CHAPTER VII
SUMMARY, CONCLUSION AND RECOMMENDATION
7.1. SUMMARY
The question of improving the performance of athletes in our country has been constantly engaging the attention of sports coaches, physical educationists, sports lovers and Govt. at all levels.

In spite of this, it is seen that the performance of our athlete falls short of international standards. The search for the reasons of such a performance of our athletes continues.

This investigation was planned in order to find out some of the problems and if possible to suggest some methods for improvement in athletic performance.

In an attempt, the present investigation entitled, "A STUDY ON PHYSICAL PERFORMANCE IN ATHLETICS AND SOME OF ITS AFFECTIVE PSYCHOLOGICAL DETERMINANTS OF TEACHER TRAINEES" has been undertaken.

However, the resultant approach of this study is confined to the following objectives:

0 To develop and standardize the psychological scales in relation to athletics for the Bengalee population as follows:
   o Achievement Motivation in Athletics (BAMIA);
   o Anxiety Test in Athletics (BISTAA); and
   o Level of Aspiration Test in Athletics (BLATA).

0 To develop and standardize a test of General Intelligence (DGIT) for the Ss of this study;

0 To evolve a measure of physical performance in selected athletic events;

0 To determine the degree of correspondence between physical performance in athletics and different levels of -
0 To suggest the measures for improving athletic performance considering the following sub-objectives:

- to develop a *suggestive model* plan on the basis of the results of this study;
- to estimate the extent of influence of the *suggestive model* plan on selected track & field athletic performance.

This study consists of three main parts:

- Standardization of Tests;
- Main Study;
- Follow Up Study.

The summary of each part is given below:

7.1.1. Summary of Standardization of Tests

The psychological inventories namely, BAMIA, BISTAA, and BLATA have been developed and standardized by the present investigator. An intelligence test (DGIT) was also standardized for the Ss of the study on the basis of tool developed by Bhattacharyya (1982).

The total number of Ss was one thousand and two hundred (N = 1200; Men = 724, Women = 476). The Ss were the physical education teacher-trainees. The age group of the Ss ranged from 20\textsuperscript{+} to 30 years. The Ss belonged to the West Bengal State (India). They were undergoing study in the physical education training colleges of West Bengal and Orissa states. The mother tongue of the Ss was Bengali, and they could fluently read and efficiently write the Bengali language.
The psychological inventories were standardized on the basis of standard procedures (Bhattacharyya et al., 1977; Martens, 1977; Ewing, 1981; Carron et al., 1985; Vealey, 1987; Gill et al., 1988).

The findings of standardization of the tests revealed the following facts:

0 For the BAMIA, self-curiosity in athletics ($A_1$), athletic reward and punishment ($A_2$), personality of athletic coach ($A_3$), sports facilities ($A_4$), aggressiveness in athletic competition ($A_5$), power dominance and leadership in team sports ($A_6$), and recreation in athletics ($A_7$) have been identified as 7 dimensions. The BAMIA contained 35 items which have been finally selected after item analysis. The norms of the BAMIA have been established. The BAMIA has adequate reliability ($r = 0.70, p < 0.01$), face validity and external criterion validity ($r = 0.66, p < 0.01$).

0 For the BISTAA, the identified dimensions are consciousness of fear or restless condition in athletic participation ($B_1$), behaviour of trembling or short temperedness in athletic situation ($B_2$), obstruction in the digestive and circulatory function ($B_3$), condition of family and society to which the athlete belongs ($B_4$), nausea in athletics ($B_5$) respectively. The BISTAA contained 50 items which have been finally selected after item analysis. The norms of the BISTAA have been established. The BISTAA has adequate reliability ($r = 0.68, p < 0.01$), face validity, and external criterion validity ($r = 0.58, p < 0.01$).

0 In the case of the BLATA, the chosen dimensions are socio-economic status of athletes ($C_1$), athletes and parental relation ($C_2$), expectations of athlete about performance ($C_3$), previous experience in athletics ($C_4$), judgement discrepancy ability of athlete ($C_5$), and goal discrepancy ability of athlete ($C_6$) respectively. The BLATA consists of 60 items which were finally accepted after item analysis. The norms of the BLATA have been established. The BLATA has
adequate reliability \( (r = 0.71, p < 0.01) \), face validity and criterion validity \( (r = 0.69, p < 0.01) \).

For DGIT, the identified dimensions are classifications \( (D_1) \), analogies \( (D_2) \), arrangement \( (D_3) \), number series \( (D_4) \), logical selection \( (D_5) \), inference \( (D_6) \), and differential aptitude \( (D_7) \) respectively. The DGIT consists of 72 items. The norms of the DGIT have also been established. The DGIT has adequate reliability \( (r = 0.76, p < 0.01) \), face validity and criterion validity \( (r = 0.73, p < 0.01) \) for the Ss of this study.

To measure the physical performance in track & field athletics, the NPFP (National Physical Fitness Programme) was used. However, special norms for Bengalee population have been prepared for males and females. In the case of developing the norms, the Ss were having the same status as mentioned above. The total number of Ss was six hundred and forty \( (N = 640; \text{Men} = 335, \text{Women} = 305) \). The NPFP consists of the track & field events \( \text{Men:} 100 \text{M run, running long jump, shot put, running high jump and 800 M run; Women:100M run, running long jump, shot put, running high jump and } 200 \text{ M run}. \) For men Ss, the NPFP possesses adequate reliability \( (r = 0.84, p < 0.01) \), face validity, and criterion validity \( (r = 0.80, p < 0.01) \).

7.1.2. Summary of the Main Study

The main purpose of this study has been narrated as to find out the relationship of the selected events of track and field athletics and the selected psychological determinants of teacher-trainees in physical education.

Bengalee teacher-trainees of physical education \( (N = 240; \text{Men} = 120, \text{Women} = 120) \) have participated in this correlation study as subjects. The age of the Ss ranged from 20 to 30 years. The Ss were chosen randomly from Balliapal College of Physical Education.
The NPFP was administered to the Ss in play field situation on the same day. Prior to the administration of each athletic event of the NPFP, the participants were given meaningful directions. The performance in each event was recorded following the scoring principle.

The psychological inventories (BAHIA, BISTAA, BLATA, and DGIT) were administered to the Ss on the subsequent days in a classroom situation. The scoring keys for individual inventories were used separately for scoring the data.

The data of the NPFP and the psychological inventories were transformed to normalized score using their separate norms. The normalized scores of both the NPFP and the psychological inventories were processed for the statistical analysis. The product moment correlation, sign test, profile analysis and multiple step up regression analysis were used appropriately to test the hypotheses.

The findings of this main study revealed as follows:

0 Physical performance in selected athletic events was positively associated (p < 0.01) with achievement motivation in athletics (BAHIA), level of aspiration in athletics (BLATA) and general intelligence (DGIT), and negatively associated (p < 0.01) with anxiety in athletics (BISTAA).

0 The high- and low- groups on BAMIA, BISTAA, BLATA, and DGIT differed significantly on physical performance in the selected athletic events.

0 The high group on achievement motivation in athletics (BAMIA), level of aspiration in athletics (BLATA), and general intelligence (DGIT) had higher physical performance in athletic events as compared to the low groups in the said inventories.
The high group on anxiety (BISTAA) had lower physical performance in the selected athletic events as compared to low groups on the anxiety scale.

The high- and the low groups on physical performance in athletic events differed on BAMIA, BISTAA, BLATA, and DGIT.

The high groups on physical performance in the selected athletic events had greater achievement motivation, higher level of aspiration and higher level of general intelligence when compared to the low groups on physical performance.

The high groups on physical performance in the selected athletic events had lower anxiety level in comparison with the low groups on physical performance.

The profiles of high- and low- groups on BAMIA, BISTAA, BLATA, and DGIT on the five events of track & field athletics did not remain parallel to each other. This is true for both the sexes. The overall performance of high- and low- groups did not remain at the same level and at the same value.

Maximum percentage of the variance in physical performance in athletic events was explained by the linear regression on achievement motivation (BAMIA). However, lower percent of the variance in physical performance in athletic events was explained by the linear regression on anxiety in athletics (BISTAA), level of aspiration in athletics (BLATA), and general intelligence (DGIT) respectively.

7.1.3. Summary of the Follow Up Study

The result of the main study was extended in this follow up study. The main purpose of this 'follow up study' was to suggest measures for improvement of athletic performance. However, the report of this 'follow up study' has been divided into three parts:
In the 1st part a 'suggestive model' has been planned;

In the 2nd part a 'vertical teaching model' has been planned;

In the 3rd part of this reporting is the 'experimental study'.

The summary of said three parts is presented below:

7.1.3.1. Summary of Planning the 'Suggestive Model'

The 'suggestive model' has been planned on the basis of the findings of the 'main study' and 'reviewing' the reports of various investigators (Suinn, 1972; Kolonay, 1977). The purpose of planning such a model was to see if the 'suggestive model' was useful for the improvement of athletic performance.

However, the 'suggestive model' consisted of five dimensions viz., muscle relaxation ($E_1$), practice of mental imagery ($E_2$), demonstration of athletic performance ($E_3$), practice of athletic skills ($E_4$), and error correction and discussion ($E_5$).

The procedures of working out the 'suggestive model' have already been discussed. Total time allotted was 235 mins. per day to work out the model. Instructions about the model were also clearly stated.

7.1.3.2. Summary of Planning the 'Vertical Teaching Model'

A 'vertical teaching model' was also planned on the basis of the principles reported by Lydon & Cheffers (1984). The purpose of planning such a model was to see if the 'vertical teaching model' was also useful for the improvement of the athletic performance.

Four important stages have been considered as follows:
Stage 1 - Introductory part dealing with warming up and physical conditioning programme related to the selected athletic events.

Stage 2 - Developmental part dealing with verbal explanation about the technique of the events, demonstration of the technique, individual skill practice, and group practice.

Stage 3 - Recreational part dealing with recreational games and lead up games.

Stage 4 - Dismissal part dealing with clarification of doubts and discussion between Ss and coach.

The procedures of working out the 'vertical teaching model' have been discussed. Total time allotted was 235 mins/day to work out the model. Instructions about the model have clearly been stated.

7.1.3.3. Summary of the Experimental Study

Two models namely, 'suggestive model' and 'vertical teaching model' have already been planned and stated earlier. However, the main purpose of this experiment was to compare the effect of 'suggestive model' and 'vertical teaching model' on physical performance in the selected athletic events.

The design of this experiment is Adjusting With Covariance (Hubbard, 1973). However, the Ss consisted of 120 teacher-trainees of physical education (Men = 60 & Women = 60) chosen from Baliapal College of Physical Education (Utkal University, Orissa). The age of the Ss ranged from 20+ to 30 years.

The Ss of both the sexes were given a pretest in the selected athletic events of the NPPF.
A stratified random sampling procedure was used to ensure that equal number of men Ss being distributed in three groups:

Group $A_1$ = Suggestive Model Group ($n_1 = 20$)
Group $B_1$ = Vertical Teaching Model Group ($n_2 = 20$)
Group $C_1$ = Control Group ($n_3 = 20$).

Similarly, Women Ss were also equally distributed into three groups:

Group $A_2$ = Suggestive Model Group ($n_4 = 20$)
Group $B_2$ = Vertical Teaching Model Group ($n_5 = 20$)
Group $C_2$ = Control Group ($n_6 = 20$).

After the pretest of the NPFP, the Group $A_1$ and Group $A_2$ have been given a training according to the plan of the 'suggestive model'. The Group $B_1$ and Group $B_2$ were given training according to the plan of the 'vertical teaching model'. However, the Group $C_1$ and Group $C_2$ known as control groups did not participate in either of the said training programmes.

Training of both the models was conducted between 5:00 a.m. to 7:30 a.m. and 2:25 p.m. to 4:05 p.m., three days per week for a total period of 6 weeks.

After the end of 6 weeks experimental period the events of the NPFP were again conducted for both the men and the women Ss. The data were recorded carefully and arranged for statistical analysis.

Between-group changes were assessed by ANCOVA (Analysis of Covariance) and the Scheffes' post hoc technique (Rothstein, 1985).

The findings of this experimental study reveal as follows:

0 The 'suggestive model' is useful in improving physical performance in all the selected athletic events for both the sexes.
The 'vertical teaching model' is also useful in improving physical performance in the selected athletic events except the following events: 100 M run (men), running high jump (men), and 800 M run (men).

The 'vertical teaching model' is equally effective like 'suggestive model' for improving physical performance in the following athletic events: shot put (men) and running high jump (women).

The 'suggestive model' shows better influence as compared to the 'vertical teaching model' for improving physical performance in the events as follows:

100 M run (men & women), running long jump (men & women), shot put (women), running high jump (men), 800 M (men), and 200 M run (women).

7.2. CONCLUSION

The findings of this study appear to warrant the following conclusions:

The achievement motivation in athletics could be measured through the inventory (BAMIA) which consists of the following dimensions:

- self-curiosity in athletics ($A_1$),
- athletic reward and punishment ($A_2$),
- personality of athletic coach ($A_3$),
- sports facilities ($A_4$),
- aggressiveness in athletic competition ($A_5$),
- power dominance and leadership in team sports ($A_6$),
- and recreation in athletics ($A_7$).

The state-trait anxiety in athletics could be assessed using the inventory (BISTAA) which has been identified by the dimensions such as:

- consciousness of fear or restless condition in athletic participation ($B_1$),
- obstruction in the reaction related to digestive and circulatory functions ($B_2$),
- behaviour of trembling or short temperedness in athletic situation ($B_3$),
- condition of family and society to which the athletes belong ($B_4$),
- and nausea (sickness due to anxiety) in athletics ($B_5$).
The level of aspiration in athletics could be determined by administering the inventory (BLATA) which is made up of following dimensions:

- socio-economic status of athletes (C_1), athletes and parental relation (C_2), expectations of athlete about performance (C_3), previous experience in athletics (C_4), judgement discrepancy ability of athlete (C_5), and goal discrepancy ability of athlete (C_6).

The general intelligence of the Ss could be measured using the inventory (DGIT) which consists of the dimensions such as:

- classifications (D_1), analogies (D_2), arrangement (D_3), number series (D_4), logical selection (D_5), inference (D_6), and differential aptitude (D_7).

The physical performance in selected athletic events could be assessed reliably and validly for the Ss using the NPPF which consists of the items viz.,

- 100 M run (men & women), running long jump (men & women), shot put (men & women), running high jump (men & women), 200 M run (women), and 800 M run (men).

The physical performance in selected athletic events is positively associated with achievement motivation in athletics, level of aspiration in athletics and general intelligence, and negatively associated with anxiety in athletics.

The high group on achievement motivation in athletics, level of aspiration in athletics and general intelligence have higher physical performance in the selected athletic events as compared to the low groups.

The high group on anxiety in athletics has lower physical performance in the selected athletic events as compared to low groups on anxiety scale.
The high groups on physical performance in the selected athletic events have greater achievement motivation, level of aspiration, and general intelligence when compared with the low groups on physical performance.

The high groups on physical performance in the selected athletic events have lower anxiety level in comparison with the low groups on physical performance.

Maximum percent of the variance in physical performance in athletics is explained by the linear regression on achievement motivation. However, a lower percent of the variance in physical performance in athletic events is explained by the linear regression on anxiety in athletics and general intelligence.

The 'suggestive model' is useful in improving physical performance in all the selected athletic events for both the sexes.

The 'vertical teaching model' is also useful in improving physical performance in the selected athletic events except the following events:
- 100 M run (men), running high jump (men) and 800 M run (men).

The 'vertical teaching model' is equally useful as the 'suggestive model' for improving physical performance in the following events:
- shot put (men) and running high jump (women).

As compared to the 'vertical teaching model', the 'suggestive model' has shown better results for improving
physical performance in the following events:
100 M run (men & women), running long jump (men & women), shot put (women), running high jump (men), 800 M run (men), and 200 M run (women).

7.3. RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The findings of the present study have a number of implications for reducing anxiety in athletics, improving achievement motivation in athletics and level of aspiration, and using general intelligence. This piece of research has also some implications for further research about psychological variables in relation to athletic performance. In view of this the recommendations based on this research and suggestions for further research are presented as follows:

7.3.1. Recommendations

0 Since this study has shown that psychological training followed by relaxation exercises along with physical training programme enhances track & field performances significantly, it is recommended that the combination relaxative exercises, psychological and physical training techniques may be advocated for the track & field athletes in advanced training for high level physical performance.

0 It is also recommended that psychological training followed by physical training-cum-relaxation should form an integral part of the curriculum in professional training colleges of physical education, general colleges, universities and in the training centres such as Netaji Subhas National Institute of Sports (NSNIS), sports councils of states and districts, and renowned sport clubs where advanced athletic training and coaching are advocated for the track & field athletes.

0 The coaches and physical education professionals are advised
to adopt psychological training prior to athletic training followed by relaxative exercises.

The athletic coaches are advised to take the advantage of the 'suggestive model' planned in this report to improve athlete's physical performance in track & field events.

The 'suggestive model' has been planned for the physical education teacher-trainees of age ranging from 20+ to 30 years and therefore it may not be applicable to the athletes of lower age level. However, this model may be useful for the other athletes having age range of 20+ to 30 years.

Now-a-days psychological make up of athletes is tested before their selection for athletic participation. In this case, the standardized psychological tests in athletics have a greater implication to assess the psychological states of athlete. Athletic coaches are advised to apply these inventories, developed in this piece of research, to analyze the psychological states of their athletes of the said age level. The psychological analysis through these inventories may be of great importance for improving athletic performance.

A word of caution: this report is based upon a study that can only be considered for physical education teacher-trainees and is restricted to track & field athletes. The results appear to be promising, but it is even debatable whether any psychological test can be used as the sole means for such decisions in team selection. However, it is reasonable that these psychological inventories related to athletics can be used as a kind of interview guide to develop insights about an track & field athlete.
7.3.2. Suggestions for Further Research

The results of this study seem very promising. The investigator of this study, however, feels that the work should be expanded to improve its utility and establish its value in the direction given below:

0 There is a large scope for future research considering other psychological variables in relation to athletic performance. Standardization of such inventories in athletics for different age groups has further scope of research. This research may, further, be extended for finding out the coefficient of reliability and validity of the 'suggestive model' which may be applicable with more specificity.

0 Inclusion of more dimensions in the inventories may have more accurate approach to measure the psychological variables among athletes.

0 In this study, the developed norms of the NPFP for Bengalee population reveal that there is a need to develop separate norms of each event of the NPFP for different ethnic groups in our country.

0 It is suggested that the further studies should encompass wide population along with the studies on larger sample of athletes.

7.4 CONTRIBUTION TO KNOWLEDGE

This study has made the following contribution to the quantum of knowledge and expertise in the field of sports:

0 Three 'new psychological tests' (BAMIA = Bera's Achievement Motivation Inventory in Athletics, BISTAA = Bera's Inventory of State Trait Anxiety in Athletics, and
BLATA = Bera's Level of Aspiration Test in Athletics) related to athletics were developed and standardized for the Ss having age group range of 20 to 30 years.

- One 'general intelligence test' (DGIT = Durgadas's General Intelligence Test) developed for 11 to 17 years students by Dr. D. Bhattacharyya, Professor, Department of Education, University of Kalyani, India in 1982 was standardized in this study for the adult Ss of age group range of 20 to 30 years.

- The NPFP (National Physical Fitness Programme) developed by the LNCPE (Lakshmibai National College of Physical Education), Gwalior, India was standardized separately for the Ss of West Bengal state (India) having age group of 20 to 30 years.

  Separate norms for both the sexes were also established.

- Interrelationships between selected 'psychological determinants' and 'track & field athletic events' were determined. The results were discussed and valuable conclusions were made.

- One 'suggestive model' was planned on the basis of the result of the 'relational study' done in this piece of research and reviewing 'literature' related to sports.

- The impact of this 'suggestive model' for the improvement of track & field performance has been established conducting 'one experimental study'. The results of this experiment are promising and leading towards a new horizon for improving the athletic performance of our Indian athletes.