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MOTOR RESPONSE SPEED AND ITS RELATIONSHIP TO SHOOTING AND PASSING ACCURACY IN HANDBALL FOR FOURTH-YEAR STUDENTS

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ABSTRACT

The research aimed to identify the motor response speed of fourth-year students in the College of Education/Department of Physical Education and Sports Sciences/Al-Qalam University, and to determine the accuracy of their handball passing and shooting skills. It is also aimed to identify the relationship between motor response speed and the accuracy of these skills. The researcher used a descriptive approach with correlational analysis, deemed suitable for the research problem. The research sample was selected purposively from 30 fourth-year students in the College of Education/Department of Physical Education and Sports Sciences/Al-Qalam University during the 2025/2026 academic year. Through presenting, analyzing, and discussing the results, the researcher concluded that there is a significant correlation between motor anticipation and the accuracy of handball passing among fourth-year students in the College of Physical Education and Sports Sciences/Al-Qalam University, and a significant correlation between motor anticipation and the accuracy of shooting. Based on the presented results, analysis, discussion, and conclusions, the researcher recommends emphasizing abilities that directly influence the accuracy of students' skill performance. The educational units are motor prediction and motor response speed and emphasize the need to adopt computer technology in educational curricula to develop students' mental abilities.

KEYWORDS: *Speed of motor response, shooting accuracy, handling, handball.*

INTRODUCTION:

The advancement in performance levels in sports has resulted from the use of modern scientific methods and techniques to develop individual athletes and help them reach the highest levels in their chosen activity.

Handball is a team sport whose players possess numerous physical, technical, and mental abilities that play a crucial role in executing various skills with speed and precision. As a result of modifications and changes to the rules of the game, the importance of mental abilities has increased. These changes have significantly enhanced offensive skills compared to the development of defensive skills. This approach aims to create a balance between defensive and offensive skills, leading to integrated skill development in handball, as well as adding an element of excitement and suspense.

Reaction speed is a crucial mental ability in sports. Students with high reaction speed have a better chance of success in situations requiring decisive action and quick responses (Shamoun, 1996: 197). Reaction speed is also essential for successful decision-making in handball, a game of diverse situations that demands students' constant and rapid adaptation during matches. Therefore, the importance of this research lies in understanding motor response and its relationship to the performance of certain offensive handball skills. This understanding serves a vital part of the training process and contributes to achieving better results.

RESEARCH PROBLEM:

The modifications and changes to the rules of handball, along with the accompanying shift in the pace of the game, characterized by increased speed, and the diversification and development of offensive strategies, have necessitated that students possess high-level mental abilities, including motor response. This is essential for quickly determining the correct course of action to anticipate the opponent's movements at the appropriate time and place. Through his experience in handball, the researcher, a handball specialist, observed that reaction speed plays a significant and crucial role in the accuracy of offensive skills, particularly passing and shooting. Therefore, the researcher aimed to identify the reaction speed of students and determine the relationship between it and the accuracy of their passing and shooting skills. Ultimately, the goal was to find the most suitable solutions to contribute to developing their skills and achieving optimal results at both the local and international levels.

RESEARCH OBJECTIVES:

1. To identify the reaction speed of fourth-year students at the College of Physical Education and Sports Sciences, Al-Qalam University.
2. To determine the accuracy of the students' passing and shooting skills in handball.
3. To identify the relationship between reaction speed and the accuracy of the students' passing and shooting skills in handball.

RESEARCH HYPOTHESIS:

- There is a statistically significant relationship between reaction speed and the accuracy of the students' passing and shooting skills in handball.

RESEARCH AREAS:

- Human Resources: Fourth-year students, College of Education, Department of Physical Education and Sports Sciences, Al-Qalam University, for the academic year 2026/2027.
- Timeframe: From October 4, 2025, to January 7, 2026.
- Spatial Area: Al-Sulaf Sports Club Hall

RESEARCH METHODOLOGY AND FIELD PROCEDURES:

1. RESEARCH METHODOLOGY:

The researcher used the descriptive method with a correlational approach, as it is suitable for the research problem. This method "represents a scientific diagnosis of problems or phenomena to the extent that objective tools are available, and then this diagnosis is expressed through precise linguistic and mathematical symbols according to a well-organized system." (Al-Kandari, 1999: 113)

2. RESEARCH SAMPLE:

Selecting the research sample is one of the important and fundamental aspects that influence the progress of the research. Therefore, the research sample must be truly representative of the original population, as it "is the part that represents the original population or model upon which the researchers conduct their entire work." (Mahjoub:2001: 163)

The research sample was selected purposively from fourth-year students at the College of Education, Department of Physical Education and Sports Sciences, Al-Qalam University, for the academic year 2026/2027, totaling (30) students. To determine the validity of the sample selection and its normal distribution, the skewness coefficient was used to determine the homogeneity of the sample in the variables of (height, weight, age), as shown in Table (1). Note that the skewness coefficient in those variables was limited to (+3), therefore the sample is considered normally distributed.

Table (1). shows the variables (height, weight, age) and the values of the arithmetic means, standard deviations and skewness coefficient for the individuals in the research sample

Variables	Mean	Std	Median	Skewness	Sample
Height, cm	176.648	2.378	177.53	0.425	**30**
Weight, kg	71.383	5.783	71.38	0.324	
Age, months	290.534	3.735	290.5	0.135	

EQUIPMENT, TOOLS, AND DATA COLLECTION METHODS:

Research tools are "the means by which researchers can collect data and solve their problem to achieve the research objectives, regardless of the nature of those tools, such as data, samples, and equipment." (Mahjoub: 2002: 161)

1. DATA COLLECTION METHODS:

- Arabic and foreign sources and references.
- Motor response speed assessment form.
- Tests used in research.
- Supporting research team.
- Statistical methods.

2. RESEARCH EQUIPMENT AND TOOLS:

- Panasonic (Japanese made) video camera with stands.
- Dell computer.
- In Focus data projector.
- Height and weight measuring devices.
- Casio electronic timer.
- Measuring tape for measuring distance.
- Film projection wall. 8. Colored adhesive tape.
- A regulation handball court and regulation handballs.

3. TESTS USED IN RESEARCH:

FIRST: NELSON'S TEST OF SELECTIVE MOTOR RESPONSE (HUSSEIN & AL-YOUSEF, 1999, P. 245)

- Purpose of the Test: To measure the ability to respond and move quickly and accurately according to the selected stimulus.
- Equipment: A level, unobstructed area 20 meters long and 2 meters wide; an electronic timer; a measuring tape; and adhesive tape.
- Procedures: The test area is marked with three lines, 6.40 meters apart and 1 meter long.
- Test Description: The subject stands at one end of the center line facing the examiner, who stands at the other end of the line. The subject assumes a ready position with the center line between their feet and leans slightly forward. The judge holds the timer in one hand and raises it, then quickly moves their arm either left or right while simultaneously starting the timer.

The subject responds to the hand signal and attempts to run as fast as possible in the designated direction to reach the sideline, which is 6.40 meters from the center line. When the subject crosses the correct sideline, the judge stops the timer. If the subject starts running in the wrong direction, the judge continues to run the timer until the subject changes direction and reaches the correct sideline. The subject is given six consecutive attempts, with 20 seconds between each attempt, three attempts on each side.

The attempts on each side are chosen randomly. To do this, six pieces of cardboard (cards) of the same size and color are prepared. Three are labeled "Left" and the other three "Right." They are turned over and placed in a bag, then drawn without looking at them.

CONDITIONS:

- Each subject is given a number of off-test attempts under the same basic conditions to familiarize themselves with the test procedure.
- The examiner must practice the starting signal so they can simultaneously give this signal with their arm and start the clock.
- Before administering the test to the subject, the examiner randomly draws the six previously drawn cards and records the order in which they are drawn on a special card held in one hand. This card guides the examiner in the sequence of signal directions and allows them to record the time for each subject individually. This procedure prevents the subject from predicting the direction from one attempt to the next.

- The subject must not be informed that they are required to perform six attempts, three in each direction. This procedure is also important to limit the subject's ability to predict.
- The subject must be informed that the number of attempts is not equally distributed between the two directions; one direction may have more attempts than the other. The order of the attempts is random and will vary from one subject to another.
- The test should begin with the judge giving the following signal:
- Get ready - Start, and in all attempts the time interval between the words (Get ready - Start) should be between 1.5 and 2 seconds
- The test subject should do some light exercises for the purpose of warming up, and the test area should be free of any obstacles.

RECORDING:

- The time for each attempt is recorded.
- The test score is the average of the six attempts.

SECOND: COORDINATION AND PASSING SPEED TEST (AL-KHAYYAT & AL-HAYALI, 2001, P. 492)

- Test Objective: To measure coordination and passing speed along a wall.
- Equipment:
  - Regulation handball (58 cm).
  - Flat wall.
  - Stopwatch.
- Procedure:
  - The player stands 4 meters from the wall.
  - The player passes the ball along the wall, continuing to pass it as many times as possible within the allotted time (60 seconds).
- Scoring: The number of passes within the allotted time is counted (the number of times the ball is received is recorded).

THIRD: SHOOTING ACCURACY TEST (AL-KHAYYAT & AL-HAYALI, 2001, P. 493)

- Test Objective: To measure shooting accuracy with a handball.
- Performance Method: A handball goal is drawn on a wall in front of the goal, consisting of two uprights and a crossbar (2 x 3 meters). The shape representing the uprights should be in contact with the ground (the line where the wall meets the court meets). The goal is then divided into nine rectangles, as shown in Figure 3, to measure shooting accuracy. A line is drawn on the ground nine meters away from this shape. The player shoots from behind the line, taking a pivot step. The player whose shot lands on rectangles 1, 3, 7, and 9, which represent the four corners of the goal and measure 60 x 100 cm, receives a score of four points. If the ball lands on rectangles 2 and 8, which represent the area above the goalkeeper's head and between his feet and measures 60 x 100 cm, the player receives three points. If the ball hits rectangles (4 and 6), which represent the goalkeeper's arm area and measure (80 x 100 cm), the player receives two points. If the ball hits the middle rectangle – number five – which represents the goalkeeper's chest and torso and measures (80 x 100 cm), the player receives one point. If the ball lands outside of these areas, the player receives zero points. Each player performs ten attempts after completing the necessary warm-up, and this constitutes the maximum score for the test.

PILOT STUDY:

The researcher conducted a pilot study with a group of individuals outside the main research sample of (10) students. This took place in the Al-Sulaf Sports Club at 10:00 AM on October 18, 2025. The purpose of the pilot study was:

1. To determine the time required to complete the tests.
2. To assess the efficiency of the support team.
3. To evaluate the suitability of the equipment and tools used in the research.

MAIN STUDY:

After completing the pilot study and confirming the validity of the tests, the main and final study was conducted with the main sample of (30) students on November 23-24, 2025. The order of the tests was as follows: students first performed the motor response speed test, followed by the skills performance tests.

1. Scientific Foundations of Research

- Validity: "Validity is one of the fundamental conditions for judging the validity of a test. A test is considered valid if it measures what it is designed to measure and differentiates between individuals" (Majed, 2022).

- Reliability: "Reliability means that an individual's score does not change significantly with repeated testing. Statistically, it is expressed as the correlation coefficient between individuals' scores across different test administrations. In other words, test reliability means that the test is trustworthy and dependable" (Rafeeq, 2021).

STATISTICAL METHODS:

The researcher used the Statistical Package for the Social Sciences (SPSS) to statistically analyze the data.

RESULTS:

The results of the motor response speed and accuracy of shooting and passing skills for the research sample are presented.

Table (2). shows the arithmetic means and standard deviations of the motor response speed for the accuracy of the passing and shooting skills in handball for the research sample

Variables	Mean	Std	Correlation coefficient	Calculated t value	Error rate	Significance
Speed of motor response	5.883	0.678	0.923	0.86	0.00	Sig.
Accuracy of aiming skill	37.578	0.345	0.994	-0.55	0.00	Sig.
Handling skill	48.868	0.453	0.946		0.00	Sig.

DISCUSSION:

Based on the results shown in Table (2), we found a significant correlation between motor anticipation, motor response speed, and the accuracy of shooting and passing skills in handball. The researcher attributes this to the fact that the more time a student has to prepare their response, the greater their anticipation and the faster their decision-making process for the motor response. In other words, in passing skills, the student has sufficient time to anticipate the ball's trajectory because the distance the ball travels is crucial compared to dribbling and other techniques. Therefore, the student has enough time to determine where the ball will land at the right time and place. Indeed, "taking the appropriate stance, following the ball, focusing, and paying attention have a positive effect on receiving" (Subhan, 2000: 69).

The researcher attributes this to their acquisition of technical skills such as basic handball motor skills, the ability to adapt to different game situations to achieve victory in competition, and the repetition and opportunities for success provided by the university team coach to instill self-confidence, which in turn generates motivation to achieve the best athletic results with high speed and accuracy. This is confirmed by Faten Mohammed (1999: 80), who states that confidence influences the evocation of many positive emotions in students. It instills in them a sense of vitality, enthusiasm, joy, freshness, enjoyment, and satisfaction. This leads to smoother, stronger, and faster student movements. In addition, confidence helps students maintain calmness and relaxation, especially in stressful competitive situations, and it aids in focusing attention and increases perseverance and effort.

The researcher attributes the significant differences to the extensive training in shooting skills, given that shooting is one of the most frequently used skills in matches. This training, through repetition and mastery, led to increased motivation and reduced errors among the national team players. The varied and intensive shooting training enabled the players to focus on their reaction speed and body composition, developing their willpower and control over their skill. This aligns with Ahmed Oraibi's (1998) finding that students' awareness of their mistakes and their efforts to minimize them are strong motivators for continued training to improve their performance and reach an advanced level. (Oraibi, 1998: 240)

This indicates a significant relationship between self-control, reaction speed, and shooting accuracy among fourth-year students in the College of Education/Department of Physical Education and Sports Sciences/Al-Qalam University. The researcher attributes the high response rate of handball students to the development of their psychological and volitional qualities, particularly the trait of self-control, which allows them to maintain high speed, adapt to different and difficult situations, and make decisive choices. A student with self-control is able to maintain composure in all circumstances, even the most challenging and complex situations, while maintaining a high level of performance throughout the match. This is what Muhammad Hassan Alawi emphasizes: "It is essential to focus on developing volitional qualities, especially self-control and perseverance, which allow for maintaining a high response speed until the end of the match." (Alawi, 2003: 59). Samir Mahna Al-Rubaie confirms this, stating that shooting accuracy is affected by both training and experience. (Al-Rubaie, 2009: 69). Hassan Abdul-Jawad further emphasizes this, saying, "The goal of mastering the basic principles and tactics is to enable a player on the team to reach a position that facilitates shooting and scoring goals, especially with fast shots on the court, according to different and successive situations." (Abduljawad: 1995: 53)

Furthermore, rapid motor response is essential, as students need it to adapt and quickly shift to the opponent's actions. This depends on the student's speed of movement, focus, and readiness to counter the opponent's attack and follow it throughout the game to perform defensive duties effectively and minimize the success rate of counter-attacks.

The researcher attributes this to the experience of the study participants. Highly experienced students can choose the best and most appropriate course of action that suits the nature of the situation they are responding to. Moreover, experienced

students have the ability to quickly understand movements, receive information, and analyze the opponent's offensive moves to enhance their defensive skills. In addition, good defensive performance depends on the student's experience, rapid response to stimuli, and motor anticipation. (Hussein: 1999: 40)

CONCLUSIONS:

1. There is a significant correlation between motor anticipation and the accuracy of handball passing skills among fourth-year students at the College of Education, Department of Physical Education and Sports Sciences, Al-Qalam University.
2. There is a significant correlation between motor anticipation and the accuracy of shooting skills among the research sample.
3. There is a significant correlation between motor response speed and the accuracy of passing skills among the research sample.
4. There is a significant correlation between motor response speed and the accuracy of shooting skills among the research sample.

RECOMMENDATIONS:

1. Emphasizing the abilities that directly impact the accuracy of students' skill performance during educational units, namely motor anticipation and motor response speed.
2. Emphasizing the necessity of integrating computer technology into educational curricula to develop students' cognitive abilities.
3. Emphasizing the importance of conducting regular mental and physical assessments to evaluate students' performance, which will help coaches develop their educational curricula scientifically and up-to-dately.
4. Conducting similar studies on offensive skills that incorporate mental and physical capabilities.

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