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The Relationship Between Selected Sensorimotor Abilities and Shooting Accuracy Among Soccer Players

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ABSTRACT
In this research, it was intended to find out the relationships between selected sensorimotor abilities and shooting accuracy of soccer players. The use of descriptive correlational design was appropriate for this study as a result of it being related to the study's nature and purpose. The study's population was composed of 24 soccer players who belonged to the Al-Shirqat Sports Club team. A purposive sampling technique was applied to select a sample size of 10 players, which constituted 41.66% of the population. The objectives of the study were accomplished by conducting several sensorimotor abilities' tests; namely, foot lateral-distance perception, sensorimotor perception of the foot in the vertical plane, ball-throw perception, and shooting accuracy test. Statistical analysis was done using arithmetic mean, standard deviation, Pearson's simple correlation coefficient, and percentage. The mean score for shooting accuracy was 6.9 (SD = 2.46), while the foot lateral-distance perception, vertical foot position sense, and ball-throw perception tests yielded mean scores of 10.0 cm (SD = 3.60), 13.7 cm (SD = 4.22), and 9.3 cm (SD = 2.46), respectively. Significant correlations were found between shooting accuracy and selected sensorimotor abilities. This means that there is a contribution of selected sensorimotor abilities in improving shooting accuracy of soccer players. According to these findings, the researcher suggests incorporating sensorimotor ability training practices within the training programs of soccer players along with conducting regular testing.

Keywords: Sensorimotor Abilities; Shooting Accuracy; Soccer Players; Sensorimotor Perception; Technical Performance.

ABSTRAK
Dalam penelitian ini, dimaksudkan untuk mengetahui hubungan antara kemampuan sensorimotor yang dipilih dan akurasi menembak pemain sepak bola. Penggunaan desain korelasi deskriptif sesuai untuk penelitian ini karena terkait dengan sifat dan tujuan penelitian. Populasi penelitian ini terdiri dari 24 pemain sepak bola yang tergabung dalam tim Klub Olahraga Al-Shirqat. Teknik purposive sampling diterapkan untuk memilih

ukuran sampel 10 pemain, yang merupakan 41,66% dari populasi. Tujuan penelitian dicapai dengan melakukan beberapa tes kemampuan sensorimotor; yaitu, persepsi jarak lateral kaki, persepsi sensorimotor kaki di bidang vertikal, persepsi lemparan bola, dan uji akurasi menembak. Analisis statistik dilakukan dengan menggunakan rata-rata aritmatika, standar deviasi, koefisien korelasi sederhana Pearson, dan persentase. Skor rata-rata untuk akurasi tembakan adalah 6,9 (SD = 2,46), sedangkan persepsi jarak lateral kaki, indera posisi kaki vertikal, dan tes persepsi lemparan bola menghasilkan skor rata-rata masing-masing 10,0 cm (SD = 3,60), 13,7 cm (SD = 4,22), dan 9,3 cm (SD = 2,46). Korelasi yang signifikan ditemukan antara akurasi pemotretan dan kemampuan sensorimotor yang dipilih. Artinya, ada kontribusi kemampuan sensorimotor yang dipilih dalam meningkatkan akurasi menembak pemain sepak bola. Menurut temuan ini, peneliti menyarankan untuk memasukkan praktik pelatihan kemampuan sensorimotorik dalam program pelatihan pemain sepak bola bersama dengan melakukan pengujian rutin.

Kata Kunci: Kemampuan sensorimotor; Akurasi Menembak; Pemain Sepak Bola; persepsi sensorimotor; Kinerja teknis.

INTRODUCTION

The field of sports has witnessed remarkable development in recent decades as a result of scientific advances in training methods and athletic preparation. This progress has contributed significantly to improving performance levels across various sports, particularly soccer, which is considered one of the most popular and competitive sports worldwide (Darley Jhosue Burgos Angulo et al., 2024; Zhang & Wang, 2023). Such development has influenced the physical, technical, tactical, and psychological aspects of athletes, making it essential to consider the various factors affecting sports performance in the pursuit of higher achievement levels.

Sensorimotor perception is regarded as one of the fundamental requirements for skilled performance, as it is associated with an athlete's ability to perceive body positions and movements during activity, as well as to recognize distance, direction, speed, and timing. These abilities enable athletes to execute motor skills with greater precision and efficiency. According to Mahjoub (2000), perception represents the primary foundation of human knowledge, providing meaning to sensory stimuli through the sensory and neural systems that directly influence the effectiveness of motor performance.

Furthermore, sensorimotor perception plays a vital role in successful athletic performance, as it allows athletes to identify the position and movement of body parts in space, in addition to maintaining balance and motor control during skill execution. Consequently, it contributes positively to the level of athletic achievement (Joseph & Oxendine, 1986).

The importance of sensorimotor abilities is particularly evident in soccer due to the game's demands for rapid decision making and precise motor execution under constantly changing match conditions (Darley Jhosue Burgos Angulo et al., 2024; Ren & Ma, 2025; Zhang & Wang, 2023). Shooting is one of the most essential fundamental skills in soccer because it represents the direct means of scoring goals and achieving victory. All offensive efforts ultimately aim to create opportunities for successful scoring (Kusuma et al., 2022; Sinclair et al., 2014). Mowafaq Asaad Mahmoud (2008) emphasized that successful shooting performance depends on several factors, most notably

accuracy, power, and speed, with accuracy being the most influential factor in scoring goals.

Accordingly, possessing a high level of sensorimotor abilities may enhance a player's capacity to control body movements and ball actions, estimate distances and directions accurately, and perform skills more effectively (Mappaompo et al., 2024; Shan & Zhang, 2022). This, in turn, may improve shooting accuracy and offensive effectiveness. Therefore, the significance of the present study lies in examining the relationship between selected sensorimotor abilities and shooting accuracy among soccer players, thereby providing scientific evidence that may assist coaches and practitioners in designing training programs aimed at improving technical performance.

Related Studies

Study of Ahmed Abdulrahman Al-Masalmeh

Entitled: "The Effect of a Proposed Training Program on the Development of Sensorimotor Perception and Its Relationship with Skill Performance in Handball"

The study aimed to:

1. Develop a set of tests for measuring sensorimotor perception.
2. Design a training program to improve the level of sensorimotor perception.
3. Identify the relationship between sensorimotor perception and skill performance in handball.

The researcher employed the experimental method. The study sample consisted of 34 players from the national youth handball team, aged between 18 and 20 years. The participants were selected purposively. Statistical procedures included the arithmetic mean, standard deviation, t-test for dependent and independent samples, percentage, self-validity coefficient, and Pearson's simple correlation coefficient.

The study reached the following conclusions:

1. The proposed training program had a positive effect in reducing the time required for skill acquisition among the experimental group.
2. The training program produced positive effects across all measured variables and tests.
3. A set of practical tests was identified for assessing the level of sensorimotor perception.

Research Problem

Shooting is considered one of the most fundamental skills in soccer, as it represents the primary means of scoring goals and determining match outcomes. Effective shooting requires a high level of accuracy, motor control, and rapid response to various game situations. The successful execution of shooting performance depends on several physical, technical, psychological, and perceptual factors, among which sensorimotor abilities play a significant role in perceiving body positions, estimating distances and directions, and controlling limb movements during skill performance.

Through reviewing previous studies and relevant literature, as well as his practical experience in the field of soccer, the researcher observed noticeable differences in shooting accuracy among players. These differences may be associated with variations in their sensorimotor abilities. Therefore, there is a need to investigate these abilities and determine their relationship with shooting accuracy among soccer players.

Accordingly, the research problem is centered on identifying the relationship between selected sensorimotor abilities and shooting accuracy among soccer players.

Research Objective

The study aims to: This research aims at exploring the correlation between selected sensorimotor capabilities and shooting accuracy among soccer players.

Research Hypothesis: The selected sensorimotor capabilities have a statistically significant relationship with shooting accuracy among soccer players.

Scope of the Study

1. Human Scope: Soccer players of Al-Shirqat Sports Club.
2. Spatial Scope: Al-Shirqat Sports Club Stadium.
3. Temporal Scope: From February 4, 2026, to April 11, 2026.

METHODS

Research Method

A descriptive research design, using a correlational approach, was used by the researcher, which was the most appropriate for this study considering its problem statement and objectives.

Research Population and Sample

The study population included 24 football players in Al-Shirqat Sports Club. This study sampled 10 football players purposively from midfield and forwards positions, accounting for 41.66% of the study population.

Instruments and Tools Used in the Research

Instruments (One stopwatch, Measuring tape). Research Tools (Arabic references and literature, Personal interviews (Appendix 1)).

Tests Selection

It has been noted that researchers have to either select the existing or design new test instruments, which will be useful in measuring the variables of interest, especially when they are related to the phenomena under examination. Therefore, the selection of tests that can adequately measure the required variables becomes a very important aspect (Jaber & Kazem, 1973, p. 270).

In this case, a number of field tests were used as instruments, which would give indications regarding sensorimotor perception and the evaluation of the phenomenon in question. This selection process was based on observations, analysis of literature available both in Arabic and foreign languages, and consultations with the research supervisor.

Characteristics of the Tests Conducted to Measure Sensorimotor Perception

Evaluation of the level of sensorimotor perception involved three different tests designed to measure the degree of sensorimotor perception. Procedures and criteria for conducting these tests are explained below.

Test 1: Measurement of Lateral Distance Position Sense Test (Weibe Test)(Abdel-Fattah & Hassanein, 1997, p. 179)

Purpose of the test:

Measuring the ability to sense lateral distance. Proper movement of one foot to a certain lateral distance without visual input indicates a better sensorimotor perception.

Procedure of Test:

Two parallel lines were marked on the floor having a separation of 30 cm. The subject was made to stand such that one foot was parallel to the left line, and the right

foot was directed towards the same line. The first step involved visually estimating the distance. Following this, the vision was blocked using a blindfold.

Scoring of Test:

Subject has to move his/her right foot sideways to reach a point 30 cm away from the first line on the floor. The distance left between this point and the end of the second line is measured. Three trails for each participant were conducted, and their scores combined.

Test 2: Vertical Foot Position Sense Test (Weibe Test)(Abdel-Fattah & Hassanein, 1997, p. 178)

Purpose

To test the perceptual abilities of the participant in terms of foot vertical positioning during knee flexion.

Procedure

A horizontal line was drawn on the wall at the level of 35.5 cm from the floor. The participant was made to judge the target level by sight initially, and thereafter, vision was blocked by a blindfold and the participant was required to position his foot against the wall by flexing the knee.

Scoring

Two trials for each subject were conducted, and the total score of two trials was noted.

Test 3: Ball Throw Perception Test (Weibe Test)(Abdel-Fattah & Hassanein, 1997, p. 182)

Purpose

To test the participant's perception and estimation abilities in throwing a ball without any visual input.

Procedure

Two lines were placed in a distance of 127 cm between them. The participant stood behind one line and estimated the distance to the other line, and thereafter threw the ball blindly.

Scoring

Distance covered by the ball in relation to the other line is measured, and the scores obtained are either positive or negative based upon whether the ball fell before or after the target line.

Shooting Accuracy Test (Mahmoud, 2009, p. 44)

Test Name, Shooting at Nested Rectangles Test.

Objective

To measure shooting accuracy toward a target.

Equipment

1. Three soccer balls.
2. One stopwatch.
3. A smooth wall marked with four nested rectangular targets.

Procedure

Four rectangular targets were drawn on a smooth vertical wall with the following dimensions:

1. First rectangle: 2 × 6 ft
2. Second rectangle: 2 × 12 ft

3. Third rectangle: 6 × 18 ft
4. Fourth rectangle: 8 × 24 ft

A line was marked parallel to the wall at a distance of 20 ft from the target area. The participant stood behind the starting line with a ball. Upon the start signal, the participant kicked the ball using either foot toward the wall, aiming to hit the smallest target rectangle (2 × 6 ft) as many times as possible within the allocated test duration of 30 seconds.

Scoring

Points were awarded according to the rectangle hit by the ball:

1. First rectangle: 4 points
2. Second rectangle: 3 points
3. Third rectangle: 2 points
4. Fourth rectangle: 1 point

A score of zero was awarded when the ball failed to hit any of the designated rectangles,Figure (1) illustrates the test setup.

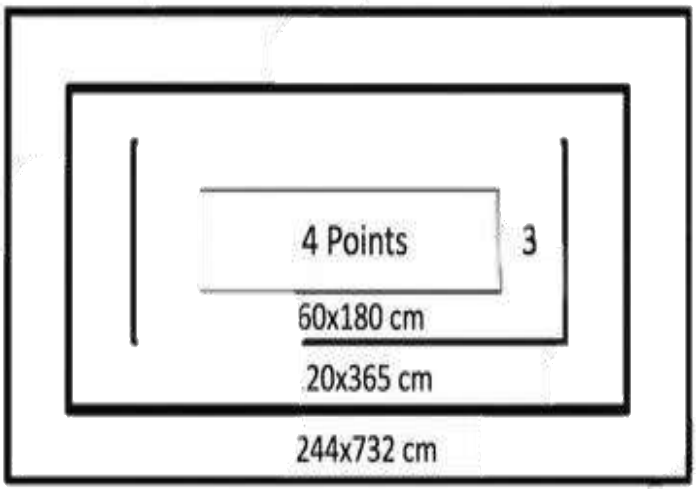

Figure 1. Shooting Accuracy Test Targets

Scientific Features of the Tests

Validity

In order to assess the appropriateness of sensorimotor perception tests, the opinion of expert group members was sought. The experts reached an agreement that the chosen tests have content validity as they meet the purpose of measurement.

Reliability

Test-retest reliability was applied as an estimate of internal consistency. The first administration of the assessment took place on 20 March 2026, while the second test was performed on 27 March 2026. The analysis of collected data was based on Pearson's simple correlation coefficient, which had the following values: Foot Lateral Distance Perception Test: 0.93, Vertical Foot Position Sense Test: 0.91, Ball Throw Perception Test: 0.92.

This indicates a high level of reliability of the tests used.

Objectivity

Objectivity was defined through the agreement of two independent evaluators.

Pilot Study

A pilot study was carried out to establish the environment surrounding the phenomenon being studied and any possible problems that would be encountered during the main study. The pilot study was conducted on 4th April 2026, and involved the use of five participants who were selected from the research population.

The objectives of the pilot study included:

1. Determining the understanding of the procedure of tests by the subjects.
2. Establishing how much time is needed to carry out the tests.
3. Ascertaining the safety of the testing devices.
4. Establishing any possible problems that may occur during data collection.
5. Evaluating the researcher's competence in conducting the research tests.

Main Study

After confirming the reliability of the tests, validity of the procedures of tests, and solving any problems that had been established during the pilot study, the main study went on to conduct the tests. This was done on Tuesday, 10th April 2026.

Statistical Analysis

The collected data were analyzed using the following statistical techniques:

1. Arithmetic Mean
2. Standard Deviation
3. Pearson's Product-Moment Correlation Coefficient
4. Percentage

RESEARCH RESULTS

After the statistical treatment of the data, the results were organized and presented in tables for analysis and interpretation.

Presentation of Means and Standard Deviations of the Research Variables

Table 1. Means and Standard Deviations of the Research Variables

Research Variables	Unit of Measurement	Mean	Standard Deviation
Shooting Accuracy	Score	6.9	2.46
Foot Lateral Distance Perception Test	cm	10.0	3.60
Vertical Foot Position Sense Test	cm	13.7	4.22
Ball Throw Perception Test	cm	9.3	2.46

Mean scores and standard deviations of the evaluated criteria were provided in Table 1. Specifically, the score in terms of the shooting accuracy was 6.9 (SD = 2.46). On the other hand, for the test that evaluates lateral foot distance perception (Weibe test), the score was 10.0 (SD = 3.60). As for the vertical foot position sense test, the result was 13.7 (SD = 4.22). Lastly, the ball throw perception (Weibe test) had a score of 9.3 (SD = 2.46).

Presentation, Analysis, and Discussion of the Correlations Between Shooting Accuracy and Sensorimotor Perception Variables

Table 2. Correlation Coefficients Between Shooting Accuracy and the Selected Sensorimotor Perception Variables

Variables	Foot Lateral Distance Perception	Vertical Foot Position Sense	Ball Throw Perception	Critical r-value
Shooting Accuracy	0.764	-0.698	0.825	0.602

The critical r-value at the 0.05 significance level was 0.602.

According to Table 2, there is a significant correlation (coefficient 0.764) between shooting accuracy and foot lateral distance perception, as its absolute value is higher than that of the critical value (0.602) at the 0.05 significance level. The reason for this correlation might be related to the importance of kinesthetic perception in allowing the athletes to estimate distances and control limb movements. Indeed, kinesthetic perception can be considered an important part of any athletic performance based on sensory receptors in muscles and joints that help control movement and direct body actions (Agha, 1987; Al-Amir, 2002).

DISCUSSION

Besides, a significant negative correlation ($r = -0.698$) is evident between shooting accuracy and vertical foot position sense since the absolute value of the correlation coefficient is higher than that of the critical one. It means that the lower the test score, the higher the shooting accuracy. Given that scoring on this test is calculated in terms of error scores, a lower value stands for more developed sensorimotor perception of foot position. Thus, it can be concluded that better sensorimotor perception of foot vertical position helps players make more accurate shots. This correlation is consistent with the view of Mahjoub (2000) that perception provides sensory stimuli with some meaning and plays an important role in motor response selection. At the same time, Joseph and Oxendine (1986) argued that kinesthetic perception allows recognizing the position and movement of body parts in space, helping improve athletic performance.

As far as ball throw perception is concerned, there is a significant positive correlation between the latter and shooting accuracy, as the correlation coefficient (0.825) is higher than the critical value. The reason why such results have been obtained can be found in the importance of kinesthetic sensation that helps organize and regulate motor action via muscle-joint receptor information and thus make adequate estimations of forces and directions required for executing skillful shots. This conclusion is based on the ideas of Samad (2000) regarding the need for using cognition about motor perception in regulating athletic performance. Moreover, Mahjoub (1985) stated that kinesthetic sensation helps perceive one's body movement and muscular tension when performing sports activities.

In general, one can say that sensorimotor skills significantly affect the precision of kicking in soccer players. They positively influence the regulation of body movements, improve distance estimates, direction assessments, and technical skills at the moment of performing kicks.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the statistical analysis of the findings, it can be concluded that:

1. A significant relationship was found between perception of foot lateral distance and shooting accuracy in soccer athletes.
2. A significant relationship was established between perception of vertical foot positioning and shooting accuracy in soccer athletes.
3. A significant relationship was found between perception of ball throw and shooting accuracy in soccer athletes.

Based on the above conclusions, the following recommendations were made:

1. Include exercises aimed at improving the athlete's sensorimotor perception into the soccer training process.
2. Conduct regular tests to check the sensorimotor perception and accuracy of the ball shot to monitor player results and help coaches develop effective training methods scientifically.
3. Continue researching various sensorimotor perception indicators in relation to other soccer abilities.

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