Journal Website

Article history:
Received 02 September 2024
Revised 04 December 2024
Accepted 14 December 2024
Published online 10 March 2025

Journal of Adolescent and Youth Psychological Studies

Volume 6, Issue 3, pp 31-41

E-ISSN: 2821-2526

Comparison of the Effect of Training Type on Functional Ability and Psychological Skills of Iraqi Male Volleyball Players Under Psychological Pressure

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Al-wajedi, M. Q. A., Zahedi, H., Al-Swaiedi, W. M. O., & Badami, R. (2025). Comparison of the Effect of Training Type on Functional Ability and Psychological Skills of Iraqi Male Volleyball Players Under Psychological Pressure. *Journal of Adolescent and Youth Psychological Studies*, *6*(3), 31-41.
http://dx.doi.org/10.61838/kman.jayps.6.3.4

A B S T R A C T

Objective: The purpose of this study was to compare the effect of training type on the functional ability and psychological skills of Iraqi male volleyball players under psychological pressure.

Methods and Materials: This research employed a quasi-experimental design and was conducted in a field setting. A total of 45 participants who were interested and met the inclusion criteria were purposefully selected and randomly assigned to three groups of 15: sports vision training, traditional training, and combined training. Psychological components were measured using the Ottawa Mental Skills Assessment Tool (OMSAT-3). Functional ability was assessed using the repeated effort test by Sheppard et al. (2007). To determine trait and state anxiety, the SCAT inventory by Martens (1997) and the CSAI-2 by Martens et al. (1990) were used, respectively. To create conditions of psychological pressure in the post-test, a combined supervision and comparison method was employed (Esmaeili et al., 2019). Data were analyzed using covariance analysis and Bonferroni post hoc tests.

Findings: The results showed a statistically significant difference in the subscales of psychological skills in favor of the sports vision training group. Additionally, the scores of functional ability revealed a statistically significant difference favoring the specialized training group.

Conclusion: The use of sports vision training is recommended for enhancing psychological skill components, while the implementation of specialized/traditional training programs is suggested for optimizing functional abilities under psychological pressure for the target population.

Keywords: *sports vision training, combined training, specialized training, functional ability, psychological pressure, volleyball.*

1. Introduction

Sporting tasks are often performed under psychological pressure, especially when the athlete's task involves irrecoverable outcomes. Such conditions are particularly evident in volleyball. Volleyball is one of the most popular sports worldwide, and numerous studies have been conducted to understand better training programs to enhance players' performance (Pereira et al., 2015). During competition, psychological pressure on the performer can affect the athlete's performance and outcomes. When athletes are required to perform under pressure, choking is a common phenomenon; choking refers to suboptimal performance under psychological pressure despite effort and motivation to (Baumeister & Showers, 1986).

Several theories have been proposed to understand pressure-induced choking, including drive theories, behavioral theories, and attention theories (Esmaili et al., 2020). Carver et al. (2012) found that the presence of a camera may increase self-awareness, which disrupts task execution by affecting related information processing (Carver & Scheier, 2012). In a study by Oudejans et al. (2009), skilled individuals were asked to perform basketball free throws under normal and pressure conditions (with performance being videotaped). Results indicated that under pressure, individuals focused more on the task, which, based on the reinvestment theory, heightened anxiety, increased self-focus, and ultimately led to a decline in performance (Oudejans et al., 2011; Singh, 2024; Thomas-Acaro, 2024; Xu, 2024).

Competition is another factor used in choking research. Competition is categorized into situations where performance is compared either with others (explicitly) or with one's previous performance (implicitly). Often, in sports events (competitive conditions), individuals worry about the outcome of their performance; therefore, heightened perception of these situations leads to choking (Masters, 1992). At high levels of sports skills, where differences are measured in milliseconds or centimeters, mental and psychological characteristics are decisive factors. Volleyball is no exception. The primary goal of sports science researchers across various disciplines is to optimize athletes' performance with maximum power, speed, efficiency, and confidence, particularly under high-pressure and stressful conditions. Achieving this goal depends on selecting the right actions, focusing on appropriate stimuli and cues, and effectively activating the motor system (Abd El-Mahmoud, 2008).

Most sports, including volleyball, require high levels of both physical and psychological skills to manage stress and other challenges (Maddison & Prapavessis, 2007). Weinberg and Gould (2014) consider mental and psychological factors to be the primary reasons for daily fluctuations in sports performance. Volleyball demands psychological and functional components, which significantly influence outcomes. With the advent of new approaches in sports, traditional training programs have received less attention, while there is a growing preference for training programs that simulate competition conditions. Functional components specific to volleyball have gained popularity among coaches. The focus on functional components in volleyball aims to simulate target movements rather than isolating specific muscles. These movements involve direction changes, level shifts, and movement patterns (Chu et al., 2019).

Functional elements are not isolated but are executed as multi-joint movements in patterns or movement chains aligned with the sport and the ultimate training objective. Functional components challenge proprioception, motor control, and the central nervous system, training the latter to control entire movements and make optimal decisions during movement execution (Ikarugi et al., 2005; Nemati et al., 2020). Additionally, these exercises improve athletes' sensory responses, essentially acting as the nervous system's language to process environmental information, transmit it to the central nervous system, and predict the next movement (Imai et al., 2014). Identifying and employing innovative methods to enhance sports performance and achieve greater success is a fundamental principle in professional sports. Coaches, athletes, and researchers seek to improve performance through research, experimentation, and scientific collaboration in training, techniques, and competition strategies (Ikarugi et al., 2005).

These efforts drive progress and innovation in the sports world. Accordingly, developing and implementing modern training programs emphasizing athletes' psychological and functional components has become a research focus (Ferreira, 2002). Although athletes' required skills vary by sport and situation, athletes who process information more quickly and provide appropriate motor responses tend to succeed more (Adam & Wilberg, 1992). This highlights the significance of visual information in executing human movements (Land & McLeod, 2000; Luiz Vancini et al., 2023).

Sports vision is an interdisciplinary specialty aimed at enhancing the visual system to gain benefits in trained

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E-ISSN: 2981-2526

sports. Developing visual skills can improve athletes' sports and motor performance at any age (Ghasemi et al., 2011; Mahvash et al., 2024; Malahi et al., 2014; Moreno et al., 2002). Athletes with better visual reaction speeds can perceive environmental events in near slow motion, allowing them to react and decide within milliseconds, positively influencing their performance (Nascimento et al., 2021). Vision plays the most crucial role among the senses in providing environmental information. Effective visual skills are among the most valuable advantages athletes can have in competition. Coordination, focus, balance, and precision are essential skills for any sports event, which some researchers believe can be improved through vision training. These researchers have demonstrated that the visual system responds well to visual training loads (Nascimento et al., 2021).

Sports vision training has roots in sports physiology, visual rehabilitation, and various aspects of kinesiology and biomechanics (motor control). It involves techniques designed to develop visual functions and improve motor performance. Evidence suggests that eye muscle training influences visual skills (Abd El-Mahmoud, 2008; Alfailakawi, 2016; Appelbaum & Erickson, 2018; Ferreira, 2002; Formenti et al., 2019; Malahi et al., 2014; Nascimento et al., 2021), enhancing decision-making accuracy (Appelbaum & Erickson, 2018) and performance.

Additionally, Abernethy and Wood (2001) showed that generalized vision training improved certain visual skill metrics, but similar improvements were observed in control and placebo groups, with no reflection in field-based tennis transfer tests. The lack of evidence supporting the effectiveness of sports vision training for performance improvement has been attributed to methodological approaches, leading to the ecological invalidity of training stimuli. Consequently, the general and automated nature of required motor actions as responses may limit potential effects on sports performance (Abernethy & Wood, 2001).

This lack of transfer supports the ecological framework proposed by Gibson, suggesting a direct reciprocal relationship between perception and movement mediated by external environmental information (affordances) rather than internal representations. Despite growing interest in vision training for sports performance, questions remain about whether it translates to specific motor functional abilities and how such transfer manifests under psychological pressure in mental skills. Given the presented information and the lack of data on the functional and psychological components of adult Iraqi male volleyball players under ecological conditions of psychological pressure, this study seeks to answer whether a training period involving sports vision, specialized, and combined training affects the psychological components and functional abilities of Iraqi male volleyball players under psychological pressure. The findings of this research could contribute to expanding knowledge in this field for the target community and provide valuable insights for coaches, athletes, and officials in the Iraqi volleyball community.

2. Methods and Materials

2.1. Study Design and Participants

The present study was semi-experimental in nature regarding data collection and applied in terms of its purpose and outcomes. It was conducted in a field setting using a pre-test and post-test design. The research population consisted of men familiar with volleyball skills who had at least five years of non-professional experience in volleyball. A total of 68 participants who met the inclusion criteria (normal vision, at least five years of volleyball experience, no history of eye surgery or lens use, no use of glasses, male gender, right-handedness, no use of sedatives, and no membership in professional volleyball teams) were selected. To determine trait anxiety, the participants completed the SCAT inventory. Individuals with a trait anxiety score above 15 were excluded, leaving 45 participants (age: 26.28 ± 0.48 years, height: 1.81 ± 0.04 meters, weight: 88.93 ± 5.83 kg, trait anxiety: 16.73 ± 1.07) who met the inclusion criteria. These participants were purposefully selected and randomly assigned to three groups of 15: sports vision training, traditional training, and combined training.

2.2. Measures

2.2.1. Snellen Visual Acuity Scale

Before selecting participants, the visual acuity of the volleyball players was assessed using the Snellen scale. Only participants with normal vision scores were allowed to enter the study.

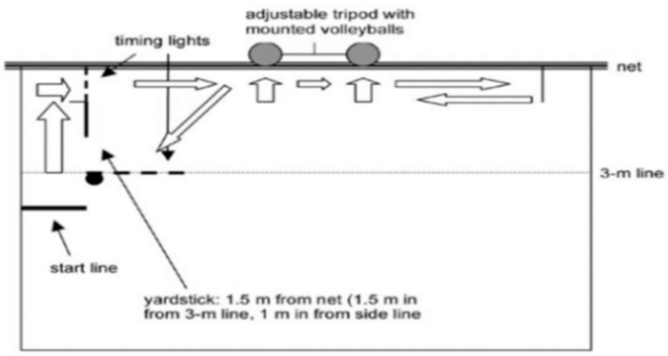
2.2.2. Repeated Effort Test

The repeated effort test by Sheppard et al. (2007) was used to measure participants' functional ability. Initially, a vertical jump apparatus was placed between the volleyball net and the 3-meter line of the court (1.5 meters from either side) and one meter from the sideline. Two light timers (or stopwatches) were placed: one 1.5 meters from the sideline beneath the net and the other 1.5 meters from the sideline on the 3-meter line. Two defensive blocks were positioned 1.5 meters apart from the center on both sides of the court. The test involved two offensive jumps, four defensive blocks, and lateral movements to mimic volleyball game patterns. The protocol consisted of four repetitions, each lasting 20 seconds, with 4–8 seconds of rest between repetitions. The protocol included two offensive jumps, four defensive blocks, and lateral movements to both sides.

For right-handed athletes, the test began on the left side of the court, four meters from the net. The participant performed the first offensive jump by touching the highest point of the vertical jump apparatus. Upon landing, the participant moved along the net (starting the timer). The participant then performed defensive jumps over each block before moving right to touch the court's outer boundary (1.5 meters from the left sideline and 1.5 meters from the 3-meter line). Next, the participant executed another defensive jump over a ball placed 1 meter to the left of the court center (15 cm above the net, positioned so the nearest side was 15 cm away from the player). The participant then performed the sequence in reverse. After the second defense, the participant moved diagonally backward in reverse and crossed the 3-meter line, stopping the timer. The participant then turned back to the starting line for the second offensive jump. Timing began after the first jump and stopped before the second jump (Nemati et al., 2020). Correct defensive blocks required a two-hand block without touching the net. Players were familiarized with the test before data collection and given three trial attempts for practice. After a complete explanation of the procedures, the data collection session began with a volleyball-specific warm-up. This was followed by one or two low-intensity trials, during which feedback was provided to ensure clarity and adherence to the protocol. Participants then performed the test at full intensity once. After 3–5 minutes of rest, participants completed the actual test, which included four repetitions. Results were recorded for vertical attack jumps (cm), lateral movement times (s), and any errors. The mean of all recorded jumps (8 in total) and times (4 in total) across four repetitions was used as the actual score. Errors were recorded if the blocking action was incorrect (e.g., touching the ball with one hand or contacting the net). The repeated effort test has been shown to reliably assess repeated effort ability in volleyball players, differentiate between skill levels, and respond to specific training interventions (Nemati et al., 2020).

Figure 1

Repeated Effort Test



2.2.3. Ottawa Mental Skills Assessment Tool (OMSAT-3)

The OMSAT-3 evaluates an individual's readiness in three dimensions: foundational skills, psychomotor skills, and cognitive skills. This questionnaire contains 48 items rated on a seven-point Likert scale from "strongly disagree" to "strongly agree." Zeidabadi et al. (2013) confirmed the factorial validity and reliability of the 48-item, 12-factor Persian version of OMSAT-3. Sanati Monfared (2006) assessed its reliability among 333 national team athletes in Iran, reporting Cronbach's alpha between 0.37–0.71 and test-retest reliability between 0.64–0.92. Riahifarsani et al. (2013) calculated Cronbach's alpha above 0.70. For stress response, fear control, focus, and refocusing skills, scores ranged from 7 (strongly disagree) to 1 (strongly agree), with reverse scoring for other skills. Scores above 25 indicated excellent performance, 20–25 good, 15–20 moderate, and below 15 weak (Riahifarsani et al., 2023).

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2.2.4. SCAT Inventory

Trait anxiety was measured using the SCAT inventory (Martens, 1997), a 15-item Likert scale questionnaire with five dummy questions. Items 6 and 11 were reverse-scored. Scores ranged from 10 (low anxiety) to 30 (high anxiety), with scores above 20 indicating high anxiety, 15–20 moderate, and below 14 low. Validity and reliability were established through responses from 2,500 athletes, with a test-retest correlation between 0.73–0.88 (mean: 0.81) and internal consistency between 0.95–0.97. Cronbach's alpha was reported as 0.79 (Zahedi et al., 2011).

2.2.5. Distress Tolerance

CSAI-2: State anxiety was measured using the Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990), a 29-item scale with three subscales: cognitive anxiety, somatic anxiety, and self-confidence, each containing nine items. Scores for each subscale ranged from 9 to 36. The CSAI-2 has demonstrated suitable validity and reliability in sports settings (α = 0.82–0.89). Subscale reliabilities for cognitive anxiety (α = 0.78–0.80), somatic anxiety (α = 0.81–0.83), and self-confidence (α = 0.87–0.91) were significant at the 1% alpha level (Hagan Jr et al., 2017).

2.3. Intervention

After selecting the participants and determining their trait anxiety levels, their anthropometric characteristics, including height, weight, and body mass index (BMI), were measured and recorded. From the participants with trait anxiety scores between 15 and 20, 15 individuals were assigned to each group (a total of 45 participants). During the pre-test, all participants underwent the repeated effort test, and their scores were recorded. To analyze the data as a single standardized score, the sum of the standardized T-scores for vertical jumps and lateral movement times in the maximum effort test was used. Additionally, the OMSAT-3 questionnaire was distributed, and participants were asked to select the option that best described their condition.

After collecting the OMSAT-3 mental skills questionnaire, participants were divided into three training groups: sports vision training, traditional/specialized training, and combined training. Over 27 sessions of 90 minutes each, participants followed their respective programs. Each session included 10 minutes of warm-up, 30 minutes of sports vision training or intervention, 20–30 minutes of volleyball-related physical skill training, and 10 minutes of cool-down and stretching exercises.

Each session was designed in a circuit format, with participants rotating through five stations, spending six minutes at each. The stations focused on developing visual skills such as peripheral vision, saccadic eye movements, and convergence. The difficulty levels were adjusted across three tiers based on distance from the wall, standing position, and the use of tools such as foam to progressively increase motor and cognitive challenges. In the combined training group, participants performed the same sports vision exercises but incorporated volleyball-specific movements using a volleyball. For example, at the first station, participants practiced sports vision exercises while controlling the ball overhead, progressing to standing on one foot and using foam for added difficulty. At the second station, participants performed lateral movements while maneuvering the ball. Other stations included volleyball movements such as ball control, passing, and spiking, with a focus on visual skills and motor coordination at varying difficulty levels.

The specialized/traditional training group performed repetitive volleyball skill techniques in a controlled environment without sports vision training. This intervention combined technical skill drills with coaching and skill-based games to facilitate learning. Specifically, the program used small-sided games (e.g., 3v3 or 5v5) and repetitive drills to simulate specific game situations with teammates and opponents (Formenti et al., 2019).

To induce psychological pressure during the post-test, a combined monitoring and comparison method was used (Esmaili et al., 2020). During the post-test session, a psychological pressure scenario was created. Four video cameras were installed around the volleyball court, two meters from the sidelines and end lines, and participants were informed that their performance would be recorded (performance pressure). Additionally, four prominent coaches from the federation, who were involved in scouting players for the national volleyball team and were part of Iraq's club volleyball coaching teams, were invited. Participants were told their performance would be reviewed by these experts for potential selection (evaluation pressure). After the cameras and evaluators were positioned and the necessary explanations provided, participants were informed that if selected, they would receive a financial incentive of 300,000 dinars. They were then asked to complete the Competitive State Anxiety Inventory (CSAI-2) and the OMSAT-3 mental skills questionnaire.

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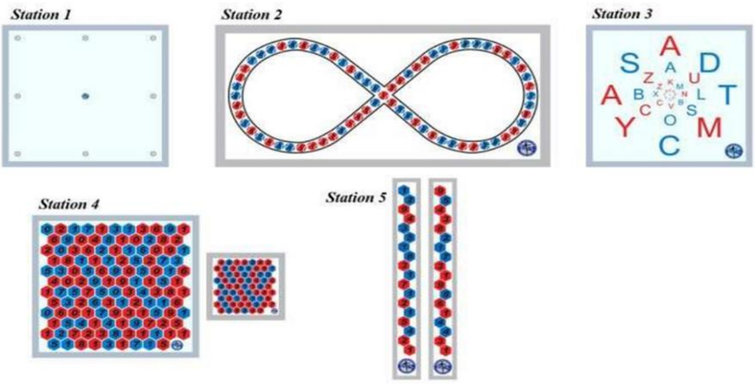
Following readiness confirmation, participants underwent the maximum repeated effort test, and their scores were recorded. Participants were instructed to refrain from intense physical activity for two days prior to the post-test. All measurements were conducted by the researcher, who is a physical education instructor at Al-Mustansiriya University and a first-class national volleyball coach in Iraq, ensuring consistent supervision of all training sessions.

Figure 2

Representation of Panels Used for the Sports Vision and Combined Training Groups



2.4. Data Analysis

For data analysis, multivariate analysis of covariance (MANCOVA) and Bonferroni post hoc tests were conducted using SPSS version 23, with a significance level set at less than 0.05.

3. Findings and Results

In the pre-test, the highest score for foundational mental skills was observed in the specialized/traditional group, whereas in the post-test, this shifted to the sports vision group. For psychomotor skills, the lowest score in the pre-test belonged to the combined group, but in the post-test, it shifted to the specialized/traditional group. For cognitive skills, the highest score in the pre-test was found in the specialized/traditional group, while in the post-test, it was observed in the sports vision group. The highest and lowest scores for mental skills were consistently recorded in the specialized/traditional group across both tests. The sports vision group had the lowest functional ability scores in both tests, whereas the combined group achieved the highest scores (Table 1).

Table 1

Comparison of Mean (M) and Standard Deviation (SD) of Examined Variables Across Three Groups

Variable	Group	Pre-Test M (SD)	Post-Test M (SD)
Competitive State Anxiety	Sports Vision	51.20 (2.95)	52.53 (3.11)
	Combined	49.46 (3.09)	52.33 (2.74)
	Specialized/Traditional	50.00 (1.92)	54.13 (1.30)
Foundational Mental Skills	Sports Vision	67.06 (3.89)	63.53 (3.64)
	Combined	67.06 (3.73)	60.80 (3.12)
	Specialized/Traditional	67.66 (3.52)	58.20 (4.75)
Psychomotor Skills	Sports Vision	72.00 (5.05)	71.60 (4.06)
	Combined	70.60 (4.43)	71.73 (4.52)
	Specialized/Traditional	70.80 (4.19)	66.93 (3.21)
Cognitive Skills	Sports Vision	90.13 (6.64)	88.86 (6.24)
	Combined	91.53 (6.44)	87.40 (5.27)
	Specialized/Traditional	92.06 (6.34)	78.73 (5.70)
Functional Ability	Sports Vision	92.57 (18.25)	92.36 (17.08)
	Combined	109.11 (7.21)	106.23 (6.89)
	Specialized/Traditional	98.31 (12.58)	101.40 (10.79)

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After confirming the assumptions of normal data distribution, homogeneity of variance, and linear covariance relationships with dependent variables (functional ability and group: p = 0.13, F = 12.15; foundational mental skills and group: p = 0.22, F = 1.55; psychomotor skills and group: p = 0.27, F = 1.32; cognitive skills and group: p = 0.38, F = 0.97), and verifying Box's test assumptions (Box = 27.53, p = 0.25, F = 1.18), analysis of covariance was used.

Table 2

ANCOVA Results for Comparing the Effects of Training Type on Variables Under Psychological Pressure

Source	Variable	Sum of Squares	df	Mean Square	F	p-value	Eta Squared	Power
Pre-Test	Functional Ability	4572.63	1	4572.63	357.10	0.000	0.90	1.00
	Foundational Skills	126.54	1	126.54	109.29	0.000	0.74	1.00
	Psychomotor Skills	359.19	1	359.19	95.83	0.000	0.71	1.00
	Cognitive Skills	273.14	1	273.14	43.70	0.000	0.53	1.00
Group	Functional Ability	198.01	2	99.00	7.73	0.002	0.28	0.93
	Foundational Skills	237.78	2	118.89	102.68	0.000	0.84	1.00
	Psychomotor Skills	347.15	2	173.57	46.30	0.000	0.70	1.00
	Cognitive Skills	1014.61	2	507.30	81.16	0.000	0.81	1.00
Error	Functional Ability	486.58	38	12.80				
	Foundational Skills	43.99	38	1.15				
	Psychomotor Skills	142.43	38	3.74				
	Cognitive Skills	237.51	38	6.25				

Table 2 indicates significant statistical differences in the studied variables among the three groups (p < 0.001).

Table 3

Bonferroni Post Hoc Test Results for Pairwise Comparisons

Variable	Group 1	Group 2	Mean Difference	SE	p-value
Functional Ability	Sports Vision	Combined	0.16	1.55	1.00
	Sports Vision	Specialized	-4.54	1.38	0.007
	Combined	Specialized	-4.70	1.43	0.007
Foundational Skills	Sports Vision	Combined	2.56	0.46	0.000
	Sports Vision	Specialized	5.88	0.41	0.000
	Combined	Specialized	3.31	0.43	0.000
Psychomotor Skills	Sports Vision	Combined	2.18	0.84	0.040
	Sports Vision	Specialized	6.91	0.74	0.000
	Combined	Specialized	4.73	0.77	0.000
Cognitive Skills	Sports Vision	Combined	2.84	1.08	0.030
	Sports Vision	Specialized	11.57	0.96	0.000
	Combined	Specialized	8.72	1.00	0.000

Table 3 shows significant differences in all pairwise comparisons for the examined variables, except for functional ability between the sports vision and combined groups (p > 0.05). All other comparisons were statistically significant (p ≤ 0.05).

4. Discussion and Conclusion

The aim of this study was to compare the effects of different types of training (sports vision training, specialized training, and combined training) on functional ability and psychological components of Iraqi male volleyball players under psychological pressure. The results of multivariate covariance analysis showed significant statistical differences in the variables under psychological pressure among the three training groups (sports vision, combined, and specialized/traditional) (p ≤ 0.05). The Bonferroni post hoc test revealed statistically significant differences in all pairwise comparisons except for functional ability between the sports vision and combined training groups (p > 0.05).

As no previous study was found that specifically examined the effect of sports vision training on functional ability in volleyball players under psychological pressure, related studies on other sports were used for discussion. These findings align with prior studies (Nemati et al., 2020; Tavares et al., 2023), but not with some studies (Abd El-Mahmoud, 2008; Alfailakawi, 2016). Nemati et al. (2021) studied the effects of functional training on skill and physical indices in teenage female volleyball players and reported improvements in repeated effort test factors, vertical jump, agility, and proprioception through functional training focusing on the neuromuscular system (Nemati et al., 2020).

There is growing interest in training programs that closely simulate competition conditions. Functional components specific to volleyball, such as direction changes, level shifts, and movement patterns, have gained attention among coaches. Functional elements are executed as multi-joint movements within patterns or chains close to the sport and training goals. These movements involve simultaneous execution of several factors, including power, stability, balance, and coordination. Functional components challenge the proprioceptive and motor control systems, allowing the central nervous system to learn to control entire movements and make optimal decisions. These exercises also improve athletes' sensory responses, which act as the nervous system's language to process environmental information and predict subsequent movements (Imai et al., 2014).

According to the results, psychological pressure conditions caused a decline in functional ability scores in the post-test compared to the pre-test across all three groups. However, the specialized/traditional group demonstrated better-adjusted functional ability scores in the post-test. This is likely because this group followed their standard routine training program, emphasizing techniques directly related to volleyball performance. The elements assessed in functional ability (repeated effort test) such as spiking, agility, and speed, rely heavily on the recruitment of motor units and muscle strength, resulting in better performance.

The adjusted functional ability scores of the sports vision group (M = 98.88, SD = 0.96) and the combined group (M = 98.23, SD = 0.99) in the post-test were very close, suggesting that both groups perceived psychological stress and pressure similarly. This might explain the lack of a statistically significant difference between these two groups. Additionally, functional ability may demand less precision, meaning that stress and psychological pressure had less impact on the specialized/traditional group.

Overall, this study highlights the critical role of the performance environment in improving perception and action in sport-specific skills, supporting the ecological approach to sports learning (Burris et al., 2018; Formenti et al., 2019).

Murayama et al. (2009), using a grounded theory approach, identified factors contributing to performance decline under pressure, such as changes in perception, physical fatigue, negative thoughts, and activation of the nervous system (Murayama & Sekiya, 2015).

Murayama and Sekiya (2015) found that performance decline under psychological pressure results from the complex interaction of psychological, physiological, and behavioral factors (Murayama & Sekiya, 2015). They also noted the significant role of low-risk strategies and motor control changes in this decline. Mohammadzadeh et al. (2014), in their study on the psychological skills of elite and non-elite volleyball players, concluded that experienced and highly skilled athletes scored higher in mental skills. Athletes consistently use mental skills during practice and competition (Mohammadzadeh & Sami, 2014).

Mental skills can be categorized into three groups, all of which are crucial for optimizing sports performance, including in volleyball. The first category consists of foundational mental skills such as goal setting, confidence, and commitment (Jean, 2010). These foundational skills are considered essential because when they are not well-developed, other psychological skills cannot fully mature (Cox, 2012). They serve as the basis for achieving success in sports.

The second category, psychomotor skills, includes stress response, fear control, mental relaxation, and energy management. These skills are closely linked to the athlete's physiological characteristics (Landers, 1986). Mastery of psychomotor skills is critical in volleyball because athletes must effectively handle stressful situations, overcome fear, and reduce tension during critical moments, such as when the team is losing. Stressful situations are vital for most successful athletes as they promote a positive approach to anxiety and worry (Hagan Jr et al., 2017). Sports events are inherently characterized by dynamic changes in the individual-environment relationship, which can create significant stress, even among elite athletes (Calmeiro et al., 2010). Calmeiro et al. (2010) provided evidence that stress appraisal and coping during competitions are functions of the performance challenges athletes face. How athletes cope with stressors such as psychological load, lack of practice, the environment, and evaluations is referred to as the stress response, which is essential for success in sports (Calmeiro et al., 2010).

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The third category is cognitive skills, including imagery, mental rehearsal, focus, refocusing, and competition planning. These skills involve cognitive processes such as learning, perception, memory, and thinking, which are necessary for improving sports performance (Cox, 2012). Liao and Masters (2002) reported that an imminent stressful event could trigger a process where the event's demands are compared with the individual's response capabilities, requiring a high level of self-focused attention. Refocusing emphasizes current performance rather than past or future events (Liao & Masters, 2002). A refocusing plan helps athletes redirect their attention from external distractions or internal disturbances, such as worry, self-doubt, or self-criticism (Oudejans et al., 2011).

It has been proposed that volleyball success depends on a set of visual-motor skills (Kluka & Love, 1991). Skilled visual perception and subsequent motor responses are critical and determining factors for successful performance in volleyball. Perception through visual search patterns, representing elements of an athlete's perceptual strategy, has received attention in sports science literature (Moreno et al., 2002). This theory suggests that at least four visual perception and decision-making factors—failure to recognize, delayed recognition, lack of internal focus, and poor choice of internal options—contribute to the inability to successfully execute volleyball skills. These components, combined with quick decision-making, enable volleyball players to anticipate upcoming events and properly time their actions and reactions.

Sports vision training has likely facilitated these processes in participants, acting as a powerful tool for managing and reducing psychological pressure. This training enhances individuals' ability to perceive stressful conditions accurately, improving clarity and focus, which helps them respond more effectively to environmental factors and situations. Thus, it is reasonable to conclude that sports vision training has aided individuals in coping better under psychological pressure and achieving superior mental performance.

The rationale behind sports vision training programs is based on three assumptions: (1) athletes have superior visual skills compared to non-athletes; (2) visual skills can be improved; and (3) enhanced visual skills can potentially transfer to improved sports skills. It is also plausible that sports vision training in this study improved coordination between the trunk, arms, and legs during tasks, reducing the destructive effects of psychological pressure on performance accuracy. This is consistent with the expectation, based on prior research, that psychological pressure negatively affects mental skills. Sports vision training might have introduced an additional visual load during sessions, which, according to the inoculation theory of stress in sports, reduced the athletes' Body Awareness Response (BAR), enabling them to focus on key elements and disregard distractions (Alfailakawi, 2016; Appelbaum & Erickson, 2018).

Moreover, sports vision training likely improved participants' attention flexibility, enhancing their executive control compared to the other groups. These abilities, often referred to as "sports intelligence," are recognized as executive functions that regulate thought and action (Formenti et al., 2019). The ultimate goal of sports vision training is to transfer visual skill improvements to the playing field. When athletes can excel in visual tasks despite sensory integration demands, distractions, and stress, their visual systems are more likely to maintain optimal performance under stressful conditions, as observed in the participants of this program.

In conclusion, performance under stress is crucial for athletes, especially in team sports like volleyball. This study showed that motor and defensive abilities, such as blocking and movement, depend on explosive power and neuromuscular coordination, which can be improved through specialized training. The findings revealed no significant differences between the sports vision and combined training groups, but the specialized/traditional group showed better performance. Additionally, the sports vision group scored higher in psychological skill tests, suggesting that this training can help Iraqi volleyball players perform better under stressful conditions.

5. Limitations & Suggestions

This study had several limitations that may affect the generalizability of the findings. First, the sample was limited to Iraqi male volleyball players, restricting the applicability of the results to other sports, genders, or regions. Second, the study's duration may not have been sufficient to observe long-term effects of the training interventions. Third, the psychological pressure conditions were simulated and may not fully replicate the complexity of real-life competitive scenarios. Lastly, reliance on self-reported measures for psychological skills might introduce response biases.

Future studies should explore the effects of sports vision training on a more diverse population, including athletes from different sports, skill levels, genders, and cultural backgrounds. Longitudinal research is needed to assess the

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E-ISSN: 2981-2526

long-term benefits and sustainability of the training interventions. Investigating the combined effects of sports vision training and other psychological techniques, such as mindfulness or resilience training, could provide a more comprehensive understanding of their synergistic impacts. Additionally, incorporating advanced tools, such as eye-tracking technology, could offer deeper insights into the mechanisms underlying improved visual perception and decision-making under pressure.

The findings of this study have practical implications for coaches and sports psychologists working with volleyball players and other athletes in high-pressure sports. Implementing sports vision training as part of regular practice routines could enhance athletes' mental and motor performance, particularly under stressful conditions. Coaches are encouraged to integrate psychological skills training into their programs to improve athletes' focus, decision-making, and coping strategies during competitions. Lastly, organizations and sports federations should consider investing in tailored training programs that combine physiological, psychological, and technical components to optimize athletic performance comprehensively.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

This article is derived from the first author's doctoral dissertation. All authors equally contributed to this article.

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