



## RESEARCH ARTICLE

# The Effect of Special Exercises Using the Visual Stimuli Device on the Speed of Motor Response, Visual Tracking, the Skills of Cutting and Dispersing the Ball, and Various Defensive Movements for Young Handball Players

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### Abstract

The research is significant because it aims to improve the speed of motor response and visual tracking through targeted exercises using the visual stimuli device that the two researchers created as part of the training program for the sample. This program also supports the individual defensive movements of the players, which are exemplified by the skills of cutting and dispersing the ball and other defensive movements for young handball players. Preparing unique workouts with visual stimuli to enhance young handball players' motor reaction speed, visual tracking abilities, ball-cutting and ball-dispersing capabilities, and defensive maneuvers is one of the research's goals. *The methodology:* researchers have used experimental methods with two groups. The research population was purposefully selected and sampled; specifically, the goalkeepers, who numbered two, were omitted, and the Diyala Handball Club youth players for the 2022–2023 sports season numbered eighteen. *As a result,* the sample size increased to sixteen participants, split into eight players representing the experimental group and eight representing the control group at random (even and odd numbers). After conducting an exploratory experiment on two handball players. *The research concludes* that workouts on the visual stimulus device positively impacted the experimental study sample's development of visual tracking and motor reaction speed.

### Keywords

Special Exercise, Visual Stimuli, Motor Response, Visual Traching.

## INTRODUCTION

Handball is one of the games characterized by varied and variable motor performance in defense and attack. This nature of Performance requires high physical, motor, and visual abilities, which requires the central nervous system to be present not only for the response to performance situations to be correct and accurate but also for these situations to be characterized by speed and accuracy in Performance to overcome the competitor (Bonnet et al., 2020).

Since the sense of sight is one of the most important senses with which we perceive the world

around us, it is a sense of perception (Howes & Classen, 2013). A behavioral tool and an integrated interaction process, a person sees a thing, perceives it, analyzes it, and has a feeling toward it (Hollan et al., 2000). Therefore, the handball player needs to have good visual abilities, including visual tracking of the movement of the attacking player and the ball, as it helps in making changes and responses of the players and thus their awareness during individual defensive movements (Alfailakawi, 2016). as well as using them during their Performance during various defensive movements and to cut, disperse or take possession of the ball due to the speed of handling and receiving. For the ball between attacking players

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(Forcher et al., 2022). The player must be able to move quickly and follow the player's movement, the direction of the ball, and its change according to the playing situations during the match to possess visual abilities (Castagna et al., 2003). Therefore, the faster the Performance increases, the greater the need for these abilities (Carling et al., 2008). The American Ophthalmology Association stated that visual vision depends on several visual abilities and identified them with fifteen diverse visual abilities (Grossman et al., 2017). they included visual tracking, which is important in players' individual and collective defensive movements in creating changes (Alfailakawi, 2016).

Since defensive skills are no less important than offensive skills in handball, Some even consider it the basis of competition that determines the level and ranking of teams (Ferrari, 2021). The handball player often performs his defensive movements, right and left, and rushes forward at full speed to carry out the defensive cover process (Wedelstaedt & Meyer, 2017). All of these movements require the defensive player to have high physical abilities, such as speed of movement and compatibility of the legs, as well as the members of his body, to perform his defensive duty in the best possible way so he is obliged to follow changes in the attack of the opposing team, which requires a high degree of rapid response to the movement of the attacking players and the ball (Venzke et al., 2023). Specialists have confirmed that defense is more difficult than attack, especially if we consider the match's final result, as a mistake in defense means scoring a goal against the team by the opponent. In contrast, a mistake in attack means losing the ball (Johnston & Morrison, 2016).

The research aims to improve the speed of motor response and visual tracking through specific exercises using the visual stimuli device the researchers designed within the training curriculum for the sample. This supports both the individual defensive movements and the motor performance of the player, as demonstrated by the skills of cutting and dispersing the ball and defensive movements. The research topic was refined by the two researchers' combined experiences in the academic and professional domains, expert consultations with handball training professionals, and exercise follow-up. The players' delayed movement and reaction to the

ball's movement were noted as a problem in their defensive play, which might be related to a visual impairment. However, the quickness of the motor response to the striker's and the ball's movements, as well as the players' disinterest in training programs. Handball players struggle with a lack of resources and tools that can help them improve their physical and visual skills, which are among the fundamental building blocks of visual efficiency (Campher, 2008).

The necessity to employ various techniques increases with the game's complexity or speed of play to create the instrument (Adams & Dormans, 2012). One of the sports where the defensive player must always keep an eye on the attacker's movements and the ball's movement is handball (Alhosseini et al., 2015). The player's ability to cut and distribute the ball and perform other defensive maneuvers in handball will be positively impacted by the visual aspect's high efficiency (Gogoi & Pant, 2017). One of the research's goals is to prepare unique workouts with visual stimuli to enhance young handball players' motor reaction speed, visual tracking, ball-cutting and ball-dispersing skills, and defensive maneuvers. Also, learn how visual stimulus workouts affect young handball players' defensive maneuvers, visual tracking, cutting and ball-dispersing skills, and motor response speed. According to the research hypothesis, practicing with the visual stimulus device helps the young handball players in the research sample improve their speed of motor reaction, visual tracking, ball-cutting and ball-dispersing abilities, and defensive maneuvers.

## MATERIALS AND METHODS

### Participants

The researchers used the experimental method with two equal designing experimental and control groups with pre-and post-tests to implement the study. The sample of the study was determined and sampled intentionally, namely the Diyala Handball Club youth players, who numbered (16) players without goalkeepers. Thus, the number of the divided into two groups, experimental and control, with (8) players for each group. Prior to beginning the exercises, the researchers compared parity between the experimental and control groups in the variables examined, as well as homogeneity in the growth

variables (Length, mass, chronological age, and training age).

Participants were included in the trial only if they were in a clinically stable state with no history of illness or worsening of respiratory symptoms, no medication alterations within the preceding two months, and no clinical signs of edema. Patients with evidence of cardiovascular, osteoarticular, or other terminal cancers, inability to consent or cooperate, long-term home oxygen therapy, active tuberculosis or other infectious disorders, as well as stroke were excluded. The

study was approved by the Institutional Review Board (IRB) of the University of Babylon in Iraq (date of approval on first of April 2020). All experimental procedures regarding testing, lower torso training, and respiratory training by devices were carefully explained to the participants and written informed consent from participants who met the inclusion criteria was obtained before the beginning of the experiment. Thus, the study was conducted in accordance with the Declaration of Helsinki. Table (1) (2) shows the homogeneity and equivalence of the sample, as shown below.

**Table 1.** shows the sample specifications according to length, mass, chronological age, and training age.

Variables	Measuring unit	Mean	Std. Deviation	Skew ness
Length	Cm	171.312	3.439	0.269-
Mass	Kg	68.8000	2.465	0.551
Age	Year	17.781	0.729	0.595
Chronological age	Month	42.6	4.728	-0.186

**Table 2.** shows the results of the equality of the research sample in the variables investigated

Variables	Experimental group		Control group		Means Difference	SD Difference	Calculated t value	Error level	Sig type
	X	SD	X	SD					
Visual Tracking	51.000	4.750	50.000	4.629	1.000	6.803	0.416	0.690	Non-Sig
Speed Motor Response	10.875	3.090	10.000	3.664	0.875	6.379	0.388	0.710	Non-Sig
Cutting And Dispersing The Ball	2.875	0.834	2.750	0.462	0.125	0.991	0.357	0.732	Non-Sig
Various Defensive Movements	18.036	1.348	18.165	1.071	0.128	1.114	327	0.753	Non-Sig

\*Significant at significance  $\geq 0.05$ , Mean (X), Std. Deviation (SD)

The calculated (t) values achieved an error greater than the significance level (0.05), indicating the randomness of the differences and the equality of the two research groups in all research variables. This confirms the randomness of the differences in the (t) test results between the experimental and control groups, as shown in Table (2) above. The researchers spoke with experts and professionals in handball and sports training to determine the research variables. They also analyzed several Arab and international

sources that addressed the topic of this visual capacity and individual defensive skills in handball. Following the collection and analysis of the surveys, a set of tests was created to evaluate visual tracking, ball-cutting and dispersal skills, defensive maneuvers, and their testing. It was ascertained by combining defensive maneuvers, ball-cutting and ball-dispersing techniques, and visual tracking testing with the Vienna Test System. These tests are scientific, accurate, and codified and are defined by scientific foundations

of honesty, consistency, and impartiality, as they have been employed in comparable studies. The suitable assessments for the talents under investigation were, in turn.

**First:** Test the response speed. Which consists of testing short-term defensive movements (front, back, side) (Otoom et al., 2019).

**Second:** Visual tracking test. The Vienna test system carries out the testing (Ong, 2015).

**Third:** Individual defensive skills in handball.

Various defensive movements: Test name: Cutting and dispersing the ball between two handball attack players (Marzouk & Shabib, 2023).

Table 3. shows the values of the arithmetic means, their deviations

Cutting and scattering the ball. Test name: Cutting and scattering the ball between two handball attack players (Young & Murray, 2017).

The researchers adopted the tests, which received an 80% rating from the experts' choice. After that, the researchers conducted exploratory experiments on (2) players from the research sample. Special exercises were created using the visual stimuli device that the researchers designed as part of the training program for the sample to improve the speed of motor response and visual tracking. These exercises support the player's

motor performance and individual defensive movements, exemplified by the skills of cutting and dispersing the ball and other defensive movements for young handball players.

The training section is 3 times a week for 8 weeks applied. Duration for each training season is between 90-120 minutes with high intensity (%90 – %92) half time spent with researchers and others with club couch. On Wednesday and Thursday, which correspond to 16–17/2/2023, the researchers pre-tested the research group on the Diyala Sports Club handball court. At exactly 10:30 Am. The experimental group underwent the experiment at the start of the main training unit section and received three training units each week for eight weeks, or a total of twenty-four training units. Following the training program's installation, the researchers utilized the software to administer post-tests to the two groups under the same temporal and geographical settings as the pre-tests.

**Statistical Analysis**

To investigate intervention induced between and within-group changes, Statistical Tool. For the study researchers used the SPSS software. Mean (M) and standard division (SD) has been used for statistical analysis.

**RESULTS**

**Table 3.** Shows the values of the arithmetic means, their deviations, and the significance of the differences between the pre-and post-tests for the variables investigated for the experimental and control Groups

Variables	Groups	Experimental group		Control group		Means difference	SD difference	T-value	Error level	Sig type
		X	SD	X	SD					
Visual Tracking	Experimental	10.875	3.090	14.875	0.991	4.000	2.777	4.073	0.005	Sig
	Control	10.000	3.664	12.000	3.023	2.000	1.603	3.340	0.010	Sig
Speed Motor Response	Experimental	51.000	4.750	56.750	3.654	5.750	3.535	4.600	0.002	Sig
	Control	50.000	4.629	54.500	3.703	4.500	2.203	5.775	0.001	Sig
Cutting And Dispersing The Ball	Experimental	2.875	0.834	6.000	1.069	3.125	0.991	8.919	0.000	Sig
	Control	2.750	0.462	4.875	1.125	2.125	0.991	6.065	0.001	Sig
Various Defensive Movements	Experimental	18.036	1.348	13.771	1.033	4.265	0.883	13.651	0.000	Sig
	Control	18.165	1.071	15.136	0.950	0.811	0.286	10.563	0.000	Sig

\*Significant at significance ≥ 0.05, Mean (X), Std. Deviation (SD)

**Table 4.** shows the significance of the differences between the post-tests of the investigated variables

Variables	Experimental group		Control group		Means difference	Std. Deviation difference	Calculated t value	Error level	Sig type
	X	SD	X	SD					
Visual Tracking	14.875	0.991	12.000	3.023	2.875	3.356	2.422	0.046	Sig
Speed Motor Response	58.625	1.922	54.500	3.703	4.125	3.136	3.720	0.007	Sig
Cutting And Dispersing The Ball	6.000	1.069	4.875	1.125	1.125	0.991	3.211	0.015	Sig
Various Defensive Movements	13.771	1.033	15.136	0.950	1.365	1.322	2.919	0.022	Sig

\*Significant at level  $\geq 0.05$ , Mean (X), Std. Deviation (SD)



**Figure 1.** During training



**Figure 2.** The device used in the research

## DISCUSSION

The tables above' results demonstrate that, for the two tests (speed of motor response and visual tracking), there are notable differences between the pre-and post-tests and the experimental and control groups, with the experimental group's post-tests showing a significant advantage. The researchers attribute this development to the effect of exercises on using the visual stimuli device, which effectively contributed to the development of Variables (response speed and visual tracking). Defensive play requires speed in responding to the attacker's movement. Therefore his movements must be characterized by a purposeful mechanism performed in quick, short, successive and precise steps, aiming to prevent the attacker from acquiring offensive motor features that help implement the offensive vision for him and his team. Defense is not limited to preventing the attacker from hitting the goal with a goal. Still, it has other positive functions and goals as well, including trying to gain possession of the ball to begin the stages and operations of the attack, this is confirmed by (Ferrari, 2021) that defense is a preparation stage for the attack, which consists of

quickly switching to defense as soon as the team's players lose the ball.

The exercises that the researchers prepared using a visual stimuli device and with shots to different places and directions responded to the stimulus, as the handball player often performs his defensive movements right and left and rushes forward at full speed to carry out the process of defensive coverage or cutting and scattering the ball to prevent the attacker from shooting. All of these movements require the player, the defender, must have a degree of speed and coordination of the legs and eyes, as well as the members of his body, to perform his defensive duty in the best way and to follow the changes in the attack of the opposing team, which requires a high degree of motor response speed (Vila & Ferragut, 2019; Zapardiel Cortés et al., 2017). Confirm that the speed of motor response is the most important type of speed necessary for players in handball, and this appears when he blocks balls aimed at the goal at a speed better than the speed of the ball, especially from the near shooting area or balls.

The game of handball is one of the games that has witnessed great development at the level of the countries of the world and has begun to spread rapidly because it contains technical skills and various plans that are interesting for the

viewer, it can be considered one of the games that work to spread the spirit of cooperation and unify efforts to reach the high sporting level (García et al., 2013). Therefore, the researchers were keen that the exercises include diversity in style in terms of the tools used and the directions and distances in which the players move according to the visual stimuli and repetitions to spread the spirit of competition and the desire to perform the exercise, which helped to learn and train these skills quickly (Lilić et al., 2020). Using modern methods, innovation, and diversification in educational units contributes to learning defensive skills (Ferrari et al., 2019). The study (Cottrell et al., 2014) also indicates that (diversifying the units so that for every unit or two, the trainer changes the style or method so that the learner does not feel bored and fed up, which is reflected in skill performance). The development that occurred in the visual tracking variable in the post-tests of the experimental sample compared to the control resulted from the use of modern means and tools, including the designed visual stimulation device, which worked to develop visual tracking in the experimental research sample. To vary from the typical workouts, considering the significance of using contemporary technology and tools in training, Researchers have suggested that it is important to transition from old training techniques and technologies to more contemporary ones during the training process (Cottrell et al., 2014; Türkistanli, 2024).

Using contemporary instruments and gadgets helps people concentrate more on performing, learning, and improving abilities, as well as "the great diversity in performing skills, which works to improve Performance (Schmidt & Wrisberg, 2008). The researchers believe that developing visual abilities is very important in the game of handball, in addition to physical abilities and motor skills, as it is characterized by the movements of attacking players and the ball in multiple directions, which requires mastering various defensive movements by handball players, This is what was confirmed by (Ion & Silviu, 2019) that (athletic Performance in general includes two aspects: the motor and the visual, and if the visual aspect does not work well, this negatively affects the Performance of the motor and skill aspect). Also, ideal Performance is linked to visual abilities, and this has been confirmed by (Chukhlantseva, 2023) (Visual abilities are

important in sports, whether individual or team, as they require focus and attention). Accordingly, one of the tasks of the defensive player is to Visual tracking of the ball and player, which relies on eye movements to scan the playing area and track the ball in flight some studies, including the study (van Donkelaar & Staub, 2000) have indicated that the extent of eye movement in visual tracking is greater when it is not moved with the hand movement. Therefore, any weakness in these visual abilities causes disability and poor Performance with the loss of the appropriate timing to cut and disperse the ball or to obtain it.

The tables mentioned above (3, 4) also demonstrated significant differences in favor of the experimental group's post-tests in the two tests (cutting and dispersing the ball, various defensive movements) and between the pre-and post-tests for the experimental and control groups. The researchers believe that using the stimulant gadget in certain activities has resulted in this development. Visual contributed effectively to developing my skills (cutting and dispersing the ball, various defensive movements) through various exercises that serve defensive skills and are similar to skill performance in terms of tools and the diversity of the exercises themselves. This was indicated by (Kraemer & Ratamess, 2004) (Preparing the exercises through the training program according to the similarity to the competition, the diversity in the exercises, and the differences in their implementation with different repetitions works to master these skills). More favorable outcomes for the experimental group were obtained because the exercises used were designed to improve the visual skill represented by visual tracking in a scientific and codified manner and acquire physical abilities, such as the speed of motor reaction and its growth. More than the conventional curriculum that the control group used.

The researchers believe that the player's movements and motor skills in defense must be appropriate to the requirements and circumstances of competitions and awareness of different situations, which allows for quick perception of what the opponent intends to do so that the player can determine the accuracy and speed of judging special cases and emergency circumstances, ensuring the speed of the player's correct responses through The defense process faces tactical changes, which requires the use of his previous

experience (McPherson, 1993) states, "It is necessary to master the defense process and train in it, because in it it is possible to block a goal and score a goal, while in attack it is possible to score a goal. The team becomes a defender when it loses control of the ball, as it becomes its duty to quickly switch to a defensive state. The players begin trying to regain control of the ball by the player who lost the ball or the closest other defender to prevent the attacker from handling or shooting and allow the rest of the defending players to cover. A quick return to the defense area and organizing their ranks because failure to defend leads to scoring a goal. Therefore, it is necessary to pay attention to training for the speed of performing defensive movements in handball, as it is no less important than the attack and is the basis for repelling the opposing team's attack and starting a counterattack.

For the player to be able to move in all directions continuously, the defender must have good physical abilities, in addition to the requirements for good Performance to hinder opponents, limit their movements, and gain possession of the ball through various defensive movements (Gréhaigne et al., 2005). as (researchers believe that the nature of defensive movements in handball in training and matches requires speed and high physical fitness to enable the player to move to the side, backward, and forward high, and continuously, it must be the defender has the ability and ability to investigate correctly, and through this he can hinder opponents, reduce their danger, and prevent them from scoring. As a result, this has led to the player defending his goal with proper timing and speed, as the distance between the attacking player and the goal is very close.

### **Conclusions**

The experimental group's members' motor response time and visual tracking improved due to the workouts on the visual stimulus device. The visual stimulation exercises positively impacted the experimental group members' individual defensive skills (ball dispersal and cutting, as well as other defensive maneuvers). For the control group, traditional exercises improved motor reaction time, visual tracking, and individual defensive skills (ball dispersal and cutting, among other defensive maneuvers). The experimental group performed better than the control group in the visual stimuli device exercises to improve their

motor response speed, visual tracking, and individual defensive skills (such as cutting and dispersing the ball and other defensive movements). The visual stimulus device workouts improved the participants' motor response time and visual tracking, which had a favorable and substantial impact on each player's defensive abilities (ball dispersal and cutting, among other defensive maneuvers) in the experimental group.

### **Recommendations**

Investing in exercises with a visual stimuli device designed to develop skill performance and physical and visual abilities to raise the efficiency of handball players. Working to find tests for visual abilities for defensive and offensive skills in handball. The need to pay attention to other physical, skill and visual abilities by preparing special exercises and different methods and devices to increase excitement and suspense among male and female handball players. Conduct similar studies and research on different age groups and other handball skills.

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### **The Ethics Committee**

This article's necessary ethics committee permissions were obtained with University of Baghdad College of Physical Education and Sports Sciences for Woman Ethics Committee Commission Date: 12.02.2024 Issue/Decision No: 2024/10.

### **Conflict of Interest**

The authors declare no conflict of interest. In addition, no financial support was received.

### **Author Contributions**

Study Design, WKM and LASJ; Data Collection, LASJ; Statistical Analysis, WKM and LASJ; Data Interpretation, WKM and LASJ; Manuscript Preparation, LASJ ; Literature Search, WKM, and LASJ. All authors have read and agreed to the published version of the manuscript.

### **REFERENCES**

Dhuha, H, & Kadhum.W. (2021). Building and measuring e-learning scale from the point of view of students of the College of Physical Education and Sports

- Sciences - University of Baghdad. *ModernSport*, 20(4), 0126. [CrossRef]
- Adams, E., & Dormans, J. (2012). *Game mechanics: advanced game design*. New Riders. [CrossRef]
- Alfailakawi, A. (2016). The Effects of visual training on vision functions and shooting performance level among young handball players. *ovidius university annals, Series Physical Education & Sport/Science, Movement & Health*, 16(1). [CrossRef]
- Alhosseini, Z. N., Safavi, S., & Zadeh, M. N. (2015). Effect of skill level and indirect measurements in the attack situations in handball. *Journal of Neuroscience and Behavioral Health*, 7(2), 8-14. [CrossRef]
- Lamiaa , A.S , & Widad, K .( 2021). The level of physical fitness and movement compatibility associated with health and activity patterns among middle school students. . *Modern Sport*, 20 (1), p73 . [CrossRef]
- Bonnet, G., Debanne, T., & Laffaye, G. (2020). Toward a better theoretical and practical understanding of field players' decision-making in handball: A systematic review. *Movement & Sport Sciences*(4), 1-19. [CrossRef]
- Campher, J. (2008). *The role of visual skills and its impact on skills Performance of cricket players*. University of Pretoria (South Africa). [CrossRef]
- Carling, C., Bloomfield, J., Nelsen, L., & Reilly, T. (2008). The role of motion analysis in elite soccer: contemporary performance measurement techniques and work rate data. *Sports medicine*, 38, 839-862. [PubMed]
- Castagna, C., D'ottavio, S., & Abt, G. (2003). Activity profile of young soccer players during actual match play. *The Journal of Strength & Conditioning Research*, 17(4), 775-780. [PubMed]
- Chukhlantseva, N. (2023). Medicine balls training in the sequence of complex handball training versus only handball training: effects on physical fitness in pre-adolescence female handball players. *Baltic Journal of Health and Physical Activity*, 15(4), 2. [CrossRef]
- Cottrell, C. E., Al-Kateb, H., Bredemeyer, A. J., Duncavage, E. J., Spencer, D. H., Abel, H. J., Lockwood, C. M., Hagemann, I. S., O'Guin, S. M., & Burcea, L. C. (2014). Validation of a next-generation sequencing assay for clinical molecular oncology. *The Journal of molecular diagnostics*, 16(1), 89-105. [PubMed]
- Ferrari, W. R., Sarmento, H., & Vaz, V. (2019). Match analysis in handball: a systematic review. *Montenegrin Journal of Sports Science and Medicine*, 8(2), 63-76. [CrossRef]
- Forcher, L., Altmann, S., Forcher, L., Jekauc, D., & Kempe, M. (2022). Using player tracking data to analyze defensive play in professional soccer-A scoping review. *International Journal of Sports Science & Coaching*, 17(6), 1567-1592. [CrossRef]
- García, J. A., Sabido, R., Barbado, D., & Moreno, F. J. (2013). Analysis of the relation between throwing speed and throwing accuracy in team-handball according to instruction. *European journal of sport science*, 13(2), 149-154. [CrossRef]
- Gogoi, D., & Pant, G. (2017). A Comparative Study on Eye-Hand Co-Ordination Ability Between Attackers and Blockers in Volleyball. *International Journal of Research and Analytical Reviews*, 4(2), 52-55. [CrossRef]
- Gréhaigine, J., Wallian, N., & Godbout, P. (2005). Tactical-decision learning model and students' practices. *Physical Education and Sport Pedagogy*, 10(3), 255-269. [CrossRef]
- Grossman, D. C., Curry, S. J., Owens, D. K., Barry, M. J., Davidson, K. W., Doubeni, C. A., Epling, J. W., Kemper, A. R., Krist, A. H., & Kurth, A. E. (2017). Vision screening in children aged 6 months to 5 years: US preventive services task force recommendation statement. *Jama*, 318(9), 836-844. [PubMed]
- Ghofran, Z, Kh, & Widad, K, M. (2022). The effect of the seven-course learning strategy on learning some offensive handball skills for female students. *Modern Sport*, 21(2), 0053. [CrossRef]
- Hollan, J., Hutchins, E., & Kirsh, D. (2000). Distributed cognition: toward a new foundation for human-computer interaction research. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 7(2), 174-196. [CrossRef]
- Ion, M., & Silviu, S. (2019). Defending In The Handball Game (Junior Level). *Ovidius University Annals, Series Physical Education & Sport/Science, Movement & Health*, 19(2) . [CrossRef]
- Johnston, D., & Morrison, B. W. (2016). The application of naturalistic decision-making techniques to explore cue use in rugby league playmakers. *Journal of Cognitive Engineering and Decision Making*, 10(4), 391-410. [CrossRef]
- Kraemer, W. J., & Ratamess, N. A. (2004). Fundamentals of resistance training: progression and exercise prescription. *Medicine & science in sports & exercise*, 36(4), 674-688. [PubMed]
- Lilić, A., Joksimovic, M., D'Angelo, S., Karišik, S., Hamad, S., & Gardašević, N. (2020). Influence of body composition parameters on anaerobic strength of lower extremities in female football players. *Physical Education Theory and Methodology*, 20(4), 256-261. [CrossRef]
- Marzouk, H. M., & Shabib, H. B. (2023). The effect of special exercises using the optical defender device designed in the development of some physical abilities and performance composite skill of handball players. *Modern Sport*, 22(2). [CrossRef]
- McPherson, S. L. (1993). The influence of player experience on problem solving during batting preparation in baseball. *Journal of sport and exercise psychology*, 15(3), 304-325. [CrossRef]
- Ong, N. C. H. (2015). The use of the Vienna Test System in sport psychology research: A review. *International review of sport and exercise psychology*, 8(1), 204-223. [CrossRef]
- Otoom, A. F., AL Kateb, G., Hammad, M., Sweis, R. J., & Hijazi, H. (2019). Success factors importance based on software project organization structure. *Information*, 10(12), 391. [CrossRef]
- Schmidt, R. A., & Wrisberg, C. A. (2008). *Motor learning and Performance: A situation-based learning approach*. Human kinetics. [CrossRef]



- Azeez, S. R., & Widad, K, M. (2022). Muscular strength training and its effect on strength endurance and speed in wheelchair tennis players. *SPORT TK-Revista EuroAmericana de Ciencias del Deporte*, 11, 53. [CrossRef]
- Türkistanli, T. T. (2024). Advanced learning methods in maritime education and training: A bibliometric analysis on the digitalization of education and modern trends. *Computer Applications in Engineering Education*, 32(1), e22690. [CrossRef]
- van Donkelaar, P., & Staub, J. (2000). Eye-hand coordination to visual versus remembered targets. *Experimental brain research*, 133, 414-418. [CrossRef]
- Venzke, J., Schäfer, R., Niederer, D., Manchado, C., & Platen, P. (2023). Metabolic power in the men's European handball championship 2020. *Journal of sports sciences*, 41(5), 470-480. [CrossRef]
- Vila, H., & Ferragut, C. (2019). Throwing speed in team handball: a systematic review. *International Journal of Performance Analysis in Sport*, 19(5), 724-736. [CrossRef]
- Wedelstaedt, U. v., & Meyer, C. (2017). Intercorporeality and interkinesthetic gestalts in handball. *Moving Bodies in Interaction—Interacting Bodies in Motion: Intercorporeality, interkinesthesia, and enaction in sports*, 8, 57. [CrossRef]
- Young, W. B., & Murray, M. P. (2017). Reliability of a field test of defending and attacking agility in Australian football and relationships to reactive strength. *The Journal of Strength & Conditioning Research*, 31(2), 509-516. [PubMed]
- Zapardiel Cortés, J. C., Ferragut Fiol, C., Manchado, C., Abalde Valeiras, J. A., & Vila Suárez, H. (2017). Difference of the speed of handball throwing during the competition in relation to efficiency: Analysis between the first and the second half. [CrossRef]



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