



To study the relationship between physiological and psychological characteristics and performance in university-level basketball players

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Abstract

This study investigated the relationship between physiological and psychological characteristics and performance in university-level basketball players. One hundred and fifty male basketball players were randomly selected from the west zone inter-university basketball tournament. Physiological variables such as aerobic power, anaerobic power, vital capacity, and resting pulse rate were measured, while psychological variables such as anxiety, aggression, self-concept, and locus of control were assessed using standardized questionnaires. The results showed significant relationships between physiological and psychological variables and basketball performance. Specifically, aerobic power, anaerobic power, vital capacity, and resting pulse rate were found to be significantly related to basketball performance. Additionally, anxiety and locus of control were found to be significantly related to basketball performance. The study suggests that coaches and trainers can use these variables to predict player performance and develop targeted training programs. The findings of this study can also be used to inform the development of sports psychology programs and to enhance player selection and recruitment processes. Overall, this study contributes to our understanding of the complex relationships between physiological and psychological characteristics and performance in sports.

Keywords: Physiological, Psychological, Performance prediction, Basketball performance Statement of the Problem

Introduction

The purpose of the study was to find out the relationship between physiological and psychological characteristics of the University level basketball players with their performance.

Delimitations

1. The study was delimited to the basketball players as subjects who had represented interuniversity level tournaments.
2. The study was also delimited to only senior university level male basketball players.
3. The study was further delimited to the following physiological characteristics:
 - a. Aerobic power
 - b. Anaerobic power
 - c. Vital capacity
 - d. Resting pulse rate

The study was delimited to the following psychological characteristics:

- a. Anxiety
- b. Aggression
- c. Self-concept
- d. Locus of control

Limitations

1. The subjects of the study were university level basketball players, belonging to different socio-economic status, with different individual characteristics which might have affected the result of the study, hence treated as limitations for this study.
2. The use of questionnaire is itself a limitation of the study.

Definition and explanation of the terms physiological Characteristics

This may be defined as those characteristics which are directly linked with the various physiological systems and which may be voluntary or involuntary.

Aerobic Power

The work in which the amount of oxygen that the body can supply is sufficient to perform the task is known as aerobic power.

Anaerobic Power

A work in which the amount of oxygen that the body can supply is less than the amount necessary to perform the task is known as anaerobic power.

Anaerobic Power is the ability, which requires working with more intensity for a short period of time.

A work in which the amount of oxygen that the body can supply is inadequate than the amount necessary to perform the task is known as anaerobic power.

Vital Capacity

The volume of air that can be made to pass into and out of the lungs by the most forcible inspiration and expiration is termed the vital capacity of the lungs.

The vital capacity is the amount of air expelled from the lungs after a deep inspiration.

Resting pulse rate

Resting Pulse Rate is the pulse count for one minute in resting position.

The Resting Pulse rate or heart beat or heart frequency is defined as the frequency of heart beats in one minute when a player is in resting condition.

Astrand Rodahl (1977) define pulse rate as frequency of pressure waves (waves per minute) propagated along the peripheral arteries, such as carotid or radial arteries. In a normal healthy individual, pulse rate and heart rate are identical.

Psychological characteristics

Self-concept

Self concept is the totality of attitudes, Judgments and values of an individual relating to the behavior abilities and qualities. "Self-concept" embraces awareness of these variables and their evaluation.

Roger defined self concept as "An organized configuration of perception of the self which are admissible to awareness. It is compared of such elements as the perception of one's characteristics and abilities, the percept and concept of the self in relation to others to the environment.

Self-Concept is the totality of attitudes, judgments and values of an individuals relating to this, abilities and qualities, 'self-concept' embraces awareness of these variables and evaluation.

Locus of Control

"A Locus of control orientation is belief about whether the out comes of our actions are contingent and what we do (internal control orientation) or on events outside our personal control (external control orientation)".

Locus of control is a personality construct referring to on individual's perception of the locus of events as determined internally by his/her own behavior faith luck or external circumstance.

Anxiety

Anxiety is the state of mind in which the individual responds with discomfort to some event that has occurred or going to occur. The person's worries about the event their occurrence and consequence is general are the sources of anxiety however the anxiety can be either somatic or cognitive in nature.

Anxiety is a subjective feeling of apprehension and high tends physiological arousal.

Anxiety is an uneasiness and feeling of foreboding often found when person is about to embark on a hazardous venture. It is often accompanied by strong desire to excel.

Aggression

Aggression is defined as the deliberate intent to harm another person. This includes physical, psychological and social harm which is primary focus. One the other hand highly robust with in the rules of the game is not aggression.

Significance of the study

1. The result may also throw light on the physiological characteristics of university level basketball players.
2. The study may also highlight selected psychological characteristics of university level basketball players.
3. The result of the study may also help the coaches and planners of the game to develop their training schedule.
4. The study may be helpful for the upcoming players of basketball.
5. The study may be helpful in predicting the performance of an individual according to their physiological and psychological characteristics.

Procedure

Selection of Subjects

For the purpose of this study one hundred and fifty university level male basketball players were randomly selected from the west zone interuniversity basketball tournament. The ages of the subjects were between 18 and 27 years.

Selection of the Variables

On the basis of literary evidences and scholars own understanding, the following physiological and psychological variables were selected for the purpose of the study:-

Physiological characteristics

- a. Vital capacity
- b. Resting pulse rate
- c. Aerobic power
- d. Anaerobic power

Psychological characteristics

- a. Anxiety
- b. Locus of Control
- c. Aggression
- d. Self - Concept

Criterion Measures

Physiological Characteristics

1. To determine the aerobic capacity, Astrand Nomogram was employed, and recorded in liters per minute.
2. To determine the anaerobic capacity, Sargent Jump-Lewis Nomogram was employed, and recorded in Kg-m./sec.
3. Resting pulse rate was measured by manual method at radial artery, over a period of one minute and recorded in numbers.
4. Vital Capacity was measured by dry Spirometer and recorded in liter.

Psychological Characteristics

1. Anxiety was measured by using Sports Competition Anxiety Test (SCAT), questionnaire developed by Renier Martin.
2. Aggression was measured by using Sports Aggression Inventory, questionnaire developed by Anand Kumar and Prem Shankar Shukla.
3. Self concept was measured by using Self Concept Questionnaire, developed by Mrs. Pratibha Dev.
4. Locus of Control was measured by Locus of Control Questionnaire (LCQ), developed by Rotter.

The Basketball performance was measured by panel of a three experts and recorded in points.

Selection of Tests / Questionnaire

The tests used in this Study for the collection of data were selected because they were found to be most reliable and have been used very often in the profession of physical education and sports throughout the world. The reliability quotients as given in the manuals of respective tests are as under.

Collection of Data

All the selected subjects of the study were informed about the aims and objectives of the study and requested for their

cooperation. The subjects were explained about different variables required for the study with necessary instructions. The required data in different characteristics for each team were collected during the course of two days. The scholar contacted the players personally and their sincere cooperation was solicited. Necessary instructions were given to the players before the administration of each test. The research scholar motivated the team coaches and managers by the promising them to send a copy of abstract of the study. No time limit was set for filling in questionnaire, but the players were requested to respond as quickly as possible, once the instructions were clearly understood by them. As soon as a team/group of players completed one questionnaire, another was given to them.

Reliability of Data

The reliability of data was ensured by establishing the instrument reliability, tester’s competency reliability, reliability of the tests and subjects reliability.

Instruments Reliability

The instruments, which were used in the study, were obtained from standard firms, which cater to the needs of various research laboratories in India and abroad and their calibration were accepted as accurate enough for the purpose of this study.

Tester Competency

To ensure that the investigator was well versed in the techniques of conducting the tests, the investigator had a number of practice sessions in the testing procedure under the guidance of the expert. The tester’s competency was also evaluated together by reliability of tests.

Statistical Procedure

1. To find out the relationship of selected physiological and psychological variables to Basketball performance, product moment method of correlation was used.
2. To find out the combined relationship of set variables of physiological and psychological variables to Basketball performance, multiple correlation method was used.
3. To predict the Basketball performance on the basis of selected physiological and psychological variables, multiple regression analysis was used.
4. The level of significance was set at .05 levels.

Results of the study

The data collected were subjected to product moment correlation, multiple correlation and regression equation for analysing the result. The level of significance was set at .05 level.

Findings

The relationships of physiological variables to Basketball performance was computed using product moment method of correlation which are presented in Table no. 1.

Table 1: Relationship of Physiological Variables to Performance in Basketball

Variables	Correlation coefficient
Aerobic Power	0.217*
Anaerobic Power	0.316*
Vital Capacity	0.522*
Resting Pulse Rate	-0.488*

*Significant at .05 level. $r_{05}(148) = 0.117$

From Table 1 it is quite clear that there is significant relationship between physiological variables (aerobic power, anaerobic power, vital capacity, resting pulse rate) and Basketball performance when the computed value being 0.217, 0.316, 0.522 and -0.488 respectively is greater than the found value of 0.117 at 0.05 level of significance.

Combined contribution of physiological variables to performance in Basketball is presented in Table no. 1A.

Table 1A: Combined Contribution of Physiological Variables to Performance in Basketball

Criterion Variables	Independent variables	Coefficient of multiple correlation
Basketball performance(c)	Aerobic Power	0.544*
	Anaerobic Power	
	Vital Capacity	
	Resting Pulse rate	

*Significant at .05 level.

Table 1A clearly discloses that the Basketball performance is significantly related to the aerobic power, anaerobic power, vital capacity, resting pulse rate.

Multiple Regression Analysis

The multiple regression equation for predicting the performance of the Basketball players on the basis of relative contribution of four physiological variables resulted in the following –

$$Y = 43.84 - 0.16 X_1 + 0.015 X_2 + .002 X_3 - 0.29 X_4$$

Where,

Y = Predicted Basketball performance

X₁ = Aerobic power

X₂ = Anaerobic power

X₃ = Vital Capacity

X₄ = Resting pulse rate

The above mentioned regression equation shows that the basketball performance depend upon the aerobic power, anaerobic power, vital capacity, resting pulse rate in a diminishing order.

The relationships of psychological variables to Basketball performance was computed using product moment method of correlation which are presented in Table no. 2.

Table 2: Relationship of Psychological Variables to performance in Basketball

Variables	Correlation coefficient
Anxiety	0.607*
Aggression	0.124
Self-Concept	-0.114
Locus of Control	0.876*

*Significant at .05 level. $r_{05}(148) = 0.117$

Table 2 indicates that there exist a significant relationship between psychological variables and performances as the correlation coefficient value were found greater than the tabulated value .187 at .05 level of significance. Psychological variables such as anxiety and locus of control were found significantly related to the performance with the found value of .607 and .876 respectively. Though, insignificant relationships were found between aggression, self concept and performance but overall contribution of psychological variables to performance in basketball found highly significant.

Combined contribution of psychological variables to performance in basketball is presented in table no. 2A.

Table 2A: Combined Contribution of Psychological Variables to Performance in Basketball

Criterion Variables	Independent variables	Coefficient of multiple correlation
Basketball Performance(c)	Anxiety	0.894*
	Locus of control	

*Significant at .05 level.

Table 2A indicate that significant relationship between criterion variables (Basketball performance) and independent variables (anxiety and locus of control) was found .894 which is higher than the tabulated value .188 as r being .05 (105).

Multiple Regression Analysis

The multiple regression equation for predicting the performance of the Basketball players on the basis of relative contribution of two psychological variables resulted in the following –

$$Y = 26.27 + 0.27 X_1 + 0.97 X_2$$

Where,

Y = Predicted Basketball performance

X_1 = Anxiety

X_2 = Locus of Control

Discussion of findings

The data gathered were analyzed by appropriate statistical techniques. The results of the analysis of the gathered data revealed that most of the variables selected for the purpose of the study were significant in relation to their basketball performance. Though, some of the variables did not show significant relationship to their Basketball performance.

In Physiological characteristics all the four selected variables were found to be significant i.e. aerobic power, anaerobic power, vital capacity and resting pulse rate. The result has clearly indicated that all the physiological characteristics are some how connected with each other and closely effecting the working ability of each other. The vital capacity has the direct bearing on pulse rate, aerobic power and anaerobic power and vice versa. That is why the fact may be attributed to the lung capacity and its working conditions as it is directly associated with these physiological characteristics.

A significant relationship was also found in case of the psychological characteristics selected for the purpose of the study. These psychological characteristics were anxiety and locus of control. It is evident from previous researches that higher achievers have better locus of control than the lower achiever. Therefore this result may be attributed to the fact that basketball players were university level players and may be considered as high achievers when compared to other grades of players. The previous studies have also proved that the optimum level of anxiety is always good for the performance. The result of present study proved to be in accordance with previous study as the analysis of data has also revealed that there exists a significant relationship of psychological characteristics with the basketball performance. The present result of the study is also supported by Hassain and Jones.

The results of the study indicate an insignificant relationship in speed with the basketball performance of basketball

players. This may be attributed to the fact that, other significant physical variables might have affected speed component of the players.

In case of other two selected psychological variables i.e. aggression and self-concept the result indicated an insignificant relationship. As self-concept is a very complex psychological characteristic of an individual which is related to knowledge, past experiences of the individual right from the childhood. Therefore the basketball players might not have been able to exhibit this character. The result of the study also revealed an insignificant relationship aggression with the basketball performance in the players. Though the game of basketball is considered as most aggressive game but the result of the present study did not reveal a significant relationship in aggression with the basketball performance this may be attributed to the fact. That these players were of national level that have already been playing the game for a long time in various competition and tournaments and also had undergone a systematic and scientific schedule for past several years and hence these players did not exhibit the aggressive character in them.

All the three regression equations may be used to predict the performance of basketball players since standard error of estimate was found less.

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