anxiety Inventory (TAI) and SCAT were relatively stable those sessions. Secondly, TAI was found to be significantly better predictor of SAI than SCAT in pre-1 (2 months before) and pre-2 (1 day before) session, on the other hand, in pot-1 (1-month after) session, both TAI and SCAT were note significantly correlated with SAI. Thirdly, no significant
correlation was detected between anxiety (TAI, SAI and SCAT) and competition outcomes and player’s self-evaluation.

Hall and Purvis (1981) investigated the effects of both trait and state anxiety on competitive bowling. Results showed that (i) lower pre-competition averages were significantly related to high A-state scores. (ii) bowlers exhibiting higher A-state prior to competition performed significantly more poorly during the tournament and that high A-trait bowlers scored significantly higher on A-state before competition (iii) high A-trait bowlers had lower averages at the beginning of competition.

Huddleston and Gill (1981) examined state anxiety as a function of skill level and proximity to competition. The results indicate that state anxiety increased immediately prior to competition. The pre-practice and pre-meet measures, which did not differ from each other, were both significantly higher than the post-practice measure, suggesting that practice created anxiety levels similar to those generated by a competitive meet. A-state score of qualifiers and non-qualifiers differed only slightly following practice and prior to the meet. The A-state levels of non-qualified were, however, somewhat more elevated than those of
qualifiers prior to practice and immediately before the competitive event. Wandzilak, Potter and Lorentzen (1982) also confirmed the previous findings concerning the relationship between CTA and pre-game state anxiety. They concluded that state anxiety increases as the event becomes closer in time.