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ASSOCIATION OF BODY COMPOSITION, EMOTIONAL INTELLIGENCE  
AND PHYSIOLOGICAL CHARACTERISTICS WITH COMPETITION  
PERFORMANCE OF LONG-DISTANCE RUNNERS



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**ABSTRACT**

The present study was conducted to determine the relationship of body composition, emotional intelligence and physiological characteristics with competition performance of long-distance runners. It also compared the body composition, emotional intelligence and physiological characteristics between high achievers (n=8) and low achievers (n=15) 5000m runners of All India inter-university. To find out the relationship of body composition, emotional intelligence and physiological characteristics with competition performance, product-moment coefficient of correlation method was applied. To determine the significance of the difference between the means of high achievers and low achiever's independent t-test was applied. The results revealed that there is a significant positive relationship of competition performance with body fat percentage, pulse rate, and systolic blood pressure among the 5000m runners. They have also found a

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negative significant relationship of competition performance with vital capacity and Vo<sub>2</sub> max. Findings further showed that significant differences were established between the high achievers and low achievers of 5000m runners in body fat percentage, vital capacity, Vo<sub>2</sub> max, pulse rate, systolic blood pressure, and diastolic blood pressure.

**Keywords:** Body composition, Emotional intelligence, Competition performance, & long-distance runners.

**INTRODUCTION:**

Running is a popular sport discipline that can be performed over several different distances from sprints to marathons. In recent years; greater focus has been placed on determining the variables that influence the best performance in running competitions. It is commonly recognized that various factors, including gender, height, performance duration, environmental conditions, etc., are related to endurance performances. Exercise and physical performance may be significantly impacted by diet and body composition (Burke LM 2007, Etheridge 2008; Giampietro M. 2009). Performance in endurance running was correlated with a variety of anthropometric measurements, including body mass, height, BMI, body fat, the total of skin-fold thickness, single skin-fold thicknesses at the upper and lower bodies, leg length, and limb circumferences (Timothy 1988; Knechille 2011; Costill DL 1970).

Over the past five years, researchers and practitioners in sport psychology have raised the possibility that emotional intelligence (EI) is a key concept in the sports domain. Initial study in sport has been useful for generating early insights, but the use of various theoretical frameworks and evaluation methods confuses rather than explains potential connections between emotional intelligence and sport. Particularly, using various concepts, definitions, and evaluation instruments may result in various emotional intelligence profiles of the same person or group (Meyer & Fletcher, 2007). All athletes should maintain their motivation and create challenging goals and objectives, which help

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predict their performance (Wielinga et al., 2011). Precompetitive cognitive anxiety was more intense for the athletes with the lowest emotional intelligence (EI) scores than it was for those with the highest EI levels (Lu et al., 2010).

Running performance is also related to a variety of physiological characteristics in national level elite long-distance runners (Rabadan, et al., 2011). High maximal oxygen consumption (VO<sub>2</sub>max), as well as the oxygen cost of running (Cr) and maximum running speed (v<sub>max</sub>), are connected to endurance performance throughout a variety of running distances (Rabadan, et al., 2011). Researchers have discovered that long-distance runners at the national (Maldonado et al., 2002) and elite levels have much higher VO<sub>2</sub>max values than middle-distance runners. According to Rabadan et al. (2011), elite long-distance runners had greater second ventilator threshold (VT<sub>2</sub>) values than middle-distance runners (Beaver, Wasserman, & Whipp, 1986).

Despite the fact that several studies have described several anthropometric parameters associated with running performance across various distances (B. Knechtle, et al., 2008; Kong & de Heer, 2008). Emotional intelligence can enhance leadership performance, team cohesion, and coping with pressure (Bal et al., 2011). Similarly, in order to excel in a sport, a person must possess excellent physical, psychological, and physiological qualities. There is a paucity of studies investigating the associations between body composition, emotional intelligence, and physiological characteristics with running performances in long-distance races.

**OBJECTIVES OF THE STUDY**

The aim of the current study was to find the relationship between body composition, emotional intelligence, physiological characteristics, and competition performance of 5000m distance runners of All India Inter-university. The second aim was to compare these variables between high and low achievers 'long-distance runners.

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**HYPOTHESES OF THE STUDY**

- It is hypothesized that body composition, emotional intelligence & physiological characteristics are significantly correlated with the competition performance among 5000m runners.
- It is hypothesized that there is a significant difference in body composition, emotional intelligence, and physiological characteristics between high achievers and low achievers 5000m runners

**DESIGN OF THE STUDY**

The study was carried out using the descriptive method of research. The investigator used a purposive random sampling approach to gather the data. The sample included 23 female long-distance runners of the 5000m event comprising high achievers (N1=8) and low achievers (N2=15), who had competed in the All-India Inter-University Championship from December 25 to December 31, 2015, at Punjabi University, Patiala. The age range of the subjects was 18 to 25. The body composition characteristics were measured using a body composition monitor with a scale called the HBF-361. The emotional intelligence scale created by Hyde, Pethe, and Dhar was used to evaluate emotional intelligence (2002). The Harvard step test, dry spirometer, sphygmomanometer & stethoscope, and a manual method were used to measure Vo2 max, vital capacity, blood pressure, and pulse rate, respectively. The product-moment coefficient of correlation approach was used to investigate the connections between physiological traits, emotional intelligence and body composition, and competition performance. Researchers used an independent "t" test to assess the significance of the difference between the means of high achievers and low achievers distance runners.

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**RESULTS OF THE STUDY**

The results of the study were presented in the following tables:

**Table No: I**

**Table showing the relationship of body composition, emotional intelligence and physiological characteristics with competition performance of female 5000m runners (N=23)**

| Sr. No | Variable correlated with competition performance | Co-efficient of correlation |
|--------|--|-----------------------------|
| 1      | Body Composition                                 | Body Fat %                  |
| 2      |  | Body Mass Index             |
| 3      |  | Skeletal Muscle Mass        |
| 4      |  | Basal Metabolic Rate        |
| 5      |  | Visceral Fat                |
| 6      | Emotional Intelligence                           |                             |
| 7      | Physiological Characteristics                    | Vital Capacity              |
| 8      |  | Vo2 Max                     |
| 9      |  | Pulse Rate                  |
| 10     |  | Systolic Blood Pressure     |
| 11     |  | Diastolic Blood Pressure    |

\*Significant at .05 level (r=.415) \*\*Significant at .01 level (r=.530)

Table No: I depicts significant and positive correlation between body fat percentage and competition performance ( $r = 0.650, p < .01$ ), between pulse rate and competition performance ( $r = 0.775, p < .01$ ), between systolic blood pressure and competition performance ( $r = 0.419, p < .05$ ) among the 5000m female runners. Negative significant correlations were also exist between vital capacity and competition

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performance ( $r = 0.529, p < .05$ ), and between Vo2 max and competition performance ( $r = 0.449, p < .05$ ) among the 5000m runners.

Table: I also indicates negative insignificant correlation between body mass index and competition performance ( $r = .075$ ), between skeletal muscle mass and competition performance ( $r = .300$ ), between basal metabolic rate and competition performance ( $r = .155$ ) and between emotional intelligence and competition performance ( $r = .114$ ). However, positive insignificant correlation between visceral fat and competition performance ( $r = .260$ ), and between diastolic blood pressure and competition performance ( $r = 0.390$ ) were also found among the 5000m runners.


**Table No: II**

**Table showing the analysis of body composition characteristics, emotional intelligence, and physiological characteristics between high achievers and low achievers of 5000m event**


| Variables                     |                      | High Achievers (N=8) |       |       | Low Achievers (N=15) |       |       | t- ratio |
|-------------------------------|----------------------|----------------------|-------|-------|----------------------|-------|-------|----------|
|                               |                      | Mean                 | S.D   | S.E.M | Mean                 | S.D.  | S.E.M |          |
| Body Composition              | Body Fat Percentage  | 18.86                | .94   | .33   | 21.46                | 1.03  | .26   | 6.05**   |
|                               | BMI                  | 19.09                | 1.45  | .51   | 19.46                | .82   | .21   | .68      |
|                               | Skeletal Muscle Mass | 27                   | 1.55  | .54   | 25.83                | 1.04  | .26   | 1.91     |
|                               | BMR                  | 1290                 | 70.63 | 24.97 | 1225                 | 76.03 | 19.63 | 2.02     |
|                               | Visceral Fat         | 1.93                 | .67   | .23   | 2.2                  | .56   | .14   | .93      |
| Emotional Intelligence        |                      | 123.3                | 1.28  | .45   | 121.87               | 9.46  | 2.44  | .55      |
| Physiological Characteristics | Vital Capacity       | 3.91                 | .23   | .08   | 3.65                 | .14   | .03   | 2.82*    |




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|                      |       |      |      |        |      |      |        |
|----------------------|-------|------|------|--------|------|------|--------|
| <b>Vo2 Max</b>       | 68.23 | 2.02 | .71  | 64.18  | 2.06 | .53  | 4.51** |
| <b>Pulse Rate</b>    | 45.9  | 1.72 | .61  | 50.8   | 1.61 | .41  | 6.66** |
| <b>Systolic B.P</b>  | 108   | 4.81 | 1.70 | 115.26 | 6.21 | 1.60 | 3.10** |
| <b>Diastolic B.P</b> | 65.38 | 2.97 | 1.05 | 72.6   | 5.97 | 1.54 | 3.87** |

\*Significant at .05 level (t=.2.08) \*\*Significant at .01 level (t=2.84)

Table: II depicts the mean, standard deviations and values of SEM for body composition characteristics, emotional intelligence and physiological characteristics among high achievers and low achievers 5000m female athletes.

In the variable of body composition characteristics, the mean value of body fat percentage for high achievers 5000m runners was found to be 18.86, and for low achievers' runners, it was computed to be 21.46, respectively. The t-value testing the significance of mean difference between the high achievers and low achievers' runners for body fat percentage came out to be 6.05 which is significant at 0.01 level of significance for df 21. Hence, it may be interpreted that high achievers 5000m runners possessed significantly lesser body fat percentage as compared to low achievers 5000m runners. Further, although the high achievers 5000m runners have depicted somewhat higher mean value for skeletal muscle mass, basal metabolic rate, and lesser mean value for body mass index and visceral fat in comparison to low achievers 5000m runners. But none of such mean differences were found to be significant. So, it may be interpreted that in case of body mass index, skeletal muscle mass, basal metabolic rate and visceral fat, there existed no significant differences between the high achievers and low achievers 5000m runners.

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In the variable of emotional intelligence, the mean value of high achievers 5000m runners was found to be 124 and for low achievers' runners, it was computed to be 122.8, respectively. But mean difference was found to be insignificant. So, it may be interpreted that in case of emotional intelligence, there existed no significant differences between the high achievers and low achievers 5000m runners.

In the variable of physiological characteristics, the mean value of vital capacity, Vo2 max, pulse rate, systolic blood pressure and diastolic blood pressure for high achievers 5000m runners was found to be 3.91, 68.23, 45.9, 108 & 65.38 and for low achievers runners, it was computed to be 3.65, 64.18, 50.8, 115.26 & 72.6, respectively. The t-value testing the significance of mean difference between the high achievers and low achievers for Vo2 max, pulse rate, systolic blood pressure and diastolic blood pressure came out to be 4.51, 6.66, 3.10 & 3.87, which is significant at 0.01 level of significance and for vital capacity came out to be 2.82, which is significant at 0.05 level of significance for df 21. Hence, it may be interpreted that high achievers 5000m runners possessed significantly greater vital capacity and Vo2 max, and lesser pulse rate, systolic blood pressure and diastolic blood pressure as compared to low achievers 5000m runners.

**DISCUSSION OF FINDINGS**

The results so obtained have been discussed under the following heading. The findings of the present study from table-I indicate significant positive correlation of competition performance with body fat percentage, pulse rate and systolic blood pressure among the 5000m runners. It shows that with the increase of body fat percentage, pulse rate and systolic blood pressure the performance of 5000 runners will increase significantly. The result reported by Yuki et al. (2020) has supported the result of present study in case of fat percentage. They found that fat percentage has significant relationship with performance of long-distance athletes. Hassan (2010) has also reported positive and meaningful relationship of body fat percentage with performance among long distance

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runners. The negative significant correlations of competition performance with vital capacity and Vo2 max have shown that with the increase of vital capacity and Vo2 max, the performance will also decrease significantly. Similarly, Hassan (2010) also found that VO2max has negative and meaningful relationship with performance among long distance runners. Similarly, Andrew et al. (2015) demonstrates that only a small to moderate relationship exists between running economy and VO2max in highly trained distance runners. It has been also found that skeletal muscle mass, basal metabolic rate and emotional intelligence have negatively and insignificantly affects the performance of the 5000m runners. However, body mass index, visceral fat and diastolic blood pressure positively and insignificantly affects the competition performance of 5000m female runners.

It has been found from the table-II that high achiever of 5000m event possess greater skeletal muscle mass and basal metabolic rate, and lesser body fat percentage, body mass index and visceral fat than low achiever runners of 5000m event. There was significant difference established between the high achievers and low achievers of 5000m event in body fat percentage. This indicates that less body fat percentage played important role in the performance of 5000m event. However, there was insignificant difference in body mass index, skeletal muscle mass, basal metabolic rate and visceral fat between them. It has been found that high achievers were more emotionally intelligent than low achievers of 5000m event. However, statistical differences found insignificant between them. This shows that emotional intelligence has significantly no effects on the performance of 5000m runners.

In the physiological characteristics, it has been found that high achievers of 5000m event possess greater vital capacity, Vo2 max, and lesser pulse rate, systolic blood pressure and diastolic blood pressure than low achiever runners of 5000m event. There was a significant difference established between the high achievers and low achievers of 5000m

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event in vital capacity, Vo<sub>2</sub> max, pulse rate, systolic blood pressure and diastolic blood pressure. This indicates that more vital capacity, vo<sub>2</sub> max, lesser pulse rate and blood pressure played a discriminating role in the performance of 5000m event. Bassett & Howley (2000) also discussed that VO<sub>2</sub>max is an important variable that sets the upper limit for endurance performance, and is the best physiological predictor of distance running performance. In distance events, maximum oxygen uptake (V<sub>O</sub>2max) is an important determinant of performance (Foster 1983; Billat et al. 2001). Juan, J. et al. (2016) also found a significant relationship between individual pulmonary function (vital capacity) and marathon race time.

**CONCLUSIONS**

It has been found that body fat percentage, pulse rate, and systolic blood pressure have shown a significant and positive relationship, and vital capacity and Vo<sub>2</sub> max have shown a negative and significant relationship with competition performance among long-distance runners of 5000m event. Significant differences were also found between the high achievers and low achievers of 5000m runners in body fat percentage, vital capacity, Vo<sub>2</sub> max, pulse rate, systolic blood pressure, and diastolic blood pressure

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