

**ANALYSIS OF PERFORMANCE FACTOR OF
TRACK AND FIELD ATHLETES**

AN SYNOPSIS

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INTRODUCTION

Conjunction with festivals and sports meets such as the Ancient Olympic Games in Greece. In modern times, the two most prestigious international track and field competitions are athletics competition at the Olympic Games and the World Championships in Athletics. The World Athletics is the International Governing Body. Records are kept of the best performances in specific events, at world and national levels, right down to a personal level. However, if athletes are deemed to have violated the event's rules or regulations, they are disqualified from the competition and their marks are erased. In North America, the term track and field may be used to refer to other athletics events, such as the marathon, rather than strictly track-based events.

At the professional level, sprinters begin the race by assuming a crouching position in the starting blocks before leaning forward and gradually moving into an upright position as the race progresses and momentum is gained. The set position differs depending on the start. Body alignment is of key importance in producing the optimal amount of force. Ideally the athlete should begin in a 4-point stance and push off using both legs for maximum force production. Athletes remain in the same lane on the running track throughout all sprinting events, with the sole exception of the 400 m indoors. Races up to 100 m are largely focused upon acceleration to an athlete's maximum speed. All sprints beyond this distance increasingly incorporate an element of endurance.

The long jump was considered one of the most difficult of the events held at the Games since a great deal of skill was required. Music was often played during the jump and Philostratus says that pipes at times would accompany the jump so as to provide a rhythm for the complex movements of the athlete. Philostratos is quoted as saying, "The rules regard jumping as the most difficult of the competitions, and they allow the jumper to be given advantages in rhythm by the use of the flute, and in weight by the use of the halter." (Miller, 67). Most notable in the ancient sport was a man called Chionis, who in the 656BC Olympics staged a jump of 7.05 metres (23 feet and 1.7 inches).

The javelin throw is a field athletics event, a spear like object is known at a distance from the following sector. Javelin for hunting and war javelin throwing is through to have been a sport enjoyed by Greeks. Javelin throwers competed while riding horses, which served to further increase the skill required in the sport. The javelin

saw its introduction to the sporting world in the games of the Ancient Greeks in around 500 BC, with a much lighter design than their military counterparts, the objective was to achieve the greatest distance. Currently, javelin throwing is practiced only as a sport event. The event demands good speed as well as flexibility and power on the part of the athletes competing. The men javelin throw was introduced Modern Olympic as field event since 1908 and now a days it is one of the most popular throwing events in sports arena.

Sports performance depends on so many groups of factors such as endogenic factor, exogenic factor, technique-tactics factor, physical fitness factor, psychological factors etc. In top level competition psychological factors plays an important role for achieving their goal. For the present study the selected psychological parameters were sport competition anxiety, attitude and personality hardiness.

In modern competitive sports, psychological preparation of a team is as important as teaching them different skills of a game using scientific methods. Now a days, teams are prepared not only to play, but to win the competition, for coaches feel that good mental and psychological preparation for competition is a necessary component for success. (Agyajit, 1991)

Anxiety plays an important role in athletic performance. Whether its effect is positive or negative depends on how an individual perceives the situation. Athletes with low anxiety level have been known to perform better in sprinting performance. A moderate level of anxiety is seen as less for the acquisition and performance of skills. The levels of anxiety either too high or too low tend to inhibit learning and performance in sprinting.

Serious athletes devote hours to conditioning, perfecting techniques, honing skills for their particular sport, and practice, practice, practice. And this is true that the inherent talent and physical training can take an athlete far. But another important part of the maximizing your athletic achievements is having the right attitude.

Hardiness is a personality construct composed of three traits – control, commitment, and challenge that are theorized to make one resilient in the face of stress. Individuals high in hardiness tend to believe and act as if life experiences are controllable (control), to engage meaningfully in life activities and to appraise these activities as purposeful and worthy of investment even in the face of adversity

(commitment), and to view change in life as a challenge toward growth and development rather than as a threat to security (challenge). Based on existential personality theory, the combination of these characteristics is believed to provide individuals with the courage and motivation to cope adaptively with life stress, thereby buffering its adverse effects on health.

STATEMENT OF THE PROBLEM

With this background concept, in the present study, an attempt has been made to observe the physical parameters, motor fitness, psychological parameters and best performance of sprinters, long jumpers and javelin throwers, so, the present study was stated as **“ANALYSIS OF PERFORMANCE FACTORS OF TRACK AND FIELD ATHLETES”**.

PURPOSE OF THE STUDY

The purpose of the present study is:

- ❖ To compare the selected physical parameters, selected motor fitness and selected psychological parameters of different track and field athletes. i.e., Sprinters, Long jumpers and Javelin throwers.
- ❖ To find out the selected physical parameters, selected motor fitness and selected psychological status of different track and field athletes. i.e., Sprinters, Long jumpers and Javelin throwers.
- ❖ To observe the relationship of selected physical parameters, selected motor fitness and selected psychological parameters with best performance of different track and field athletes. i.e., Sprinters, Long jumpers and Javelin throwers.
- ❖ Analysis of performance factors with selected physical parameters of different track and field athletes. i.e., Sprinters, Long jumpers and Javelin throwers.
- ❖ Analysis of performance factors with selected motor fitness of different track and field athletes. i.e., Sprinters, Long jumpers and Javelin throwers.
- ❖ Analysis of performance factors with selected psychological parameters of different track and field athletes. i.e., Sprinters, Long jumpers and Javelin throwers.

SIGNIFICANCE OF THE STUDY

- ❖ This study would be significant to assess their motor fitness and psychological status, at the same time it can also be able to indicate the components in which they have lacuna.
- ❖ This study would help to understand the motor fitness and psychological status of the state level players of different districts in West Bengal.
- ❖ The result of the study would provide an opportunity for Physical Education Teachers and Coaches, to spot out the latent talents of the students and to select potential students for different track and field events.
- ❖ The result would provide some information that will lead to further study and research.

LIMITATION OF THE STUDY

- ❖ The subject's dietary habit was one of the limiting factors for the present study.
- ❖ The emotional levels of different subjects for the present study were other limiting factors.
- ❖ Subjects' past experience about their performance were another limiting factors for the study.
- ❖ Socio-economic status of the subjects was one of the most important limiting factors.
- ❖ Most of the subjects were from different regions of West Bengal, this was another limiting factor for the study.

DELIMITATION OF THE STUDY

- ❖ **Geographical delimitation:** The study was delimited to the state of West Bengal only.
- ❖ **Subjective Delimitation:** Only 90 State level male athletes (30 from Sprinters, 30 from long jumpers and 30 from Javelin throwers) were considered as subjects for the present study.
- ❖ Only 100-meter sprinter were selected as a subject of sprinters.
- ❖ **Criterion Delimitation:** Only height, weight and best performance were considered as selected physical parameters, selected motor fitness was measured only by speed, leg explosive strength, agility, reaction time and coordination. The selected psychological parameters were measured only by sports competition anxiety, attitude and personality hardiness.

HYPOTHESIS

The study was based on following hypothesis:

- ❖ H0 There would be no significant difference in subject's motor fitness among the selected track and field groups of athletes.
- ❖ H1 There would be a positive relationship between motor fitness and best performance
- ❖ H1 There would be a positive relation between sports competition anxiety, attitude and personality hardiness with best performance

REVIEW OF RELATED LITERATURE

Carry (2005) conducted a study on the long jump. Most young athletes will have difficulty performing the hitch-kick because it requires considerable speed and sufficient time in the air to perform it well. However, an elementary long jump and a rudimentary form of the hang technique are well within the reach of young athletes. Remember that the most important requirements in this event are speed and springing abilities. An athlete does not have to perform a hitch-hick or a hang to jump a good distance.

Russell (2001) studied the relationship between competitiveness and par atelic dominance on the intensity and directions of precompetitive state anxiety. Competitiveness appears to be important in moderating the appraisal of anxiety and outcome, while goal expectancy may moderate the relationship between anxiety appraisal and par atelic dominance.

Vescovi (2007) conducted a study on the relationships between sprinting, agility, and jump ability in female athletes. The results indicated that the relationship between counter movement jump height and linear sprinting was stronger with the longer distances than the shorter distances and showed a stronger relationship within the college athletes than the school soccer players.

Vescovi & Guigan (2007) conducted a study on the relationships between sprinting, agility, and jump ability in female athletes. The results indicated that the relationship between countermovement jump height and linear sprinting was stronger with the longer distances than the shorter distances and showed a stronger relationship within the college athletes than the school soccer players.

METHODOLOGY

Methodology can be determined on the basis of hypothesis and objective of the study. The various aspects of methods and materials are presented in this chapter. The subject for the present study was selected purposively from different districts of West Bengal, India. For the study different track and field athletes were selected. Some of them were sprinters, long jumpers, and javelin throwers; they have more than 05(five) years of experience in these events. Most of them were participated in a regular basis in different State level competition. Total number of thirty (30) male players were selected for each group. Age range 14 to 20 years. The data for present study was collected from West Bengal athletic meet 2017 to 2019, which was organized by Athletic Association of West Bengal, at Kolkata SAI Complex.

Performance Ability:

The subject's performance ability was measured on the basis of their state level meet in track and field events.

For the study three different criteria were conducted. There are:

Physical Parameters:

- I) Age - On the basis of their Madhyamika paprikash admit card or birth certificate
- II) Height (cm) – by measuring tape or Stadiometer
- III) Weight (kg) - Weighing machine
- IV) Best Performance

Motor fitness parameters:

- I) 50-meter dash (Second) – To measure the sprinting ability of the subject
- II) SBJ (Meter) – To measure leg explosive strength of the subject
- III) Shuttle Run (4x10 yard) – To measure the agility of the subject
- IV) Nelson hand reaction test (Second) – To measure the reaction ability of the subject
- V) Jonson and Nelson speed pass co-ordination test (Second) – To measure Coordination

Psychological Parameters:

I) Sports competition Anxiety: measured by standardized questionnaire developed by Martens et al. 1990

II) Attitude: measured by standardized questionnaire developed by Harold M, Barrow and Rosemary McGee, 1979

III) Personality Hardiness: measured by standardized questionnaire developed by Singh, 2008

Statistical Procedure: The obtained data in form of digital score was treated statistically to get results and to draw conclusions. The mean and SD were considered as descriptive statistics. Analysis of variance (ANOVA) was employed to find out significant difference. For identifying significant difference post hoc test was employed to calculate the pair wise comparisons between the groups. Multiple correlation and Multiple regression were employed as relationship and predictive statistics. In all the cases 0.05 level of significance was fixed to test the hypothesis. For statistical calculation Statistical Procedure for Social Sciences (SPSS) Version-23 was used.

RESULT AND DISCUSSION

Results obtained from statistical analysis of data and there after interpretation of results based on experience and existing knowledge of the field has also been presented in this chapter. All these aspects have been described according to the dimension for the purpose of the study.

THE RESULTS

There were three groups of performance factors in this study – physical, motor fitness and psychological.

Analysis of data leads to the following results.

A. Physical parameters – height and weight were the selected factors in this group.

- I. Height and weight did not show any significant relation with performance, but height and body weight show positive relation with performance of three difference groups.

- II. Analysis of inter-group variation in these parameters indicated that there was no significant difference between three difference groups. In case of height the mean value of sprinters was slightly higher than other two groups. In case of weight the mean value of javelin throwers was heavier than both the sprinters and long jumper's groups.
- B. Motor fitness parameters – speed, leg explosive strength, agility, reaction time and coordination were the selected parameters in this group.
 - I. Results indicated that performance of sprinters had significant correlation with speed and agility. Long jumpers exhibited significant correlation of performance with leg explosive strength. Javelin throwers group exhibited no significant correlation of performance with motor fitness.
 - II. Regression analysis indicated that the performance of sprinters exhibited 50.9% dependence on motor fitness; performance of long jumpers exhibited 22.7% dependence on motor fitness and performance of javelin throwers exhibited only 15.1% dependence on motor fitness.
- III. Analysis of inter-group variation in different selected motor fitness components indicated that sprinters group was significantly better than both the groups of long jumpers and javelin throwers in speed as well as agility and reaction time. But the differences between long jumper and javelin throwers groups in case of reaction time were not statistically significant.
- IV. Long jumpers group showed significantly better in leg explosive strength than both the other groups – the sprinters and javelin throwers. The difference between sprinters and javelin throwers groups was also statistically significant.
- V. In coordination the javelin throwers group was found to be significantly better than both of sprinters and long jumper's groups. The difference between sprinters and long jumper's groups was also statistically significant.
- C. Psychological Factors - Competitive anxiety, attitude and personality were the selected psychological factors.
 - I. The group of javelin thrower exhibited significantly lesser sports competitive anxiety than both groups of sprinters and long jumpers. But the sprinters and long jumper's groups were not statistically significant in this factor.

- II. Second psychological factor was attitude. The sprinters group was found to be significantly higher than the groups of javelin throwers. But the difference between sprinters and long jumpers and also long jumpers and javelin throwers groups was not statistically significant in this factor.
- III. The third psychological factor was personality hardiness. This component was analyzed into its four dimensions – commitment, control, challenge, and personality hardiness. Analysis of inter-group difference indicated that there was no statistically significant difference in four of these dimensions – commitment, control, challenge, and personality hardiness.
- IV. Analysis of relationship between performance and selected psychological factors exhibited that there was significant positive relation of personality hardiness with performance for long jumper's group. In personality hardiness the sprinters and javelin throwers groups exhibited positive correlation. In the sprinters and javelin throwers groups also exhibited positive correlation for all psychological factors with performance.
- V. Regression analysis indicated that the performance of sprinters exhibited 5.9% dependence on psychological factors; performance of long jumpers exhibited 28.8% dependence on psychological factors and performance of javelin throwers exhibited only 19.5% dependence on psychological factors.

DISCUSSION OF THE RESULTS

As per the result of the study there was no statistical difference among selected groups of athletes- Sprinters, Long jumpers and Javelin throwers in selected parameters height and weight.

This may be due to the fact that all groups of performers within same age ranged and the basic element require for this track and field event are also similar.

Regarding motor fitness the sprinter group was found significantly better than the other two groups- long jumpers and javelin throwers. This results also supported by Harpreet Singh (2018). This may be due to the fact that the sprinting speed is the dominant factor for sprinting.

The long jumper's group was found to be significantly better than other two groups- sprinters and javelin throwers. Similar results also suggested by Norjali Wazir, M. R. W., Samsu, R., Yaacob, A., Martuan, S. Z. and Ishkandar, C. D. M. (2022). This may be due to fact that leg explosive strength most dominant motor fitness factor in running long jump.

The coordination ability was found to be significantly better for javelin thrower than other two groups. This may be due to fact that the technique of javelin throw requires more coordination because of involvement of approach running and throwing actions.

Psychological factors:

In the present study SCAT, Attitude and Personality hardiness are analyzed. The result indicated that the sprinters and long jumpers' group had higher sports competitive anxiety than the javelin groups. Similar results have been reported by Aneesh Rajappan, Dr. V. A. Manickam, (2016). This may be due to the fact that the sprinting performance is more uncertain and risk oriented. In sprinting there is a single chance to complete the event in comparison with 6 trials in javelin throw.

In Attitude sprinters group was found to be significantly higher than the javelin thrower groups. This may be due to the fact that sprinting requires more attention and involvement for the events than the events if throwing.

The results indicated that all the three groups- sprinters, long jumpers and javelin throwers exhibited positive correlation with the selected psychological parameters- SCAT, Attitude and Personality hardiness.

The regression analysis indicates that the performance for sprinter and javelin throwers groups had 54.2% dependence on selected psychological factors.

CONCLUSION

On the basis of the results and findings of the study the following conclusions are drawn-

A. Physical parameters – height and weight were the selected factors in this group.

- I. Height and weight did not show any significant relation with performance, but height and body weight show positive relation with performance of three difference groups.
 - II. Analysis of inter-group variation in these parameters indicated that there was no significant difference between three different groups. In case of height the mean value of Sprinters was slightly higher than other two groups. The Javelin throwers was heavier than both the sprinters and long jumper's groups.
- B. Motor fitness parameters – speed, leg explosive strength, agility, reaction time and coordination were the selected parameters in this group.
- I. Results indicated that performance of sprinters had significant correlation with speed, agility and reaction time. Long jumpers exhibited significant correlation of performance with leg explosive strength. Javelin throwers group exhibited no significant relation of performance with motor fitness.
 - II. Regression analysis indicated that the performance of sprinters exhibited 50.9% dependence on motor fitness; performance of long jumpers exhibited 22.7% dependence on motor fitness and performance of javelin throwers exhibited only 15.1% dependence on motor fitness.
 - III. Analysis of inter-group variation in different selected motor fitness components indicated that Sprinters group was significantly better than both the groups of long jumpers and Javelin throwers in speed as well as agility and reaction time. But the differences between long jumper and javelin throwers groups in case of reaction time were not statistically significant.
 - IV. Long jumpers group showed significantly better in leg explosive strength than both the other groups – the Sprinters and Javelin throwers. The difference between Sprinters and Javelin throwers groups was also statistically significant.
 - V. In coordination the Javelin throwers group was found to be significantly better than both of Sprinters and Long jumper's groups. The difference between Sprinters and Long jumper's groups was also statistically significant.

C. Psychological Factors – Sports competitive anxiety, attitude and personality hardiness were the selected psychological factors.

- I. The group of Javelin thrower exhibited significantly lesser sports competitive anxiety than both groups of Sprinters and Long jumpers. But the Sprinters and Long jumper's groups were not statistically significant in this factor.
- II. Second psychological factor was attitude. The sprinters were significantly higher than Javelin throwers in Attitude. But the difference between sprinters and long jumpers and also long jumpers and javelin throwers groups was not statistically significant in this factor.
- III. The third psychological factor was personality hardiness. This component was analyzed into its four dimensions – commitment, control, challenge and personality hardiness. Analysis of inter-group difference indicated that there was no statistically significant difference in four of these dimensions – commitment, control, challenge, and personality hardiness.
- IV. Analysis of relationship between performance and selected psychological factors exhibited that there was significant positive relation of personality hardiness with performance for long jumper's group. In personality hardiness the sprinters and javelin throwers groups exhibited positive correlation. In the sprinters and javelin throwers groups also exhibited positive correlation for all psychological factors with performance.
- V. Regression analysis of psychological factors with performance indicated that the sprinters group had 5.9% dependence on these factors for performance. The long jumpers group exhibited 28.8% dependence and the javelin throwers group had 19.5% dependence with the psychological factors with performance.

RECOMMENDATIONS

With the help of results derived from the present study, the following recommendations can be made.

1. It is recommended to the coaches, trainers and physical educators to adopt these findings to improve the selected parameters among their athletes.

2. A similar study may be attempted by selecting the national or international level athletes as the subjects.
3. A similar study may be conducted on the female subjects.
4. It is helpful for the coaches and physical educators for identifying talent on the basis of motor fitness factors that influence the performance of Running, Jumping and Throwing.
5. It is useful for the coaches to give special importance on the improvement of psychological factors such as personality hardiness, attitude and sports competition anxiety.

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