



The Effect of Psychomotor Exercises on Visual Interference and Accuracy of Spike Skill in Junior Volleyball Players

Alaa Taha Ahmed ¹, Jinan Naji Zwaen ²

^{1,2} University of Baghdad , College of Physical Education and sport sciences

DOI:

[https://doi.org/10.37359/JOPE.V38\(SpecialIssue\)2026.2307](https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2307)

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Article history: Received 22/ May/2025; Accepted 28/ May/2025; Available online 28/ October/2026

Abstract

This study aimed to investigate the impact of psychomotor exercises on improving visual interference and enhancing the accuracy of certain technical skills particularly the spike among junior volleyball players. The researchers applied an experimental approach with a single-group pre-test/post-test design. The sample was intentionally selected from players aged 15–17 years at the Al-Karkh First Education Club Eight players were randomly selected from a pool of 20 in addition to four players designated as a pilot group. The training program consisted of 24 training sessions distributed over 12 weeks at a rate of two sessions per week under the direct supervision of the researchers and the team coach. After carrying out post-tests and analyzing the data using the SPSS statistical software the results showed a clear positive effect of psychomotor exercises on developing visual interference and improving the accuracy of the spike. Research Objective: To validate the positive impact of psychomotor exercises, using assistive training methods on developing visual interference and improving the accuracy of the spike in volleyball players aged 15–17 years.

Keywords: Psychomotor exercises, visual interference, technical skills, smashing.

¹ University of Baghdad , College of Physical Education and sport sciences
ammar.khaleel@moheer.edu.iq, <https://orcid.org/0009-0003-7202-3308>

² University of Baghdad , College of Physical Education and sport sciences
Jennarami350@gmail.com



Introduction

Modern sports training is witnessing swift development in integrating modern technology with psychomotor methods to enhance players' physical and cognitive performance Volleyball is one of the sports that demands a high level of responsiveness to changing motor and visual stimuli particularly when performing crucial offensive skills such as the spike which needs precise timing and collaboration between mental and technical abilities.

Among the cognitive elements affecting performance accuracy visual interference stands out as one of the most important forms of cognitive distraction a player faces during play It refers to an individual's capacity to focus their attention amidst distracting environmental stimuli. Controlling visual interference is key to reaching accurate performance under pressure as a player who can overcome distractions and maintain focus can execute offensive skills with high efficiency (Al-Salehi & Mansour, 2025).

Despite the important role of cognitive abilities in achieving precise skill performance their application in training remains limited. Training programs often concentrate on physical and technical aspects neglecting sufficient attention to psychological factors or the use of modern technologies for measuring and developing them This underscores the importance of employing scientifically designed psychomotor exercises to enhance these abilities.

In this context a study by (Al-Nuwaili, 2017) showed that the use of special exercises improved visual interference and focused attention in young volleyball players according to the computerized (VTS) system that presented accurate measurements.

As demonstrated by the study (Badan, 2015) exercises using visual aids facilities develop the accuracy of the smashing skill, especially from positions (2-3-4), reflecting the importance of visual perception in directing offensive strikes.

Regarding the nature of the exercises a study by (Taqi, 2023) confirmed the effectiveness of psychomotor exercises in developing the smashing skill when applied to junior players which indicates the positive impact of integrating the psychological aspect with the motor aspect in training.

A study by Lotfallah (2013) demonstrate that exercises targeting perceptual environments such as visual perception and psychological endurance directly affect the improvement of attacking performance accuracy including smashing especially under the pressures connected with competitions.

Based on the importance of these variables this research objectives to determine the effect of psychomotor exercises on visual interference and the accuracy of the volleyball spike skill for juniors aged (15-17 years) using computerized techniques and a scientific experimental approach



in an attempt to present an integrated training model that improves the cognitive and skill performance efficiency of the players.

The importance of this research depend on the fact that it addresses one of the neglected aspects of local training which is the development of mental abilities connected to skill performance and it provides applicable scientific solutions using modern tools making it an important scientific and field addition to the sports field.

Research Methodology

The researchers used an experimental approach with a single-group pre-test and post-test design, as this design was appropriate for the research procedures The researchers practically selected the research population from the players of Al-Karkh First Education Directorate totaling (20) players. The age group of 15-17 years totaling (16) players was selected. The research sample included (eight) players chosen randomly by lottery. The size of the pilot sample was (4) players. The researchers relied on collecting data through personal interviews with specialists in volleyball and psychology, scientific references and sources and the internet for information. The equipment and tools used in the research were: a Vienna Test System (VTSS) for testing optical interference (one Austrian-made), two light cones, one optical device, two iPhones, one HP laptop, one regulation volleyball court one electrical connector and (12) Molten volleyballs. Colored floor foam (30 pieces), fabric curtain (9m x 1m) adhesive tape colored tape and stationery, wooden box (3 pieces, 50cm high), metal measuring tape (2m) for measuring length metal measuring tape (15m) for skill tests.

The following tests were used

The first test is Stroop's color interference test (Mansour and Al-Salehi, 2020, page 544): Interference, or distractibility denotes to the extent to which an athlete can focus on the core of a task when under stress from internal, external, physical or mental factors and how susceptible they are to distracting stimuli. The ability to control cognitive interference is evaluated using the STROOP test. The task involves reading colored words written in different colors and reacting to the corresponding font color or color indicated in the word The test provides a highly reliable and fair assessment of the capacity to inhibit overlearned responses to simple tasks.

Application

This test measures the degree of conflict or disturbance (interference) in reading word colors, i.e. the deficit in reading speed or color discrimination caused by conflicting information This test is only for adults.

Theoretical basis

The current form of the Stroop test provides a programmed example (model) of color conflict in words based on the assumption that reading speed is slower if a word is written in a



color different from what its meaning represents In other words there is a delay in reading the color of a word if the meaning of the word that refers to a specific color does not correspond the font color This model posits that the cause of the disagreement is due to two experimental conditions:

- 1- Determine the reading speed for the same word color.
- 2- Determining the speed of color naming.

This first performance is used as a basis related to two conditions namely

- 1- Reading speed with experimental adjustment for color interference or conflict i.e. the reading speed of a color reduces if the font is of a different color.
- 2- The experimental control of word interruption as naming the color is more difficult because the color representing the meaning of the word does not match the color of the font used in writing the word itself.

Test application

The task of taking the exam or test can be summarized as pressing the correct input field or word button as quickly as possible.

Test duration:

About 15 minutes.

The second test (Al-Nuwayni, 2017, page 89):

- **Test Name:** - Test of Accuracy in Diagonal and Straight Smashing Skills Center (4)
- **The purpose of the test:** To assess the accuracy of the diagonal and central straight smash (4).
- **Equipment:** A regulation volleyball court, regulation volleyballs two mats measuring 2m long and 1m wide.

- Performance specifications: The player being tested performs the smash from position (4) with a setup from the coach from position (3) The player must perform (5) smashes in the diagonal direction and (5) smashes in the straight direction.

➤ Registration:-

- (4) points for each correct slam that drops the ball onto the mat.
- (3) points for each correct smash that lands the ball in the yellow zone based on the type of smash.
- (2) points for each correct smash that lands the ball in area (A) for diagonal smashes and in area (B) for straight smashes.
- -(1) One point for each slam shot that drops the ball into the rest of the field.
- -(zero) for each failed crushing blow.
- Final score for the test (40 points)

Third test_ (Sakhi, 2006, pages 123-124):

- **Test Name:** - Test of accuracy of diagonal and straight smashing skill center (2).



➤ **The purpose of the test:** To measure the accuracy of diagonal and straight multiplication center (2).

Equipment: Regulation volleyball court, regulation volleyballs two mats measuring 2m long and 1m wide

➤ **Performance specifications:** The player being tested performs the smash from position (2) with the coach's setup from position (3) The player being tested must perform (5) smashes in the diagonal direction and (5) smashes in the straight direction.

➤ **-Registration:**

- (4) points for each correct smash that lands the ball on the mat.
- (3) points for each correct smash hit that lands the ball in the yellow zone according to the type of smash.
- (2) points for each correct smash that lands the ball in area (A) for a diagonal smash and in area (B) for a straight smash.
- (1) One point for each smash that drops the ball into the rest of the domain.
- (Zero) for every failed crushing blow.
- Final score for the test (40 points)

After the research variables and their tests were identified the two researchers carried out the pilot experiment on a sample of (4) participants who were selected by lottery from the research population, with the help of the assisting work team The pilot experiment was conducted with the aim of verifying the suitability of the tests for the research sample and the ease of their application identifying the time need to carry out the tests determining the obstacles that may appear during the course of the tests and identifying the occurrence of errors and interference in the work as well as the efficiency of the assisting work team.

Pre-tests were conducted on the research sample of (8 players) The conditions connected to the tests were recorded in terms of time, place, tools used method of implementation and the assisting team in order to provide them in the post-tests. After that, the training units were implemented under the direct supervision of the two researchers with the help of the team coach. The syllabus included (12) weeks during the special preparation phase that precedes the competition period, at a rate of (3) units per week (Saturday, Tuesday) Thus the training units amounted to (24) units over the period of implementing the curriculum After the completion of implementing the training units the post-tests were conducted under the same conditions procedures and conditions as the pre-tests and with the help of the same assisting team The two researchers used the statistical program (SPSS) to statistically procedure the data.

Table1. *shows the descriptive statistics of the pre-test and post-test measurements for the experimental group*

variables	pre-test		post-test	
	M	SD	M	SD
Diagonal Spike Accuracy Test from Position 4	8.375	1.187	14.500	1.414
Accuracy Test of the Diagonal Spike from Position 4	7.875	1.414	14.250	3.615
Diagonal Spike Accuracy Test from 2Position	08.00	1.851	12.750	1.908
Accuracy Test of the Diagonal Spike from Position 4	8.500	1.195	14.500	1.414
Visual Interference Accuracy Test	29.625	3.204	50.875	3.720

Table2. *shows the descriptive statistics of the pre-test and post-test measurements for the control group*

variables	Mean of differences	Standard deviation	Standard error of difference	T	Sig
Diagonal Spike Test from Position 4	-6.125	1.642	.580	-10.550	.000
Test of the Diagonal Spike from Position 4	-6.375	2.722	.962	-6.624	.000
Diagonal Spike Test from Position 2	-4.750	1.281	.453	-10.482	.000
Test of the Diagonal Spike from Position 4	-6.000	1.511	.534	-11.225	.000
Visual Interference Test	-21.250	6.670	2.358	-9.010	.000

The results in Tables 1 and 2 show that the calculated t-value was higher than the tabulated t-value at a significance level of 0.05 indicating statistically significant differences in favor of the experimental group This leads the researcher to refuses the null hypothesis and accept the



alternative hypothesis This advantage is attributed to the effectiveness of the psychomotor training program used which vital contributed to developing both skill and cognitive performance.

The results showed obvious development in the smashing skills (straight and diagonal from positions 2 and 4) along with developed cognitive abilities connected to visual interference.

The researcher attributes this improvement to the nature of the psychomotor exercises which combined visual stimulation with motor response These facilities the players enhance their timing, focus and performance accuracy within a training environment that simulates real-life playing conditions.

Regarding the skill of both types of spikes important improvement was noticed the accuracy of direction and timing of movements This reflects the effectiveness of the exercises in improving neuromuscular coordination and hand-eye integration during skill performance.

This is confirmed by what Saba (2012, p. 64) indicated: that the spike needs harmony between physical and motor qualities, and that precise execution is essential to bypass the block and reach open areas.

Furthermore, the use of exercises based on visual and light signals contributed to raising the players' spatial awareness and their capacity to selected appropriate angles for shooting.

These results are consistent with what Williams, Davids and Williams (1999, p. 144) stated: that decision-making under time pressure needs training that simulates the playing environment which is what the implemented exercises provided.

Regarding visual interference stimulus filtering exercises contributed to rising the players' ability to concentrate even if their multiple stimuli This is an advanced cognitive skill that needs specialized programs As Brown (2001, p. 54) indicated developing environmental awareness contributes to enhancing performance by improving visual discrimination and spatial awareness

Table3. shows the descriptive statistics for the pre- and post-tests of the control group

variables	control group			
	Post		Pre	
	M	SD	M	SD
Diagonal Spike Accuracy Test from Position 4	7.750	1.488	10.125	2.587
Accuracy Test of the Diagonal Spike from Position 4	7.250	1.388	9.250	2.052
Diagonal Spike Accuracy Test from 2Position	8.125	1.356	9.375	1.505
Accuracy Test of the Diagonal Spike from Position 4	7.875	1.246	10.000	2.672
Visual Interference Accuracy Test	27.125	7.239	27.25	4.367

Table 4. shows the inferential statistics for the pre- and post-tests of the control group

variables	Mean of differences	Standard deviation	Standard error of difference	T	Sig
Diagonal Spike Test from Position 4	-2.375	1.922	.679	-3.494	.010
Test of the Diagonal Spike from Position 4	-2.000	1.511	.534	-3.742	.007
Diagonal Spike Test from 2Position	-1.250	1.164	.411	-3.035	.019
Test of the Diagonal Spike from Position 2	-2.125	1.807	.639	-3.325	.013
Visual 2Interference Accuracy Test	-0.125	9.295	3.286	-.038	.971

Tables (3, 4) show the results of the control group in the post-test demonstrating a slight improvement in some of the studied skills. However this improvement did not achieve the level of qualitative development or high statistical significance that emerged in the experimental group.



The performance of the control group persisted within the normal limits of improvement resulting from routine training without being attributed to a targeted training program or one according to modern scientific principles.

At the level of the smashing skill (diagonal and straight) although some improvement was noticed in a limited number of individuals this development was not driven by enhancement in cognitive or visual abilities but was closer to the mechanical repetition of the movement.

Ali (2000, p. 95) pointed out that getting used to the exercise alone may lead to a slight improvement but it does not produce a qualitative development particularly in complex skills that rely on spatial timing and motor accuracy as is the case in the smash hit.

This supports the researcher's observation that the traditional training used in this as for visual interference the findings demonstrate near-stability in the performance of individuals which is attributed to the inadequacy of traditional training in dealing with this complex cognitive skill.

Visual interference requires a training environment rich in stimuli that demand selective attention and the ability to distinguish between important and unimportant stimuli Al-Hawari (2016, p. 148) noted that attention changes with varying situations and conditions and that inadequate attention management training can lead to technical and tactical errors.

Brown (2001, p. 54) also confirms that improving the efficiency of perceptual environments, including visual interference can only be reached through programs designed to stimulate visual attention and spatial awareness programs which have not been implemented to this group.

Accordingly, the researcher characteristic the limited performance of the control group to the shortcomings of the traditional training program which was incapable of target the skills that require visual-motor-cognitive integration.

Al-Farmawi (1994, p. 163) explained that cognitive methods are a cornerstone in developing the ability to make decisions and analyze situations and these are factors that were not included in the training program for this group.

Table5. shows the descriptive statistics for the post-tests of the control and experimental groups

Tests	Sample	N	Mean	Standard deviation	Standard error of difference
Diagonal Spike Test from Position 4	experimental	8	14.500	1.414	0.500
	control	8	10.125	2.587	0.914
Test of the Diagonal Spike from Position 4	experimental	8	14.250	3.615	1.278
	control	8	9.250	2.052	0.725
Diagonal Spike Test from 2Position	experimental	8	12.750	1.908	0.674
	control	8	9.375	1.505	0.532



Test of the Diagonal	experimental	8	14.500	1.414	0.500
Spike from Position2	control	8	10.000	2.672	0.944
Visual Interference	experimental	8	50.8750	3.720	1.315
Accuracy Test	control	8	27.125	4.454	1.574

Table6. shows the inferential statistics for the post-test scores of the control and experimental groups

variables	Value T	Sample size	Error rate	Significance
Diagonal Spike Test from Position 4	4.196	14	0.001	Significant
Test of the Diagonal Spike from Position 4	3.402	14	0.004	Significant
Diagonal Spike Test from Position 2	3.926	14	0.002	Significant
Test of the Diagonal Spike from 2 Position	4.209	14	0.001	Significant
Visual Interference Accuracy Test	11.575	14	0.000	Significant

The results in Tables 5 and 6 clearly reveal statistically significant advantage for the experimental group compared to the control group in all variables under study The experimental group members showed remarkable improvement in both types of smashes from centers 2 and 4 as well as in visual interference. This development is attributed to the psychomotor exercises implemented which were designed to promote the senses and activate the nervous and muscular systems in an integrated manner This contributed to improved motor timing and response accuracy both of which are key determinants of effective athletic performance particularly in team sports such as volleyball.

The slam slam particularly when executed from attacking positions needs a high degree of visual-motor coordination along with precise spatial awareness of teammates' positions and open playing space, and an ability to assess the opponent's changing performance Psychomotor exercises have contributed to enhancing this awareness by linking motor activity to the spatial and temporal perception of the attacking situation Nawar (quoting Qasim Hassan) pointed out that the motor performance of skills such as the slam is not random but depends on the pre-organization of information within the brain based on a pre-programmed pathway This highlights the significant of perceptual-sensory interaction in the execution of motor skills (Hussein H., 2008, p. 97).

As for visual interference the differences were statistically significant in favor of the experimental group, which is attributed to the fact that the psychomotor exercises focused directly



on enhancing visual abilities connected to the speed of capturing stimuli the accuracy of following them and prioritizing attention during performance.

(Brin Ariel, quoted by Al-Shammari, 2019, page 81) confirms that high skill performance is closely related to ideal visual capacities as weakness in these abilities negatively affects the quality of performance since the inaccuracy of visual information disrupts the timing of the response leading to a noticeable decline in the technical or cognitive level of the skills performed. The integration of visual and perceptual exercises with motor activities has had a significant effect on improving reactions to unexpected situations on the playing field.

This type of training has supporting to raising the players' efficiency in organizing motor responses based on a precise understanding of the opponent's stimuli.

This is consistent with what Schmidt indicated (quoting Hashem, 2017, page 100) that designing a learning environment rich in stimuli and connected to the learner's needs leads to stimulating motor behavior and achieving remarkable development in performance unlike random environments that may weaken interaction and limit the ability to comprehend.

Regarding accuracy the experimental group clearly outperformed the target group which is attributed to their intensive training based on conscious repetition of movements in contexts similar to real-life situations It is worth noting that accuracy is a key factort of success in athletic performance as strength and speed lose their effectiveness without proper timing and precise execution.

Hassanein and Abdel Moneim (1998, p. 21) pointed out that accurate performance can only be achieved through exercises that allow the learner to deal with unexpected situations within a realistic training environment helping him to accurately control and time his responses.

Therefore, these results confirm the validity of the main hypothesis of the study which states that psychomotor exercises are an effective training approach in developing motor and visual skills in volleyball particularly in the early stages of preparation making their adoption in modern training programs an inevitable necessity to reach qualitative and sustainable results for young players.

Conclusions

1. Psychomotor exercises have proven effective in developing the performance of the smashing skills (from positions 2 and 4) among volleyball players aged (15-17) years.
2. The experimental group showed a clear statistical superiority over the control group in the post-test measurement which verifies the impact of the training program based on the integration of sensory visual and motor perception.



3. Psychomotor exercises contributed to decreasing visual interference among players which was reflected in the accuracy of motor response and decision-making during performance.

4. The improvement recorded by the experimental group was not random or the result of routine repetition but rather the find of a purposeful scientific training program that combined sensory stimulation visual attention and spatial awareness.

5- The results confirmed the validity of the research hypothesis which states that psychomotor exercises play a vital role in improving the technical and visual performance of junior volleyball players.

Recommendations

1. Adopting psychomotor exercises as an essential part of the training programs for junior volleyball players, due to their important role in improving technical skills, cognitive abilities and visual perception.

2. Designing special training programs that combine skill exercises with sensory and visual stimuli in a way that suitable to the characteristics of players in the (15-17) age group.

3. To use the results of this study in preparing scientific training curricula that contribute to improving the skill and mental performance of young players.

4-carring out similar studies on other age groups or on different team sports to verify the effectiveness of psychomotor exercises in developing athletic performance in general.



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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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