ENHANCEMENT OF SHOOTING PERFORMANCE THROUGH VISUAL MEMORY EXERCISES. A STUDY OF JUNIOR BASKETBALL ATHLETES

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ABSTRACT

Background. In basketball, players have to observe many details very quickly within a shooting play; for example, they must note their own position on the court, the defender's distance from them, the basket's position, and their teammates' movements. **Objectives.** This paper indicates the role that higher visual memory plays in shooting accuracy (number of successful shots) among players (13-16) in a real game setting. **Method**. We conducted a descriptive correlational study that collected field data without changing the players' basic training at all. The participants were 25 junior players aged 13-16 years with at least one year of experience and either normal or corrected vision. The players were subsequently divided into two groups: 11 players with high visual memory and 14 players with low visual memory. **Results.** The results showed a strong positive correlation ($r=0.84$, $p<0.0001$) between visual memory score and the number of successful shots. A correlation was also found between the average number of successful shots in the low and high visual memory groups. Player age was not correlated with visual memory score ($p=0.18$). **Conclusion.** There is a relationship between the average successful throws of the two categories, low memory and high memory, which proves the sub-hypothesis of the research. The player's age is not related to the degree of memory ($P=0.18$). The distributions of both memory score and aiming accuracy showed a concentration around the average values.

Keywords; visual memory, shooting skill, basketball, juniors.

A. INTRODUCTION

Sports in general, and basketball in particular, are physical activities that require a complex interaction between a number of factors, including physical abilities, motor skills, technical accuracy, as well as cognitive abilities. One of the most prominent basic skills on which basketball is based is shooting, as it represents the basic tool for scoring points and achieving victory. Therefore, developing this skill is a central goal in the training programs for the game, especially in the emerging age groups, which are the basic foundation for forming players in the future.

The view of experts and coaches regarding the concept of skillful performance has evolved. It is no longer limited to precise physical movements, but also includes mental and cognitive aspects that play an important role in controlling those movements. Among these aspects is visual memory, which is considered one of the higher mental abilities that allows an individual to record, retain, and retrieve visual information later. This forms the basis for making athletic decisions in fast and complex play situations.

In basketball, when performing the shooting skill, the player needs to recall many details in a fraction of a second, such as his position on the court, the position of the basket, the approach of the defender, and the movement of teammates. All this information and these matters require strong visual memory to help the player shoot and play.

Accurate shooting is linked to the player's ability to remember the complete picture of the movement situation, enabling them to make the right decision and execute the shooting skill with high precision. On the other hand, the age group (14-16 years) undergoes... At an important stage of physical, mental, and emotional development, and awareness of the sensitive stages in athletic development, the individual's ability to learn and consolidate skills increases, and individual differences between players appear in terms of visual processing and decision-making abilities. This makes it necessary to highlight how mental abilities, such as visual imagery memory, affect the quality of motor performance.

Despite the crucial importance of scoring in basketball and its direct impact on team performance and game results, many players suffer from poor shooting accuracy and slow

decision-making in various game situations. These problems are often attributed to weak cognitive abilities, particularly visual memory, which is critical for understanding the game and analyzing the constantly changing visual information during play. Young basketball players struggle with scoring easily, as well as with player positioning, ball trajectories, and optimal shooting opportunities, all of which affect their shooting efficiency. In terms of existing technical drills which we have, the connection between what we do for visual memory development and its effect on shooting skills is still a mystery – this is true for what we see played out on the field and also what we put in our training programs. Also, we don't see this element, which is to improve visual memory, as a method that includes technical and cognitive elements, put into play as a large part of our training regimens. Thus, our research question is to determine the value of using visual memory enhancement as a training method, which looks at both the technical and cognitive aspects to better support player performance and the achievement of the best results.

Research Problem

At first, notice what is emerging is a great deal of interest in players' visual perception skills; at the same time, we are seeing a gap in research that reports on direct field study of the relation between visual location recall and performance of shots on a basketball court. We put forth that the primary research question is:

What is the relationship between visual memory and shooting accuracy (number of made shots) among players (13-16) in a real game setting?

Research Objectives

This research has, out of many formal and practical issues, become a subject that is a worthwhile study and analysis. To which may be added the following: Scientific value: We see in this research a contribution to the science that improves our understanding of the relationship between cognitive processes. In particular, we are talking of visual memory and skill performance in team sports, with basketball's shooting skills used as a case in point. Also, it adds what is, theory and practice-wise, an important dimension to present-day sport science by looking at cognitive elements which often are left out in sport research, and puts forth new ways to research into the causes of individual variation in performance among

players. Practical value – the research we present gives coaches and those who work with young basketball players a framework that they can use. By which we mean it brings to light the importance of in–training programs, the development of cognitive skills as well as the physical and technical. Also, it gives measures of the impact of visual memory on shooting accuracy, which in turn allows coaches to include in training units that improve players' response and, in turn, improve performance in game-like settings. Value of junior category – the research we look at is in the junior (14-16) age group, which we feel is a key group. In the early stages of a basketball player's development, that is, in terms of both mental and physical growth. At this stage, we see great neurological, sensory, and motor flexibility, which in turn means that cognitive and perceptual interventions have very large-scale effects on the improvement of skills. From that we can also see this research's application in the development of better preparation and training methods at the beginning stage of play. Filling the targeted category gap: This research represents a response to an existing cognitive need in the sports field, which is the lack of studies that link the impact of cognitive abilities, such as visual memory, on skill performance in team sports, making this work a scientific contribution to enriching this research field and expanding its scope.

Based on the research problem, its objectives, and the nature of the variables addressed, the following hypotheses were formulated.

1. There is a statistically significant relationship at the level of (0.05) between the level of visual memory and the accuracy of shooting skills among junior basketball players (14-16) years old for juniors.
2. There is a statistically significant relationship in the level of shooting accuracy between players with high visual memory and players with low visual memory.
3. The increase in the level of visual memory leads to an improvement in the performance of the shooting skill in different game situations (during movement, during jumping, from a stationary position).
4. Visual memory contributes significantly and noticeably to the speed of shooting decision-making among junior basketball players.

B. METHOD

Study design

1. The study adopted a descriptive correlational approach, collecting field data without any modification to the players' basic training.
2. This design was able to measure the degree of visual memory and the number of successful throws directly in conditions similar to real-life sports.

Sample specifications

1. The number of participants is 25 players from the junior category, ages 13-16 years.
2. Criteria: The player must have at least one year of experience in basketball, normal or corrected vision, and be free from recent injuries that affect shooting or color perception.
3. The players were subsequently divided (for the second scenario) into two categories: High memory: 11 players; Low memory: 14 players.

Tools and materials

1. Ground colors: Four markers (30 × 30) were fixed on the ground around the shooting area (red, blue, green, yellow).
2. 7-inch basketball, 3.05-inch basketball hoop.
3. Cross-sectional slides: Slides A and B contain two color sequences (each component consists of 4 colors) to be displayed in front of the player for 5 seconds.
4. Record sheets were made on which the memory score and number of successful throws for each player in two official rounds were recorded.

Preparation phase

1. Attach the colored stickers around the basket at a distance of 3-4 meters and at an angle of approximately 90 degrees.
2. The counter for the two SIM cards (A) and (B) prepares the paper cards.
3. Informing the players of the test procedures, its objectives, and how to register.

Leadership phase

A preliminary test was conducted with 5 players to check the clarity of the instructions and the adequacy of the presentation time (5).

The display time and poster placement were adjusted according to the preliminary tour observations before starting to collect the actual data.

The main steps of the experiment

Test 1:

a. The player sits behind the free throw line so that he can clearly see the labels.

b. It displays a sequence of colors (e.g., blue, green, red, yellow) for a fixed duration of 5 seconds.

c. The player is asked verbally to repeat the order he saw, for example (blue, green, then red, then purple).

d.The researcher records the memory score = the number of colors (out of 4) that the player mentioned in their correct order.

e. Based on the degree of memory, the player advances to colored positions in the order he saw them and fires one shot at each position.

f. The researcher records the number of successful throws from

g. The accuracy of the shot is recorded using the following equation:

Shooting accuracy = Number of successful shots ÷ Memory score

Test 2:

The same procedure is repeated with the second color sequence to compensate for any effect of the first presentation. The higher of the two memory scores from Test 1 and Test 2 is taken.

Identifying research variables

1. Idependent variable

a. Visual memory score: The number of colors the player mentioned in their correct order, ranging from 0 to 4.
b. Dependent Variable the number of shots that went into the basket out of the total positions mentioned by the player (4-0).

2. Control variables (Covariates)

a. Age: The player's age is (13-16).
b. Years of experience: Years of actual basketball playing (1-4 years).

C. RESULTS

Descriptive statistics Table (1) shows the sample size of (25) players, whose ages ranged between (13) and (16) years. The arithmetic mean indicates that the focus was on the (14) and (15) age groups. The table also shows the numerical values for both visual memory and shooting accuracy, with a minimum score of zero and a maximum score of (4) for each. The arithmetic mean for the memory score shows that (2) and (3) were the most common among the participating players. As for shooting accuracy, scores (1) and (2) were the most common, based on the arithmetic mean and because they are directly related to the memory score. As mentioned previously, the majority of the participants scored (2) and (3).

Table 1. Descriptive statistic.

Variable	No.	Mean	Standard deviation	Min.	Max.
Age	25	14.64	1.05	13	16
Memory level	25	2.40	1.15	0	4
Shooting accuracy	25	1.52	1.20	0	4

The effect of age on visual memory score

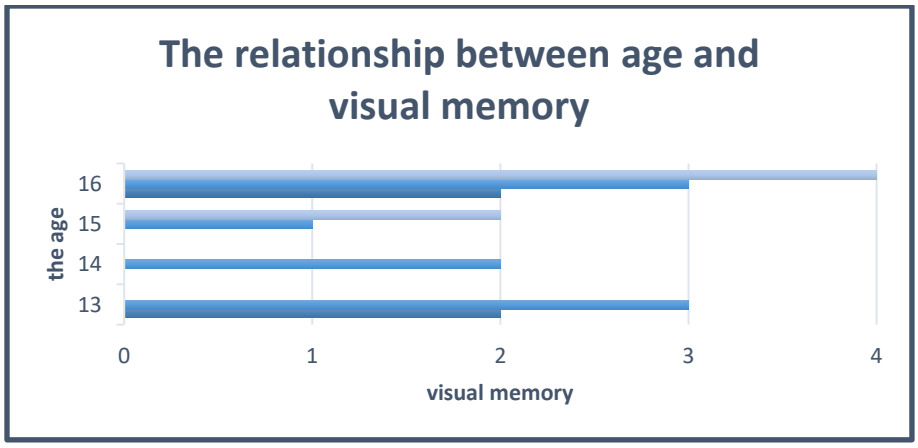

Figure 1. Explains The Relationship Between The Age Of The Players In The Sample And The Degree Of Visual Memory

Figure 1 The relationship between age and visual memory
The graph shows a slight trend towards players aged 16 scoring higher in visual memory (from 2 to 4), while scores for other age groups ranged between 0 and 3. However, when the Person's r test was administered, no relationship was found between age and memory score (p = 0.18).

The relationship between memory score and number of successful shots

Scatter plot number (2) illustrates the relationship between visual memory accuracy and the number of successful throws, indicating:

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1. High memory: Players who scored higher (3-4) memory scores scored a greater number of successful shots (2-4), and the average number of successful shots was (2.36).
2. Low memory: Players who scored lower (0-1) memory scores either scored one successful throw or did not score any throws, and the average number of successful throws was (0.71).
3. The value (P=0.00004) indicates a relationship between memory score and successful throws.

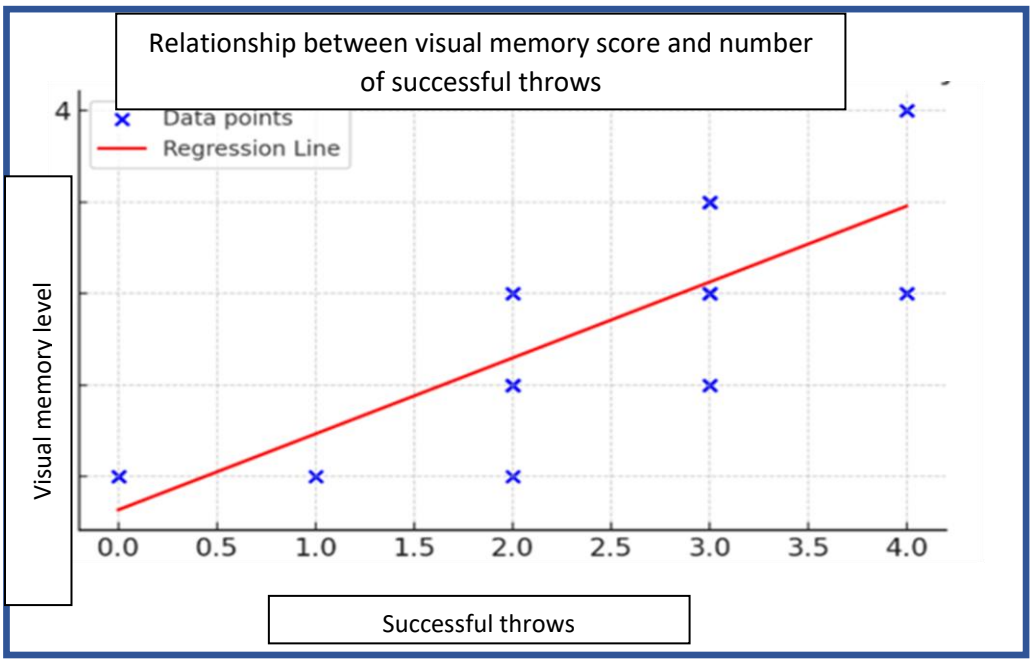

Figure 2. The relationship between Visual memory score and number of successful throws

The overall distribution of both visual memory score and number of successful throws

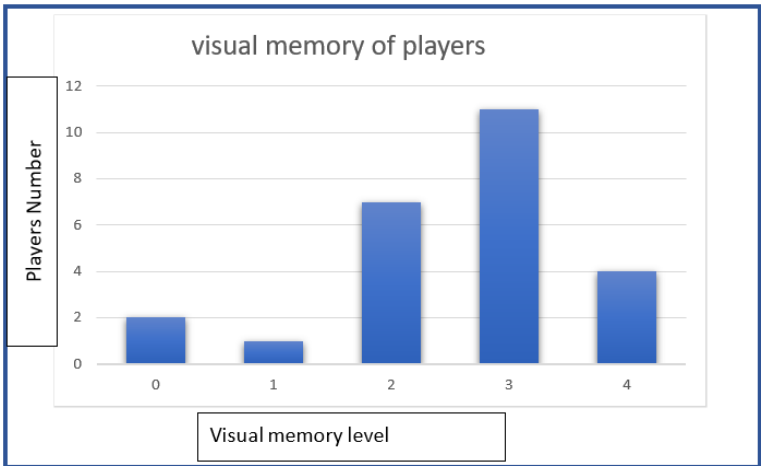

Figure 3. shows the distribution of visual memory scores for the players.

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The players tend to cluster around successful shots (2) and (3), while a few players successfully attempted shots (3) and (4). Chart (4) shows the distribution of successful shots among the players, with most players achieving (3) successful shots. The numbers (2) and (4) alternated at varying rates.

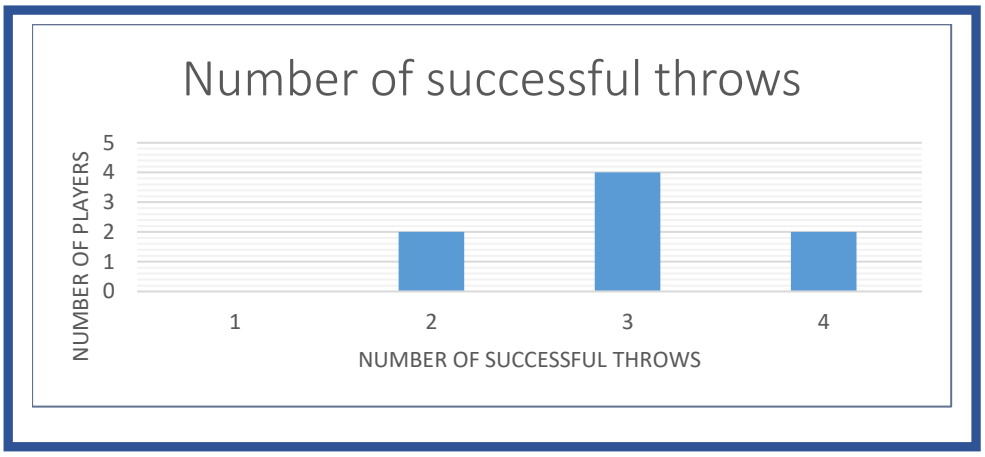

Figure 4. Number of successful throws

D. CONCLUSION AND RECOMMENDATIONS

There is a strong positive correlation (r=0.84), (p<0.0001) between the degree of visual memory and the number of successful throws, which confirms the main research hypothesis. There is a relationship between the average successful throws of the two categories, low memory and high memory, which proves the sub-hypothesis of the research. The player's age is not related to the degree of memory (P=0.18). The distributions of both memory score and aiming accuracy showed a concentration around the average values. Integrating visual memory exercises. It is recommended to incorporate periodic exercises that focus on recalling color or spatial sequences into training sessions because improving visual memory increases aiming accuracy. Expanding the sample in future research. Larger samples should be tested, including age groups over 17 years old and players with at least five years of experience. Introducing additional variables: It is possible to introduce psychological stress during the tests or to add an element to the visual memory test to measure cognitive flexibility more effectively. Coaches should adopt exercises such as: displaying various colored cards for a short period and then imposing a series of throws.

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F. AUTHOR CONTRIBUTION STATEMENT

Zahid Hasan Atiyah & Saad Mahmood Fermancontributed to the completion of this research manuscript.

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