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Investigating the relationship between weight, speed, achievement motivation and the playing abilities of handball players

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Abstract
The objective of this investigation was to conduct a comprehensive and scientifically rigorous assessment, evaluation, and prediction of handball performance. The study aimed to explore the interplay of various anthropometric, physical fitness, and psychological variables, as documented in the existing literature. Previous research endeavors often focused on isolating anthropometric measurements, physical fitness criteria, or psychological factors to understand their individual relationships with playing ability.

The primary goal of the present research is to appraise specific variables considered essential for optimal handball performance. This involves a holistic consideration of a combination of anthropometric, physical fitness, and psychological factors. Through this approach, the researcher seeks to gauge the current status of handball players in terms of their anthropometric measurements, physical fitness levels, psychological attributes, and their corresponding impact on playing ability.

For the preliminary phase of the study, five handball players at the state level were selected as subjects. These individuals fell within the age range of 18 to 25 years. The researcher plans to establish associations between each selected variable and handball playing ability within this group.

In the subsequent main study, a cohort of 100 handball players was examined to elucidate the relationships between selected anthropometric, physical fitness, and psychological variables and playing ability. Weight, speed, and achievement motivation were chosen as predictor variables to facilitate this exploration. Handball playing ability, serving as the criterion variable, was determined through a subjective rating process conducted by three experts.

To unravel the intricate connections between anthropometric, physical fitness, and psychological variables and handball playing ability, the study employed the backward multiple regression method. This analytical approach was chosen to ascertain the nuanced associations and contributions of each variable to the overall performance of handball players.

Keywords: achievement motivation, handball players, speed, weight

Introduction
The systematic measurement and assessment of performance constitute indispensable elements in gauging the degree to which formulated objectives have been achieved, the efficiency of the processes employed, and the overall quality of the resulting product. The outcomes not only provide insights into the trajectory of performance but also quantify the pace of change. In the realms of athletics, physical education, and life, the perpetual evaluation and measurement by teachers and coaches, as highlighted by Meissner and Meyers in 1940, are integral components of the educational landscape. The most robust form of evaluation involves leveraging well-established criteria as a benchmark for comparisons, rooted in the correlation of selected parameters with playing ability.

The Handball Experience
Sports, serving as a source of enjoyment, offer a pathway to enhance physical fitness and alleviate tension. Proficiency in sports requires not just skill but a nuanced understanding. Individuals naturally gravitate towards activities where their skills shine, finding enjoyment in those where their abilities surpass the average. Skill tests and the learning process are intricately entwined with neuromuscular coordination. While fundamental skills exhibit universal characteristics applicable to all races, their translation into actual gameplay varies.

Physical tests, encompassing activities such as dashes, throws for distance, jumps, and the like, frequently assess these fundamental skills. Skill tests, commonplace in evaluating students' prowess in sports and major games, serve a dual purpose of assessing comprehension and shedding light on progress during practical sessions in sports and physical education.

Anthropometric Precision

Anthropometric measurement, described as a suite of noninvasive, quantitative techniques, aims to discern an individual's body fat composition by meticulously measuring, recording, and analyzing specific dimensions such as height and weight; skin-fold thickness; and bodily circumference at the waist, hip, and chest. The long-standing realization among physical educators that the performance of both men and women is significantly influenced by factors like age, height, arm length, leg length, and body structure underscores the pivotal role of anthropometric measurements in comprehending and interpreting individual capabilities within the domains of physical education and sports.

Subject Objectives

- The literature encompasses a comprehensive exploration of the scientific assessment, evaluation, and prediction of handball performance, scrutinizing selected anthropometric, physical fitness, and psychological variables.
- These investigations aim to unveil the relationship between playing ability and isolated anthropometric measurements, physical fitness variables, or psychological variables.
- The principal objective of this research involves an in-depth assessment of selected variables as prerequisites for optimal handball performance, taking into consideration a holistic combination of anthropometric, physical fitness, and psychological factors.
- In the process, the investigator will meticulously evaluate the current status of handball players, considering their anthropometric, physical fitness, and psychological variables alongside their playing ability.
- Furthermore, each selected variable will be systematically correlated with handball playing ability.

Problem Statement

The study's primary aim is to conduct a thorough assessment of selected anthropometric, physical fitness, and psychological variables alongside the playing ability of state-level handball players. It seeks to discern the relationship between playing ability and the chosen anthropometric, physical fitness, and psychological variables among these athletes.

Significance of the Study

In recent years, physical educators, coaches, sports experts, and players alike have come to recognize the paramount importance of playing ability. The study's significance lies in establishing a correlation between performance in handball, measured through playing ability, and selected anthropometric, physical, and psychological variables.

- Evaluation of state-level handball players' anthropometric, physical fitness, and psychological levels will enable comparisons of players' abilities and capacities, as perceived by both the players themselves and their coaches and physical educators.
- The results and findings will serve as valuable criteria for identifying and selecting potential handball players.
- The study's outcomes may be employed as a screening instrument for the analysis and classification of handball players.
- The results will guide handball coaches and physical educationists in focusing on the selected variables with a high correlation with playing ability, aiding in the design of effective training programs.
- The study will clarify whether the selected independent variables are directly or indirectly related to the criterion variables.
- The findings will offer guidance to handball players regarding their playing ability.
- Aspiring researchers can draw from the study's results to undertake similar investigations in other areas and disciplines.

Delimitations

1. This research unfolded in two distinct phases—a pilot study, where the investigator ensured the reliability of subjects, instruments, and administered tests, followed by the final phase, dedicated to measuring selected anthropometric, physical fitness, psychological variables, and the playing ability of handball players.
2. The participants in the pilot study phase comprised five state-level handball players.
3. The age range of the selected subjects spanned from 18 to 25 years.
4. The subjects were drawn from state-level handball players who represented their state in interstate competitions.
5. The assessment of playing ability was solely conducted through subjective measures, involving the input of three experts.

Limitations

- The environmental factor for this study could not be controlled due to the diverse routine habits of state-level handball players.
- Subjects were engaged in various types of physical activities, and the impact of these activities couldn't be controlled.
- Dietary considerations and subjects' overall experiences were not factored into the study.

Methodology

In this study, the selection of subjects, research design, orientation, and selection of variables, reliability of instruments, tester competency, data reliability, test-retest administration, subjective assessment of playing ability, and the statistical procedures employed have been comprehensively elucidated.

Selection of Subjects

The generalizability of research results is the selection of sample which will provide the research data. A sample is a small proportion of a population selected for observation and analysis. A sample reflects the characteristics which define the population from which it is selected. The purpose of this study was to find out the association of anthropometric, physical, psychological, and parameters

with playing ability of handball players to achieve these purpose 100 handball players, who represented their state in interstate handball tournaments the age group of 18–25 years.

Selection of Variables
Based on the available scientific literature pertaining to finding out relationships of selected variables with playing ability in consultation with experts, the following criterion variables were selected for this study to find the association with the handball playing ability of the subjects.

Physical Fitness Variables
1. Weight
2. Speed.

Psychological Variables
Achievement motivation.

Criterion Measures
- Anthropometric variable weight was measured through the weighing machine and the scores recorded in the nearest 1/10th of a kilogram.
- Physical fitness variable, speed was measured through 50 M run test and scores recorded in 1/10th of a second.
- Achievement motivation was measured through the Sports Achievement Motivation Questionnaire (SAMQ) developed by Dr. M.L. Kamlesh (1993) was used for measuring achievement motivation.

Subject Reliability
The subjects selected for this study were state-level handball players played at state-level competitions. The players had adequate experience in playing the game. They were well trained in all skills and participated a number of tournaments. They involved in this study impartially and they were considered reliable for the purposes of this study.

Collection of Data
The data for the criterion variables were collected by administering the appropriate standard tests. The procedure for administering the test is explained below. Before administering the test, the purpose and procedure were explained to the subjects in details.

Administration of Tests
• Weight

Objective
To measure weight.

Apparatus Used
Weighing machine.

Test Description
The weights of the subjects were taken on a weighing machine with the subjects wearing short and vest only. They stood on the weighing machine and weight was recorded nearest to 1/10th of a kilogram.

Speed (50 M run test)
Purpose
To measure the speed.

Materials used
Two stop watches, measuring tape, clapper, and track marking 50 m.

Instruction
The subjects were advised to run in their own line from the starting to finish, with maximum speed. The command used for starting was “on your mark,” “set,” and “Clap.”

Procedure
Two lines were marked 50 m apart from the starting line and finish line. On the command, “clap,” the subject ran as fast as possible across the finish line to cover 50 m area.

Scoring
The elapsed time was measured to the nearest one-tenth of a second.

Sports Achievement Motivation
The Sports Achievement Motivation Questionnaire (SAMQ), crafted by Kamlesh in 1993, serves as a pivotal tool for evaluating the sports achievement motivation exhibited by the subjects. Comprising twenty statements, the questionnaire prompts responses of "Yes" or "No" from the subjects. The subjects' sports achievement motivation is gauged by tallying the correct responses using the author's designated scoring key. The total score, representing the number of accurate responses, thereby encapsulates the subject's level of achievement motivation.

Statistical Techniques
The fundamental objective of this research endeavor was to ascertain the correlation between chosen anthropometric, physical fitness, and psychological variables and the playing ability of handball players at the state level. In pursuit of meaningful insights, the analysis was conducted utilizing the following statistical tools.

Results and Discussions
The meticulous examination of data acquired from the studied samples is integral to this research. The study's overarching aim is to uncover the correlation between carefully chosen anthropometric, physical, and psychological variables and the playing ability of handball players. In pursuit of this goal, the researcher meticulously curated a sample of one hundred handball players, all of whom represented Uttar Pradesh State in interstate Handball Tournaments and fell within the age bracket of 18 to 25 years. These subjects had previously engaged in state-level competitions, showcasing their skills on behalf of their respective states. The researcher conducted an extensive review of numerous books, journals, research articles, and coaching manuals, establishing a foundation for the hypothesis that a handball player's playing ability might indeed be linked to selected anthropometric, physical fitness, and psychological variables. Building upon these observations, the investigator judiciously selected the ensuing variables for inclusion in this comprehensive study.

Computation of Association on Anthropometric Variables with Playing Ability
Descriptive Analysis
The association of anthropometric variables with the playing ability of handball players was statistically computed. In

descriptive statistics, the number of subjects tested, mean, and standard deviation of the motor fitness parameters is presented in Table 1.

Table 1 shows that the obtained mean value of the playing ability of the handball players was the mean value on height was 64.37, with a standard deviation ± 3.97.

Analysis of Coefficient of Correlation

The obtained values were subjected to statistical treatment to find out the association between anthropometric variables with the playing ability of the subjects. The results are presented in Table 2.

Computation of association on Physical Fitness Variables with Playing Ability

Table 3 shows that the obtained mean value on speed was 6.502, with a standard deviation ± 0.311.

Analysis of Coefficient of Correlation

The obtained values were subjected to statistical treatment to find out the association of each physical fitness variable with the playing ability of the subjects. The results are presented in Table 4.

The results presented in Table 4 proved that there was a significant relationship between playing ability and speed (r: -0.652), as the obtained "r" values were greater than the required "r" value of 0.197 to be significant at 0.05 level.

Computation of Relationship on Psychological Parameters with Playing Ability

Descriptive Analysis

The association of psychological variables with the playing ability of handball players was statistically computed. In descriptive statistics, the number of subjects tested, mean and standard deviation of the physiological parameters are presented in Table 5.

Table 5 shows the obtained mean value on achievement motivation was 13.65, with standard deviation ± 1.527.

Analysis of Coefficient of Correlation

The obtained values were subjected to statistical treatment to find out the association of each psychological variables with the playing ability of the subjects. The results are presented in Table 6. The results presented in Table 6 proved that there was a significant association between playing ability and achievement motivation (r: 0.85), the obtained r values were greater than the required table r value to be significant at 0.05 level 0.197.

Table 1: Descriptive Statistics on Anthropometric Variables Selected for this study

Variables	Mean	SD	n
Weight	64.37	3.974	100

Table 2: Correlation of Coefficient between Motor fitness parameters and playing ability of the subjects

S. No.	Variables Playing Ability Versus	Correlation Coefficient	Level of Sig.
1.	Weight	0.340*	< 0.05

Required table r value playing ability and weight (-0.340),
*Significant at 0.05 level

Table 3: Descriptive Statistics on Physical Fitness Variables Selected for This Study

Variables	Mean	SD	n
Speed	6.5020	0.31112	100

Table 4: Correlation of Coefficient between Physical Fitness Variables and Playing Ability of the Subjects

S. No.	Variables Playing Ability Versus	Correlation Coefficient	Level of Sig.
1.	Speed	-0.652	<0.05

Required table r value $(1.99)_{0.05}$ = 0.197, * Significant at 0.05 level.

Table 5: Descriptive Statistics on Psychological Parameters Selected for this Study

Variables	Mean	SD	n
Achievement motivation	13.65	1.527	100

Table 6: Correlation of Coefficient between Psychological Variables and Playing Ability of the Subjects

S. No.	Variables Playing Ability Versus	Correlation Coefficient	Level of Sig.
1.	Achievement motivation	0.850	<0.05

Required table r value $(1,99)_{0.05}$ = 0.197, * Significant at 0.05 level

Discussions on Findings

Within the scope of this research, an exploration into the intricate nexus among chosen anthropometric, physical fitness, and psychological variables in relation to playing ability unfolded through a meticulous analysis of a cohort comprising 100 handball players. The discernment of these relationships was facilitated by leveraging carefully selected predictor variables, including weight, speed, and achievement motivation. The determination of handball playing ability, a pivotal facet in this study, rested on a subjective evaluation conducted by a panel of three experts, serving as the criterion variable in the research framework.

To unravel the nuanced connections between anthropometric, physical fitness, and psychological variables and the playing ability of handball players, the study employed the backward multiple regression method.

This sophisticated analytical approach meticulously examined each category of variables, delving into

parameters associated with playing ability derived from selected anthropometric variables, those linked to playing ability from chosen physical fitness variables, and the psychological variables associated with playing ability derived from carefully selected anthropometric variables. This methodological precision allowed for a comprehensive investigation into the multifaceted relationships inherent in the performance dynamics of handball players.

Discussions on Hypothesis

For the purpose of this study, the following hypotheses were formulated.

- It was hypothesized that the anthropometric variable weight would be significantly associated with the playing ability of state-level handball players. Moreover, handball playing ability can be successfully predicted by selected anthropometric variables.
- It was hypothesized that the physical fitness variables, speed would be significantly associated with the playing ability of state-level handball players. Moreover, handball playing ability can be successfully predicted by selected physical fitness variables.
- It was hypothesized that the psychological variables, achievement motivation of control would be significantly associated with the playing ability of state-level handball players. Moreover, handball playing ability can be successfully predicted by selected psychological variables.

Findings

The study found a significant association between playing ability and anthropometric variables height and physical fitness variables agility, psychological variables, achievement motivation, and self-confidence.

Conclusions

Taking into account the constraints and specific boundaries set forth in this study, the following conclusions have been derived:

- The investigation yielded the conclusion that the chosen anthropometric variable, specifically weight, exhibited a significant association with the playing ability of handball players. This implies that variations in weight had a discernible impact on the players' performance in the game.
- Another significant finding was the determination that physical fitness variables, particularly speed, demonstrated a noteworthy correlation with the playing ability of handball players. This underscores the importance of speed in influencing and contributing to the overall playing proficiency of these athletes.
- Further analysis led to the conclusion that psychological variables, specifically achievement motivation, exhibited a substantial association with the playing ability of handball players. This implies that the motivational aspects influencing players' achievement orientation played a notable role in shaping their overall playing capabilities.

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