

# **A Study of General Mental Ability among Players and Non-Players of Chandigarh Schools**

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*Abstract*—As it is well known good physical fitness is the key to success for any sportsperson. However, being physically fit is not enough. One must also have good mental ability to perform better. The present is an attempt to understand the same. The present study is based on a survey of 100 school students of Chandigarh region. The study revealed that the female national players had exhibited significantly better general mental ability than their counterpart male national players. Also, the male players demonstrated significantly better general mental ability than their counterpart male non-players.

**Key words:** Chandigarh, Mental Ability, Non-Players, Players, Schools

## **I. INTRODUCTION**

In the present scenario, the sports at competitive level become more of psychological phenomenon than the physical one. Success in competitive sports places high psycho-physical demands on the participants. They are to be physically fit, technically skillful and tactically sound to have a firm grip over the competitive situations. However, their psychological aliveness to the situation has been described by many to be of paramount importance. At the time of competitive struggle, it is the psychological aspects of the players which move them to their optimum physical fitness, technical and tactical preparedness. The sportspersons have to be highly vigilant, emotionally stable, socially mature and able to control their nerves in order to perform at sports competitions. It becomes quite apparent that psychological fitness also needs to be kept equally in mind to achieve high results in sports competition.

The ability of a person to perform in any sports/game is obviously limited by his/her physical characteristics, but beyond these broad restrictions, psychological factors play a decisive role. Many coaches and psychologists believe that future records will be broken primarily because of increased focusing to psychological features of the personality more than physiological and mechanical aspects of performance (Cratty, 1973).

Sports psychology has emerged as a front runner discipline in shaping athletes in world beaters. It has many psychological aspects which assist an athlete for better performance in every sport. The psychological preparation is planned and carried out with the aim of enabling the sportsperson to have an optimum psychological state at the time of competition so that the athlete can achieve his/her maximum possible performance in the competition.

General mental ability (GMA) is a term used to describe the level at which an individual learns, understands instructions, and solves problems. Tests of general mental ability include scales that measure specific constructs such as verbal, mechanical, numerical, social, and spatial ability. The overall score is considered the most important factor, explaining more variation in individual performance than

specific abilities. Green (1989) showed that mental techniques are the most common ones in improving the performance of athletes in competitive situations. Mental practice is the cognitive rehearsal of a physical skill in the absence of overt physical movement. This imagination leads to creation of nerve impulses similar to those generated during real performance. Along with learning skills and achieving a higher level of performance, creating coordination between the mind and the body gains importance.

Rateb (2000) viewed that the psychological ability helps the individuals to mobilize their efforts and physical energy to achieve the best sport practicing which can be developed through special training and programmes dedicated to this purpose (i.e. psychological skills training programmes). Sport psychology researchers and practitioners, coaches, sports commentators, sports fans, and athletes acknowledge the importance of mental toughness in sporting performance (Goldberg, 1998; Hodge, 1994; Tunney, 1987; Williams, 1988). Loehr (1982, 1986) points out that both athletes and coaches believe that at least fifty percent of success is due to psychological factors that reflect mental stability. Similarly, Gould et al. (1987) confirms that coaches feel that mental stability is important in achieving success and developing champion athletes. Dahllkoetter (2003) stresses the importance of mental factors in sports performance when arguing that 'wherever the mind directs, everything follow up'. Middleton (2006) also stresses the importance of mental aspects related to the superior sport performance and reaching the highest level of sport.

Sport and exercise psychologists have discussed the importance of controlling attention and thought. However, people use various techniques in sport situations including imagery, goal setting etc. which are perhaps the most wide-spread techniques in this regard. This resurgence has been particularly strong in connection with general mental ability (GMA), a construct first postulated and defined nearly 100 years ago by Spearman (1904). A number of developments and findings have contributed to renewed interest in general mental ability (GMA). The accumulated evidence has become very strong that general mental ability (GMA) is correlated with a wide variety of life outcomes, ranging from risky health-related behaviours, to criminal offenses, to the ability to use a bus or subway system (Gottfredson, 1997; Lubinski & Humphreys, 1997).

## **II. REVIEW OF LITERATURE**

Zivdar et al. (2012) studied the mental imagery ability of male and female badminton players. The sample consisted of 40 men and 40 women who were selected out of 400 male and female athletes (220 men and 180 women) participating in individual badminton tournaments by using simple random sampling technique. The present research is descriptive-comparative where field method is used for data

collection. The measurement material includes 2 questionnaires i.e. Vividness of Imagery Questionnaire (VVIQ) and Vividness of Movement Imagery Questionnaire (VMIQ). Descriptive statistics and 't' test for independent samples were used for data analysis. The results indicated that there is a significant difference between male and female badminton players in internal and external imagery ability as well as mean internal and external imagery scores, suggesting that male athletes have higher internal and external imagery ability.

Song et al. (2010) evaluated the differential effects of general mental ability and emotional intelligence on academic performance and social interactions. The study considers the debate about whether emotional intelligence (EI) has incremental validity over and above traditional intelligence dimensions. They propose that EI and general mental abilities (GMA) differ in predicting academic performance and the quality of social interactions among college students. Using two college student samples, they find support for the notion that emotional intelligence and general mental abilities each have a unique power to predict academic performance, and that General Mental Abilities is the stronger predictor. However, the results also show that emotional intelligence, but not general mental abilities, is related to the quality of social interactions with peers.

Mokhtar et al. (2009) studied to develop psychological and mental abilities for the elite junior players through applying a programme of mentoring and some techniques of neuro-linguistic programming (NLP). It is a new programme in sports field at the middle east, whereas the programmes were limited in the mental training and psychological skills training (PST) without different psychological techniques or methods like mentoring, counseling and neuro-linguistic programming. Considering that the athlete does not have any social or psychological problems, the important goal from sports psychology is to improve the performance in the competition; therefore, the researchers have studied different psychological techniques, participated in courses and various programmes to get the expertise, and certified practice. The study sample had made up of 15 players, representing the basketball national team of youth. The programme consisted of eighteen sessions the aim of which is to develop psychological and mental abilities for the elite junior players by using mentoring and some neuro-linguistic programming techniques. The results show the importance of using mentoring with elite players besides the other psychological methods. Explicit improvement in all mental and psychological abilities for the elite junior players had also recorded.

Batty et al. (2007) examined the relation of scores on tests of mental ability in childhood with food consumption and physical activity in adulthood. Based on a cohort of more than 17000 individuals born in Great Britain in 1970, 8282 had completed data for mental ability scores at 10 years of age and reported their food intake and physical activity patterns at 30 years of age. Results revealed that Children with higher mental ability scores reported significantly more frequent consumption of fruit, vegetables (cooked and raw), whole meal bread, poultry, fish, and foods fried in vegetable oil in adulthood. They were also more likely to have a lower intake of chips (French fries), non-whole meal bread, and cakes and

biscuits. There was some attenuation in these associations after adjustment for markers of socioeconomic position across the life course, which included educational attainment, with statistical significance lost in some analyses. Higher mental ability was positively associated with exercise habit, in particular, intense activity (defined by being out of breath/sweaty). The associations between mental ability and these behaviours were similar in both men and women, and they were somewhat stronger for verbal than non-verbal ability.

Robert et al. (2005) explored the prediction of general mental ability based on neural oscillation measures of sleep. The usual assessment of general mental ability (or intelligence) is based on performance attained in reasoning and problem-solving tasks. Differences in general mental ability have been associated with event-related neural activity patterns of the wakeful working brain or physical, chemical and electrical brain features measured during wakeful resting conditions. Recent evidences suggest that specific sleep electro-encephalogram oscillations are related to wakeful cognitive performances. The aim is to reveal the relationship between non-rapid eye movement sleep-specific oscillations (the slow oscillation, delta activity, slow and fast sleep spindle density, the grouping of slow and fast sleep spindles) and general mental ability assessed by the Raven Progressive Matrices Test (RPMT). The grouping of fast sleep spindles by the cortical slow oscillation in the left frontopolar derivation (Fp1) as well as the density of fast sleep spindles over the right frontal area (Fp2, F4), correlated positively with general mental ability. Data from those selected electrodes that showed the high correlations with general mental ability explained almost 70% of interindividual variance in RPMT scores. Results suggest that individual differences in general mental ability are reflected in fast sleep spindle-related oscillatory activity measured over the frontal cortex.

John et al. (2000) evaluated childhood mental ability and blood pressure at midlife: linking the Scottish Mental Survey 1932 and the Midspan studies. *Objective of the study* was to establish the relationship between childhood mental ability and adult hypertension. *Design of the study* was community based retrospective cohort study. *Participants* were Non-clinical sample of people born in 1921 who participated in both the Scottish Mental Survey 1932 and the Midspan studies. Nine hundred and thirty-eight people were participants in both studies. *Results revealed that* after adjustment for age, sex, social class, body mass index, height, cholesterol level and smoking, there remained a 3.15 mmHg decrease in systolic blood pressure and a 1.5 mmHg decrease in diastolic blood pressure for each standard deviation increase in childhood IQ. *It is concluded from the study that* the association between hypertension and lower cognitive function in adulthood is partly accounted for by individual differences in childhood IQ.

Mizutani et al. (1989) investigated factors which affect mental ability of over residents in Shizuoka Prefecture, age over 65. Kana-pick-out test was carried out on 1245 subjects. They investigated 124 individuals of excellent scores as well as higher than normal and 133 suspects predementia with scores below the lower limit of the normal. The former group, 92.5 percent, was fond of reading books and newspapers in contrast to 55.3 percent of

the latter group. They also found that 49.2 percent of the excellent group participated in regular sports exercises, whereas only 25.8 percent of the pre-dementia group engaged in sports activities.

Schaie et al. (1987) evaluated the effects of cognitive training on primary mental ability structure. 401 participants in the Seattle longitudinal study, over 62 years old, received a 5 hour test battery at pre and post test that included 16 ability tests, marking the five primary abilities of spatial orientation, inductive reasoning, numerical ability, verbal ability and perceptual speed. A total of 229 of subjects received 5 hour of individual training on either spatial orientation or inductive reasoning. Restricted factor analysis with the LISREL algorithm tested the hypothesis of measurement equivalence across test occasions, separately for the control subjects and for each of the training groups.

When ability-specific cognitive training intervenes, no structural change is observed for abilities not subject to intervention. However, slight shifts occurred in the optimal regression weights for the different markers for the training target abilities.

Kaufman (1978) evaluated the relationship of hand dominance to the motor co-ordination, mental ability and right-left awareness of young normal children. Normal children, who have established hand dominance as measured by the McCarthy scales, were compared on mental and motor variables with youngsters who did not give evidence of dominance. Using the McCarthy normative sample (N=1032) as the data source, significant differences in mental ability and motor ability were found for 2 ½ - 4 ½ year olds but not for 5-8 ½ olds. However, a significant relationship between handedness and right versus left awareness was obtained for the older group.

### III. RESEARCH METHODOLOGY

The study was based on primary data collected from 100 children of Chandigarh schools. General Mental Ability was

Source of Variance	Sum of Squares	df	Mean Square	F-value	Sig.
Between Group	11748.500	2	5874.250	47.250*	.000
Within Group	36923.780	297	124.322		
Total	48672.280	299			

Table 1: Analysis of Variance (ANOVA) results with regard to the variable general mental ability among male national players, inter-school players and non-players

\*Significant at 0.05

It can be seen from table-1 that significant differences were found with regard to the variable general mental ability among male national players, inter-school players and non-players as the P-value (Sig.) .000 was found smaller than 0.05 level of significance ( $p < 0.05$ ).

Since the obtained F-value was found significant, therefore, Post-hoc test i.e. Least Significant Difference

Groups				
National Players	Inter-School Players	Non-Players	Mean Difference	Sig.
66.22	66.27	-	0.05	.999
66.22	-	52.97	13.25*	.000
-	66.27	52.97	13.3*	.000

Table 2: Significance of difference among male national players, inter-school players and non-players with regard to the variable General Mental Ability

\* Significant at 0.05

It has been observed from table-2 that mean difference between male national players and inter school

measured by applying the group test of General Mental Ability prepared by Jalota (1972). One way Analysis of Variance (ANOVA) was applied to find out the significant differences among male and female national players, inter-school players and non-players. Where F-value found significant, Post-hoc test i.e. Least Significant Difference (LSD) was applied to find out the direction and significance of differences. The 't' test was applied to find out the significant differences between male and female national, inter-school players and non-players. To test the hypothesis, the level of significance was set at 0.05.

#### A. Research Objectives

- 1) To evaluate the significant difference among male national players, inter-school players and non-players on the variable general mental ability.
- 2) To evaluate the significant difference among female national players, inter-school players and non-players on the variable general mental ability.
- 3) To ascertain the significant difference between male and female national players, inter-school players and non-players on the variable general mental ability

#### B. Research Hypotheses

- 1) There would be no significant difference among male national players, inter-school players and non-players on the variable general mental ability.
- 2) There would be no significant difference among female national players, inter-school players and non-players on the variable general mental ability.
- 3) There would be no significant difference between male and female national players, inter-school players and non-players on the variable general mental ability

### IV. RESULTS & DISCUSSIONS

(LSD) was employed to study the direction and significance of differences between paired means among male national players, inter-school players and non-players on the variable general mental ability. The results of Post-hoc test have been presented in Table--2.

players was found 0.05. The P-value (Sig.) .999 showed on insignificant difference between male national players and inter-school player on the variable general mental ability.

The mean difference between male national players and male non-players was found 13.25. The P-value (Sig.) .000 revealed that the male national players had exhibited significantly better general mental ability than their counterpart male non-players.

Source of Variance	Sum of Squares	df	Mean Square	F-value	Sig.
Between Group	9464.507	2	4732.253	57.753*	.000
Within Group	24336.040	297	81.940		
Total	33800.547	299			

Table 3: Analysis of Variance (ANOVA) results with regard to the General Mental Ability among female national players, inter-school players and non-players

\*Significant at 0.05

It can be seen from table-3 that significant differences were found with regard to the variable general mental ability among female national players, inter-school players and non-players as the P-value (Sig.) .000 was found smaller than 0.05 level of significance ( $p < 0.05$ ).

Since the obtained F-value was found significant, therefore, Post-hoc test i.e. Least Significant Difference

The mean difference between male inter-school players and male non-players was found 13.3. The P-value (Sig.) .000 revealed that the male inter-school players had demonstrated significantly better general mental ability than their counterpart male non-players.

(LSD) was employed to study the direction and significance of differences between paired means among female national players, inter-school players and non-players on the variable general mental ability. The results of Post-hoc test have been presented in Table-4.4.

Groups				
National Players	Inter-School Players	Non-Players	Mean Difference	Sig.
69.68	67.54	-	2.14*	.000
69.68	-	56.84	12.84*	.000
-	67.54	56.84	10.7*	.000

Table 4: Significance of difference among female national players, inter-school players and non-players with regard to the variable General Mental Ability

\* Significant at 0.05

It has been observed from table-4 that mean difference between female national players and inter school players was found 2.14. The P-value (Sig.) .000 showed that the female national players had demonstrated significantly better general mental ability than their counterpart female inter-school players. The mean difference between female national players and female non-players was found 12.84. The P-value (Sig.) .000 revealed

that the female national players had exhibited significantly better general mental ability than their counterpart female non-players. The mean difference between female inter-school players and female non-players was found 10.7. The P-value (Sig.) .000 revealed that the female inter-school players had exhibited significantly better general mental ability than their counterpart female non-players.

NATIONAL PLAYERS							
Male		Female		Mean Difference	SEDM	't'	Sig.
Mean	SD	Mean	SD				
66.22	11.028	69.68	8.643	3.46	1.401	2.469*	0.01

Table 5: Descriptive analysis of male and female national players on the variable General Mental Ability

\* Significant at 0.05

Table-5 presents the results of male and female national players with regard to the variable general mental ability. The mean score of male national players on the variable general mental ability was found 66.22 whereas the mean score of female national players was recorded as 69.68 with mean difference 3.46. The standard deviations (SD) of male and female national players were 11.028 and 8.643

respectively. However, the standard error difference of mean was found 1.401. The 't' value 2.469 as shown in the table was found statistically significant ( $p < 0.05$ ). It has been observed that female national players had demonstrated significantly better general mental ability than their counterpart male national players.

INTER-SCHOOL PLAYERS							
Male		Female		Mean Difference	SEDM	't'	Sig.
Mean	SD	Mean	SD				
66.27	8.375	67.54	7.146	1.27	1.101	1.154	0.25

Table 6: Descriptive analysis of male and female inter-school players on the variable General Mental Ability

Table- 6 reveals the results of male and female inter-school players with regard to the variable general mental ability. The mean score of male inter-school players on the variable general mental ability was found 66.27 whereas the mean score of female inter-school players was recorded as 67.54 with mean difference 1.27. The standard deviations (SD) of male and female inter-school players

were 8.375 and 7.146 respectively. However, the standard error difference of mean was found 1.101. The 't' value 1.154 as shown in the table was found statistically insignificant ( $p > 0.05$ ). When compared the mean scores of both the groups, it can be seen that female inter-school players had exhibited better general mental ability than their counterpart male inter-school players.

NON-PLAYERS							
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Male		Female		Mean Difference	SEDM	't'	Sig.
Mean	SD	Mean	SD				
52.97	13.46	56.84	10.96	3.87	1.736	2.229*	0.026

Table 7: Descriptive analysis of male and female non-players on the variable General Mental Ability  
\* Significant at 0.05

Table- 4.7 shows the results of male and female non-players with regard to the variable general mental ability. The mean score of male non-players on the variable general mental ability was found 52.97 whereas the mean score of female non-players was recorded as 56.84 with mean difference 3.87. The standard deviations (SD) of male and female non-players were 13.46 and 10.96 respectively. However, the standard error difference of mean was found 3.87. The 't' value 2.229 as shown in the table was found statistically significant ( $p < 0.05$ ). It has been observed that female non-players had demonstrated significantly better general mental ability than their counterpart male non-players.

#### A. Hypothesis testing

- 1) It was hypothesized that "there would be no significant differences among male national players, inter-school players and non-players on the variable general mental ability". However, the obtained results revealed significant differences among male national players, inter-school players and non-players on the said variable. Hence, hypothesis number-1 stands rejected.
- 2) It was hypothesized that "there would be no significant differences among female national players, inter-school players and non-players on the variable general mental ability" whereas, the obtained results revealed significant differences among female national players, inter-school players and non-players on the variable general mental ability. Hence, hypothesis number-4 stands rejected.
- 3) It was hypothesized that "there would be no significant difference between male and female national players, inter-school players and non-players on the variable general mental ability". The results also revealed insignificant differences between male and female inter-school players on the variable general mental ability. However, significant differences were observed between male and female national players and non-players on the said variable. Therefore, hypothesis no-7 stands partially accepted in case of male and female inter-school players whereas partially rejected in case of male and female national players and non-players.

#### V. DISCUSSION OF RESULTS

It is evident from tables (1-2) that significant differences have been observed among male national players, inter-school players and non-players on the variable general mental ability. It is further revealed that the male national players and inter-school players had exhibited significantly better general mental ability than their counterpart non-players. The outcome of results might be attributed to the interaction of national players and inter-school players at different level of training camps, competitions and exposure to the different environments during camps and competitions which enabled them to outdo their counterpart non-players on the variable general mental ability. The present findings support the views of Plato that Sound mind

found only in sound body. Kawano *et al.* (1992) reported that table tennis players showed better mental ability even in the older age as compared to non-players. It is clearly illustrated from the tables (3-4) that significant differences have been noticed among female national players, inter-school players and non-players on the variable general mental ability. While calculating the mean values, it has been observed that national players had exhibited significantly better general mental ability as compared to their counterpart inter-school players and non-players. The result might be due to the fact that sports provide ample social experiences to its participants and also provide platform for the development of their general mental ability which they require to attain optimum level of performance at the time of competition. Mokhtar *et al.* (2010) explored that elite junior basketball players showed improvement in all mental abilities after neuro-linguistic programming techniques. It is clearly illustrated from the table (5) that significant difference has been found between male national players and female national players with regard to the variable General Mental Ability. While calculating the mean values, it has been noticed that female national players had exhibited significantly better general mental ability as compared to their counterpart male national players. It might be due to the fact that females pay more attention while handling the crucial situations, are more sincere towards the task at hand and also work with utmost care which might have enabled the female national players to outdo their counterpart male national players. Batty *et al.* (2007) reported that higher mental ability was positively associated with exercise habit. The results of table (6) showed insignificant difference between male and female inter-school players on the variable general mental ability. However, while comparing the mean values of both groups, it has been noticed that the female inter-school players possess better general mental ability though not significantly than their counterpart male inter-school players. It can be safely summarized that both the groups developed equal general mental ability. Silliker and Quirk (1997) also revealed insignificant differences between high school male and female soccer players with regard to the variable general mental ability. The results shown in table (7) with regard to general mental ability revealed significant difference between male and female non-players. When compared the mean values of both the groups, it has been observed that female non-players possessed significantly better general mental ability as compared to their counterpart male non-players. The outcome of the result might be due to the fact that female non-players had shown more alertness, commitment/dedication towards the task at hand as compared to male non-players.

#### VI. FINDINGS

It has been noticed from the above results (tables-1-2) that significant difference were found among male National Players, Inter-School players and Non-players on the variable General Mental Ability ( $p < 0.05$ ). However,

insignificant difference was found between male national players and inter-school players on the said variable ( $p>0.05$ ). It has been observed from the above results (table-3-4) that significant difference were found among female national players, inter-school players and non-players on the variable general mental ability ( $p<0.05$ ). It has been observed from the above results (table- 5) that significant difference were found between male national players and female national players on the variable general mental ability ( $p<0.05$ ). It has been noticed from the above results (table- 6) that insignificant difference were found between male and female inter-school players on the variable general mental ability ( $p>0.05$ ). It has been noticed from the above results (table- 7) that significant difference were found between male and female non-players on the variable general mental ability ( $p<0.05$ ).

## VII. CONCLUSIONS

It is concluded from the findings that the players (national and inter-school) demonstrated significantly better general mental ability than their counterpart male non-players. The female national players had demonstrated significantly better on the variable general mental ability than their counterparts female inter-school players and non-players. Similarly, female inter-school players also exhibited significantly better general mental ability than their counterpart female non-players. The female national players had exhibited significantly better general mental ability than their counterpart male national players. The female inter-school players had exhibited significantly better general mental ability than their counterpart male inter-school players. The female non-players had exhibited significantly better general mental ability than their counterpart male non-players.

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