Chapter VII

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS
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Summary

Theoretical Background

Sports performance at national and international levels in various games and sports are influenced by many factors such as physique, level of motor abilities, technique, tactics, psychological abilities, personality make up of a sportsman etc. In recent years an increasing amount of attention has been paid to study the relationship of psychological and physical abilities variables to competitive performances in different games and sports. The role of psychology in attaining high performance goes on becoming greater as the level of competition goes on becoming higher. Schollander (1971), the winner of four gold medals in Tokyo Olympic Games in 1964 states "in Olympic competition a race is won in mind...... winning is 20 per cent physical and 80 per cent mental." Morgen (1970), while emphasising the important part played by psychology of sports, states that as training programmes and competition become more intensive and extensive especially in case of elite sportsmen, the role of psychology becomes even more vital. Psychology is becoming and getting lot of popularity in competitive sports in these days throughout the world. Sports
psychology has been accepted as an integral part of successful coaching and highly adaptable to one's performance. Physical preparation of a sportsman is equally important. Success in competitive sports places high psycho-physical demands on the participants. At the time of competition it is the psyche of the players which moves them to use their physical fitness, tactical and technical preparedness at its maximum.

Personality dimensions of the sportsmen have been investigated into by innumerable psychologists, especially Kane (1964), Ogilvie and Tutko (1966), Malumphy (1968), Hardman (1968), Cratty (1971), Singer (1972), Whiting (1973), Eysenck et al. (1982), Cratty (1989) etc. etc. Participation in sports activities, achieving proficiency and winning competition have profound effect on personality characteristics of an individual. The outstanding athletes have been found to possess several distinguishing characteristics like seriousness, toughmindedness, emotional stability, freedom from greater emotional inhibition, conscientiousness, and controlled self-discipline. It is accepted on all hands that different sports discipline require and develop different kind of personality traits. It has been suggested by Cofer and Johnson (1960) that in personality champion athletes are a "special breed" and personality is a vital factor in discriminating process which singles out champions from amongst those who seem to have a similar physical gift. Most recently there has been considerable emphasis on
identification of the variables of personality which can be said to have very significant relationship with achievement in athletic field.

Competition anxiety is another influencing factor which plays paramount role in sports performances. Martens (1973) has described A-trait as a tendency to perceive competition situations with feelings of apprehension or tension. A certain amount of anxiety is required for peak performance. However, excessive anxiety is debilitating to performance. Higher anxiety will tend to reduce quality of performance in those sports where proficiency and quality of movement is required. The study of the effect of anxiety on sports performances has become one of the major topics of interest to the sports psychologists. Research has shown that anxiety is present in all of us, including athletes in varying degree. But in the field of sports, the competitions, competitive situations, the opponents etc. naturally produce more anxiety than other situations. An optimum level of anxiety is considered to be the best level for achieving high performance. Both, the very low anxiety and extremely high level of anxiety cause performance impairment. It has been reported by many researchers like Oxendine (1970), Scanlan and Passer (1978), Singer (1984), Cratty (1989), that optimum levels of A-state for one sport may not necessarily be optimal level for another sport to achieve superior performance. Highly anxious gymnasts are more likely
to become disrupted under conditions of stress and individual
with low resting anxiety are less likely to evidence performance
distruption under similar stress.

The role of concentration in sports is obvious, as the
greatest athletes are legendary for their power of concentration.
While emphasising on the importance of concentration in sports.
Frost (1971) states that the great athlete, the great champion
is the person who can shut out the rest of the world and concen-
trate on contest and the performance at hand. Concentration,
freedom from distraction and sustained alertness is required in
every sport. The development of athletics skill depends on one's
ability to focus unbroken attention on performance. Nideffer (1976)
reports that the successful gymnasts may differ in their attentional
and interpersonal characteristics from those who are less success-
ful. Concentration is perhaps the most critical psychological skill
necessary for a gymnast (Gordin et al. 1986). To be able to
concentrate on one's task under stress and frustration of competi-
tion and training is one of the most important factors for success.

Performances in competitive sports are also influenced
by the level of physical abilities. Different sports disciplines make
different demands on physical abilities. Men gymnastics is a strength
endurance dominating activity. Execution of various movements
on different gymnastics apparatus requires sufficient amount of
strength in all regions of the body especially in arms and shoulders, as a gymnast has to lift his own body against gravity on apparatus nearly in each movement. Leg strength is required for performing take-off and acrobatic movements. Flexibility is a primary prerequisite of a qualitative and quantitatively good execution of movement. It is indispensable for the full realisation of various motor abilities i.e. strength, speed, endurance, and agility. Insufficient flexibility may lead to errors in movement flow and injuries. A good combination of optimum strength and optimum flexibility in all regions of the body is a basic requirement for achieving high performance in gymnastics. According to Cumming (1967) "gymnasts at high level are going to learnest, strongest and the most flexible."

The requirements of physique (age, height and weight) are different in different games and sports. Peak performance age in various games and sports is different. In the recent years the peak performance age in gymnastics has reduced as the gymnasts have started performing more risky and flight movements on all apparatuses. Similarly height is also specific to sport discipline. The average height to achieve optimum performance in men gymnastics is around 165 cm. A smaller gymnast is in better position to perform spinning and turning movements in free flight. If the two gymnasts are equally trained with similar
somatotype, the taller gymnast is at a disadvantage as he has a smaller strength body weight ratio than a shorter gymnast. Gymnasts have been found lighter by many research workers. Greater body weight reduces the amount of relative strength. The lighter people are better able to control their own body weight while performing an apparatus. Gymnasts have been found younger, smaller and lighter than most of the Olympic athletes by many researchers (de Garay et al. 1974; Hirata, 1979; Carter, 1980; Carter, 1984). Thus the age, height and weight play significant role in gymnastic performance.

Need of the Study

Performance in competitive sports is multi-dimensional process which is influenced by various physical, physiological, technical, tactical, sociological and psychological factors. It is only recently that the sports administrators and coaches have realized the importance of psychological and physical preparation and training of athletes to enable them to bear the strain and stresses of sports participation. There is a need to study those psycho-physical abilities which play important role in competitive performance in gymnastics so that proper training programmes can be prepared to inculcate and develop the required psycho-physical abilities to enable a gymnast to achieve high level performance. So the present study has been conducted to find out
the contribution of various psycho-physical abilities to performance in gymnastics.

Objectives of the Study

The present investigation has been conducted with the following objectives:

1. To find out the relationship of various personality traits to competitive performance in gymnastics.

2. To find out the relationship of anxiety and concentration to performance in gymnastics.

3. To find out relationship of physical abilities (strength and flexibility) age, height, and weight to competitive performance in gymnastics.

4. To find out the differences in personality traits (16 PF) among high, mediocre and low performance groups.

5. To find out the differences in anxiety level and concentration level among high, mediocre and low performance groups in gymnastics.

6. To find out the differences in physical abilities (strength and flexibility), age, height and weight among high, mediocre and low performance groups.
Hypotheses of the Study

Twelve hypotheses were formulated for the present investigation. The condensed description of the hypotheses is as under:

1. There would be non-significant relationship of personality traits (16 PF) to competition performance in gymnastics.

2. There would be non-significant relationship of anxiety and concentration to competition performance in gymnastics.

3. There would be non-significant relationship of Physical Abilities (strength and flexibility), age, height and weight to performance in gymnastics.

4. There would be non-significant differences in personality factors (16 PF) among high, mediocre and low performance groups.

5. There would be non-significant differences in Anxiety and concentration among high mediocre and low performance groups.

6. There would be non-significant differences in physical abilities variables (strength and flexibility measuring variables), age, height and weight among high, mediocre and low performance groups.
Selection of Variables

Dependent Variable:

Performance level, i.e. results obtained by a gymnast in national level competitions, was selected as dependent variable for the present study.

Independent Variables:

Personality trait (16 PF), sports competition anxiety, concentration, strength ability (strength of arms and shoulders, explosive legs strength, right and left grip strength), flexibility (trunk flexion, trunk extension and shoulder flexibility), age, height and weight were taken as independent variables for the investigation.

Sample and Sampling

Sample:

The sample of the investigation consisted of national level male gymnasts of India. The study was conducted on 108 men gymnasts who participated in senior national gymnastics championships.

Sampling:

The total sample of 108 gymnasts was divided into three groups, i.e. high performance, mediocre performance and low
performance groups, on the basis of their competitive performance scores. Both the high and low performance groups consisted of 20 subjects in each group and rest of the 68 subjects fell under the middle group, hence it was designated as mediocre performance group.

Tools of Data Collection

The followings tests and tools were used to collect data pertaining to psycho-physical abilities studied in this investigation.

1. Cattle's Sixteen Personality Factor (16 PF) Questionnaire to measure personality traits.

2. Sports Competition Anxiety Test (SCAT) by Martens for measuring competition Anxiety.

3. 'd^2 test' by Brickenkamp to measure concentration of the subjects.

4. Dips on Parallel bars and pull-ups on horizontal bar to measure arm strength.

5. Vertical Jump for measuring explosive legs strength.

6. Right and Left grip strength with standardized grip dynameter.

7. Trunk Flexion for trunk flexibility, Bridge test for trunk extensibility and stick test for shoulder flexibility.
8. Age in years, height in centimetre by anthropometer rod and weight in kilograms by weighing machine were also measured.

Statistical Treatment of the Data

Data collected on 108 subjects by using above mentioned tests and tools were statistically analysed. Zero Order Product Moment Correlation was applied to find out the relationship and contribution of various psycho-physical abilities (16 Personality Factors, Competition Anxiety, Concentration, Arms and Shoulders Strength, Legs Strength, Right and Left Grip Strength, Trunk Flexibility, Trunk Extensibility, Shoulder Flexibility, Age, Height, and Weight) to competitive performance in gymnastics in case of high performance group.

Regression equations were prepared for those independant variables which had significant correlation with competitive performance.

One way analysis of variance was applied to compute significance of mean differences in various variables among high, mediocre and low performance groups. Schefee's Post-hoc 't' was applied to find the significance of differences in means of those variables, in which 'F' ratio obtained was significant.
Results

The results of the study indicate that there is significant relationship and contribution of personality factor F (r = -0.692, P < .01), Factor I (r = -0.65 ±2, P < .01), Factor M (r = -0.715, P < .01) and Factor O (r = -0.556, P < .05) to competitive performance in gymnastics. The correlation coefficients obtained between Factor A and Performance (r = -0.311), Factor B and performance (r = -0.392), Factor E and Performance (r = -0.217), Factor G and Performance (r = 0.399), Factor H (r = 0.253), Factor L and Performance (r = -0.077), Factor Q₁ and Performance (r = 0.085), Factor Q₂ and Performance (r = 0.138), Factor Q₃ (r = 0.155), and Factor Q₄ and Performance (r = -0.338) are non-significant.

Sports Competition Anxiety is a contributing factor to gymnastics performance as a high correlation of -0.724 (P < .01), between Competition Anxiety and Performance in Gymnastics has been obtained.

The findings of the study indicate significant correlations coefficients of competition performance in gymnastics to concentration (r = 0.510, P ≤ .05), dips on parallel bars (r = 0.705, P ≤ .01), pull-ups on horizontal bar (r = 0.565, P ≤ .01), vertical jump (r = 0.645, P ≤ .01), trunk flexion (r = 0.773, P ≤ .01), weight (r = -0.453, P ≤ .05).
The results also indicate non-significant correlation coefficients of competitive performance in gymnastics to right grip strength \( (r = 0.151) \), left grip strength \( (r = 0.121) \), trunk extension \( (r = -0.355) \), shoulder flexibility \( (r = -0.212) \), age \( (r = -0.323) \), and height \( (r = 0.255) \).

The findings pertaining to one way analysis of variance show significant 'F' values in Factor A \( (F = 12.74, P < .01) \), Factor C \( (F = 5.43, P < .01) \), Factor F \( (F = 8.41, P < .01) \), Factor G \( (F = 4.06, P < .05) \), Factor I \( (F = 5.06, P < .01) \), Factor M \( (F = 11.30, P < .01) \), Factor N \( (F = 3.16, P < .05) \), Factor O \( (3.36, P < .05) \), Factor Q \( (F = 3.34, P < .05) \) and Factor Q3 \( (F = 3.43, P < .05) \).

The results also reveal significant 'F' values in Sport Competition Anxiety \( (F = 8.52, P < .01) \), Concentration \( (F = 18.51, P < .01) \), dips on parallel bars \( (F = 67.33, P < .01) \), pull-ups on horizontal bar \( (F = 47.87, P < .01) \), vertical jump \( (F = 24.64, P < .01) \), right grip strength \( (F = 25.01, P < .01) \), left grip strength \( (F = 22.88, P < .01) \), trunk flexion \( (F = 9.27, P < .01) \), age \( (F = 9.80, P < .01) \), weight \( (F = 3.80, P < .01) \) and competitive performance \( (F = 192.61, P < .01) \). Scheffe's Post-hoc 't' test was applied to compute the differences in means, of these variables in which 'F' values found were significant, between high and mediocre performance groups, between high and low performance groups and between mediocre and low performance groups.
Conclusions

The data collected through various tools were statistically analysed. On the basis of findings of the study, the following conclusions have been drawn.

1. Personality Factor F has a negative significant correlation with performance in gymnastics. Seriousness has high relationship with gymnastics performance.

2. Personality Factor I has significant negative correlation with gymnastic performance. Toughmindedness contributes, to achieve high performance in gymnastics.

3. Personality Factor M has significant negative correlation with performance. Carefulness and attentiveness contribute to achieve high performance in gymnastics.

4. Personality trait of self assuredness and self confidence (Factor O) has significant role in achieving high performance in gymnastics.

5. High performance group is more reserved than mediocre performance and low performance groups. Mediocre performance group is more reserved than low performance group.
6. High performance group is emotionally more stable and calm than mediocre performance group.

7. High performance group is more sober and serious than mediocre and low performance groups.

8. High performance group is more conscientious and rule bound than mediocre and low performance groups.

9. High performance group is more toughminded than mediocre and low performance groups. Low performance group is more tenderminded than mediocre performance group.

10. High performance group is more careful and more practical than mediocre, and low performance groups. Mediocre group is more careful and practical than low performance group. Low performance group is the most careless of all the three groups.

11. Mediocre group is more shrewed and calculating than high performance group.

12. High performance group is more self assured and confident than both the mediocre and low performance groups.

13. High performance group is more conservative than mediocre and low performance groups.

14. High performance group has high self concept control than low performance group.
15. Sport competition Anxiety plays negative significant role in achieving high performance.

16. High performance group has lower amount of sports competition anxiety than mediocre and low performance groups.

17. Concentration has positive contribution to achieve high performance in gymnastics. High performance group has more concentration than mediocre and low performance groups.

18. Arms and shoulder strength contributes significantly to achieve high performance in gymnastics. High performance group has more arm strength than mediocre and low performance groups. The mediocre performance group has higher level of arm strength than low performance group. One of the reasons of poor performance of low performance group is lower amount of arms and shoulder strength.

19. Leg Strength has a significant contribution towards competitive performance in gymnastics.

20. High performance group has greater amount of leg strength than mediocre and low performance groups. Mediocre performance group has higher amount of leg strength than low performance group.

21. High performance group has more amount of right and left grip strength than mediocre and low performance
groups. Mediocre performance group has more right and left grips strength than low performance group.

22. Trunk flexibility has significant contribution to competitive performance in gymnastics. High performance group has more trunk flexibility than mediocre and low performance groups. Mediocre performance group has more trunk flexibility than low performance group.

23. Low performance group is younger than mediocre and high performance group.

24. Low performance group is lighter in body weight than mediocre performance group.

**Suggestions for Future Research**

During the course of conducting this study the investigator thought of various related problems, concerning psycho-physical abilities, which may be selected for future research work. The results and finding of this study also may serve as guidelines for the research workers to further investigate the role of various other psychological and physical abilities in achieving optimum performance in gymnastics and other games and sports. The following suggestions are put forward for the future research work in the field of psycho-physical abilities and sports performance.
1. In addition to the personality factors, sports competition anxiety, and concentration included in the present study, there is need to study some more psychological variables such as achievement motivation, visual and perceptual accuracy, reaction time etc. and their contribution in competition performance in gymnastics.

2. In addition to physical abilities variables measuring strength and flexibility included in the present study (dips on parallel bars, pull-ups on horizontal bar, vertical jump, grip strength, trunk flexibility, trunk extensibility shoulder flexibility) an attempt should be made to include a few other tests measuring strength of abdominal and trunk muscles, flexibility of hip joint, speed, agility and other coordinative abilities like static and dynamic balancing ability, eye-hand coordination etc.

3. There is need to study the contribution of the psycho-physical abilities to competitive performance in other games and sports like, hockey, volleyball, swimming etc.

4. Similar kind of study may also be conducted on female gymnasts of national level to understand whether the same personality factors, and psychological and physical abilities variable contribute in competitive performance in women gymnastics or there are some other contributing
personality, psychological and physical ability variables in women gymnastics.

5. There is also a need to study the role of various psycho-physical abilities in competitive performance in junior sections, so that talented children who have potentials to achieve high performance can be selected on the basis of the results of the study.

6. It is also required to study the effect of social factors on sports performance such as effect of spectators, social facilitation, attitude towards competitions, inter-personal and social relationships among the team members etc.

7. There is a need to study the ways and means to create and develop the desired psychological and personality characteristics, and physical abilities which may help a sportsman to achieve high level of performance.

8. There is also need to study those psychological methods like psycho-tonic training, autogenic training, biofeedback procedures and some other techniques which may reduce the psychic stress on the sportsman to enhance their performance during competition.

9. It would be worthwhile to study the psychological variables, physical ability variables, and motor development of young
sportmen at school level.

10. There is dire need to study the ways and means to develop optimum amount of strength and flexibility of various body regions so that by adopting those procedures and technique, a sportsman may be able to enhance his performance systematically.

11. It would be worth while to study the inter-relationship among various psycho-physical abilities and their interaction.

12. There is a need to conduct a cross cultural study on some psycho-physical abilities variables between Indian gymnasts and gymnasts from other advance countries in gymnastics like U.S.S.R., China, Japan etc. to find out that how far the gymnasts from those countries differ from Indian gymnasts on these psycho-physical abilities variables and how much in the contribution of these variables in their case.

Recommendations

Psycho-physical abilities level of a sportsman has influence on his sports performance. Thus it becomes imperative to include the training of psycho-physical abilities alongwith the training of the skills and technique of a movement. On the basis of the findings of the present study the following recommendations are put forward:
1. The coaches should prepare the psychological profile and personality profiles of the sportsmen with the help of sports psychologists to follow up the progress made by the gymnasts in their performance of those factors.

2. The coaches should also prepare physical abilities profile of the gymnasts so that training programme can be prepared systematically to develop the desired physical abilities.

3. The coaches should pay proper attention to the psychological factors like personality factors, anxiety and concentration during training.

4. Proper emphasis should be laid to the mental fitness and psychological conditioning during the training.

5. The coaches with the help of psychologists should adopt some auto-regulatory measures to control the anxiety of the high competitive anxious sportsmen and bring it to the optimum level. Coaches should also know the ways and means to handle the gymnasts psychologically during competition. Competitive situations are different than training situations and hence more stressful. Coaches should be able to reduce the mental stress for optimum performance in competition.
6. The gymnasts should also take the help of the sports psychologists to learn various technique to overcome their psychological problems during training and competition.

7. The sports administrators and selectors should consider the psychological factors which play role in achieving optimum performance while selecting the gymnasts for various camps, trainings and competitions along with technical skills.

8. The selector should give due importance to the physical abilities while selecting gymnasts for coaching camps, training and competitions.

9. The coaches must give proper emphasis on developing strength and flexibility of different regions of the body as physical abilities play important role in gymnastics performance.

10. With the help of sports psychologists, the coaches should also impart psychological training during daily training session to create and develop such psychological qualities which play important role for achieving optimum performance. Psychological training must become integral part of physical and technical training.
11. The coaches should give adequate consideration to height and weight while selecting children for gymnastics. The gymnasts have been found to be mediocre in height (average height is about 165 cm.) and lower in body weight.