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The Effect of Quickness Training on Some Specific Coordination Abilities and Tactical performance levels for Elite Boxers

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Abstract

This research aims to shed light on the necessity of coaches' interest in the individual training process for some special coordination abilities for each boxer, which are related to motor and skill performance in a harmonious manner that is compatible with the boxer's capabilities. The researchers used the experimental method by designing the pre- and post-measurement for one experimental group to apply the basic experiment to suit the nature and objectives of the study. The research community and sample were chosen intentionally, which represented all first-class boxers at the Al-Nojoum Sports Club in Sadat City, Menoufia Governorate, who are registered with the Egyptian Boxing Federation from (18:21) years old, with a total of (25) boxers. Based on the findings, the first hypothesis of the research is verified. It states that there are statistically significant differences between the averages of the two measurements (pre- and post-test) regarding the effect of the proposed training program using interactive motor speed training on some special coordination abilities among first-class boxers aged 18-21 years (the research sample), in favor of the post-test.

Keywords: ***Quickness, Coordination, Ellite Boxers***.

Introduction

Achieving victory in international, global, and Olympic sporting events has become a symbol of superiority and cultural progress, which developed countries are eager to attain. It has also become one of the top priorities, requiring the allocation of significant budgets, with the belief that success in sports reflects their advancements in other fields. Boxing, being one of the sports featured in international, world, and Olympic competitions, sees participating countries competing for numerous medals. As a result, many countries provide extensive material and human resources to secure the highest number of medals. According to Mustafa (1993), Hassanein (1995), Nasr El-Din (1997), and El-Sayed (2006), there has been a growing

focus on studying the athlete's Quickness performance and the Quickness skills related to various sports activities, as well as the factors that affect them both directly and indirectly. This knowledge aims to optimize and enhance the training process to achieve the best possible sports results

Researchers argue that boxing is characterized by a variety of technical skills, the mastery and performance of which are closely linked to the athlete's physical fitness, Quickness experience, and the ability to effectively employ these technical skills based on the competitive situation and the opponent's performance style. Furthermore, the success of any Quickness skill is contingent upon the underlying Quickness performance elements, and certain abilities must be present in high proportions depending on the requirements of the specific sport. As highlighted by Qadous (1993), Othman (1993), and Hassanein (1995), there is a growing emphasis on the importance of Quickness performance factors in sports. Khader (1996), Johnson and Nelson (1998), and Hamada and Naja (2003) also emphasize that high-level boxers who consistently place first in major competitions demonstrate exceptional punching ability at various distances—whether long, medium, or short—in both offensive, defensive, and counterattacking positions. This requires high-level of Quickness and technical abilities. Boxing is a sport marked by rapid sequences of movement, speed, and sudden changes in punching positions, all of which demand a high level of coordination, enabling the boxer to perform skills that are strong, fast, and executed from the optimal punching distance while enduring the physical demands of the match (Qadous, 1993; Othman, 1993; Hassanein, 1995; Khader, 1996; Johnson & Nelson, 1998; Hamada & Naja, 2003).

Researchers also maintain that a key objective of the training process is to equip the athlete with Quickness skills, achieved by aligning physical conditions that support this goal. Based on these conditions, the athlete is able to control and direct their Quickness activity, performing tasks in a coordinated and purposeful manner. These conditions are known as harmonious abilities, which are influenced by the athlete's anatomical and functional attributes and can be developed through general sports training or by focusing on specific abilities. Larson (1994) and Al-Hawi (2000) further discuss the significance of coordination abilities across all sports, noting that the importance of each coordination ability can vary based on the demands of the sport. Coordination abilities are interconnected and contribute to the overall movement pattern by integrating smaller, coordinated movements (Larson, 1994; Al-Hawi, 2000).

Researchers emphasize that to reach international levels, it is crucial to monitor and evaluate the skill preparation periods to assess the progress made. This process helps in developing game plans during competitions based on the players' abilities and potential to implement and perform fundamental skills. As Wailer (1995), Mathews (1998), Roland (2000), and Al-Hawi (2004) explain, tactical preparation is one of the most important phases a boxer undergoes, serving as the critical point where the athlete's compatibility abilities are refined. This preparation enables the boxer to act in competitive situations using tactical methods that

allow him to make the right decisions according to the nature of the competition (Wailer, 1995; Mathews, 1998; Roland, 2000; Al-Hawi, 2004).

Researchers further point out that the boxer's ability to combine various Quickness skills and achieve mastery in executing them according to different situations in the ring is crucial. The boxer exploits his physical, Quickness , mental, and technical abilities to achieve the best possible outcomes. This is highlighted by Hockey (1991), Lehmann (2001), Abdel Fattah (1997), and El-Sayed (2006), who emphasize that the integration and compatibility between skill execution, planning performance, and physical condition is a complex and multifaceted ability. Its presence is essential for achieving optimal results in sports (Hockey, 1991; Lehmann, 2001; Abdel Fattah, 1997; El-Sayed, 2006).

This aligns with the views of Abdel Fattah (1997), Jensen and Fisher (1999), and Hamada and Naja (2003), who state that each sport has its own specific coordination abilities that distinguish it from other sports. High levels of Quickness coordination, integration, and harmony are required to excel in Quickness performance during these activities (Abdel Fattah, 1997; Jensen & Fisher, 1999; Hamada & Naja, 2003).

Additionally, researchers note that selecting and constructing various tactical methods should be preceded by exploratory operations using various tools to understand the opponent's punching techniques. This allows the boxer to base his strategy on sound principles, as emphasized by Muhi Abed (1996), Klaus (1997), Abdel Basir (1999), Saeed (2004), and Seif (2010). Boxing, being a sport defined by speed and sudden shifts in punching positions, demands the boxer to possess high Quickness performance, which includes agility, flexibility, speed, and the ability to strike effectively in various playing situations, all while enduring the competition's demands throughout the match (Muhi Abed, 1996; Klaus, 1997; Abdel Basir, 1999; Saeed, 2004; Seif, 2010).

This perspective is consistent with the findings of Saeed (2004), Hamed, Ghanem, El-Azab, and Maghawry (2005), and Seif (2010), who assert that boxers select from a range of skill models and competitive plans they have mastered during training, applying them according to their physical capabilities in response to the opponent's actions in the ring (Saeed, 2004; Hamed, Ghanem, El-Azab, & Maghawry, 2005; Seif, 2010).

Researchers further believe that each sport has specific requirements for coordination abilities, distinguishing it from other activities. These requirements exist within each sport, with multiple coordination abilities within a single sport, each having its own set of demands. As Alawi (2002), Drogue (2002), and Abdel Khaleq (2003) explain, coordination abilities are tightly linked to the development of technical Quickness skills. The specialized nature of the sport dictates the type of coordination abilities that need to be developed. Without the coordination abilities specific to the sport, an athlete cannot master the technical skills required for that activity (Alawi, 2002; Drogue, 2002; Abdel Khaleq, 2003).

Researchers also argue that a skilled boxer is one who maximizes the benefit from his mastery of specific Quickness skills and effectively exploits them in the appropriate manner, enabling him to perform in the most challenging game situations. The importance of punching skills lies in their role as one of the primary tools a boxer uses to implement and execute game plans, as well as their ability to formulate successful offensive and defensive strategies to win the match. Technical punching skills are considered among the boxer's key weapons, used to implement and produce various tactical approaches during a competition, all of which depend heavily on physical abilities. As noted by Redo (1990), El-Sayed (1991), Hertz (1996), Nowak (2001), and Lehmann (2002), a lack of coordination can lead to confusion in performance, reduced efficiency, and increased risks of acute and chronic injuries due to falls, collisions, or a lack of balance. Quickness coordination encompasses various coordination abilities, improving each ability individually while also testing it through specific assessments (Redo, 1990; El-Sayed, 1991; Hertz, 1996; Nowak, 2001; Lehmann, 2002).

Due to the significant role coordination abilities play in boxing, researchers have increasingly focused on understanding the effect of training speed and interactive kinetics on various compatibility abilities, particularly in boxers, and their relationship to Quickness and skill performance. A skilled boxer with excellent physical condition and high skill performance must possess a substantial amount of coordination abilities to master both technical and tactical skills effectively.

It is important for trainers to emphasize the individualized training process for each boxer, focusing on specific compatibility abilities that are directly related to Quickness and skill performance. This training should be tailored to ensure that it aligns harmoniously with the boxer's unique capabilities, allowing for optimal development of both physical and technical skills.

The research aims to to design a proposed training program using interactive Quickness drills to explore the effect of the proposed training program, utilizing interactive Quickness exercises, on certain compatibility skills in boxers, who constitute the research sample, and the improvement rates resulting from the effect of the proposed training program, using interactive Quickness exercises, on specific Coordinative abilities skills in boxers ,

Study Hypotheses

1. There are statistically significant differences between the mean scores of the pre- and post-measurements as a result of the proposed training program using reactive quickness exercises on certain specific coordinative abilities of Eliite Boxers, in favor of the post-measurement.
2. There are differences in the improvement rates between the mean scores of the pre- and post-measurements as a result of the proposed training program using reactive quickness exercises on certain specific coordinative abilities of Eliite Boxers ,in favor of the post-measurement.

Materials and Method

The researchers used an experimental method, designing both pre-test and post-test measurements for one experimental group to apply the basic experiment, in alignment with the nature and objectives of the study.

Participants

The research community and sample were intentionally selected, consisting of all Eliite Boxers at the Al-Nogoum Sports Club in Sadat City, Menoufia Governorate, and those registered with the Egyptian Boxing Federation, ,. The total number of participants was 25 boxers, and they were divided into the pilot sample consisted of (10) Elite Boxers, and The experimental sample consisted of (10) Eliite Boxers. However, (5) boxers were excluded due to not meeting the selection criteria for the sample, as shown in Table (1).

It is clear from Table (1) that the total population and sample of the research consisted of 25 Eliite Boxers, representing all Eliite Boxers at the El-Nogoum Sports Club in Sadat City, Menoufia Governorate, and those registered with the Egyptian Boxing Federation. Out of these, 5 boxers were excluded, representing 20.00% of the total sample, as they did not meet the criteria for inclusion in the research sample. As a result, the final research sample included 20 boxers, representing 80.00% of the original sample. This sample was divided into two groups: a survey group of 10 boxers, representing 40.00%, and an experimental group consisting of 10 boxers, also representing 40.00%.

Table 1. Description of the research participant groups

Description		Number	Percentage	Classification
Research community		(25) Ellite boxers	100%	All Elite Boxers at the El-Nogoum Sports Club in Sadat City, Menoufia Governorate
Research sample	exploratory	(10) Ellite boxers	40.00%	
	empiricism	(10) Ellite boxers	40.00%	
	The excluded	(5) Ellite boxers	20.00%	
Total final research sample		(20) Ellite boxers	80.00%	

Data Collection

The researcher reviewed scientific references and relevant studies—within the limits of available resources—in order to benefit from them in designing the proposed training program First: The means of collecting data appropriate for the research are as follows:

1. This form recorded the basic anthropometric data of the research sample (exploratory and experimental groups), including name, age, height, weight, resting heart rate, and training age of Elite Boxers.
2. This form documented the results of a skill-based test battery assessing coordination abilities in Eliite Boxers within the research sample

Tests of the variables

Reactive Quickness Tests for Eliite Boxers

The researchers utilized a battery of skill-based coordination tests developed by Ahmed Saeed (2008) . This battery consists of four tests designed to assess the coordination abilities of boxers. Of these, three tests were adapted as variables to assess *reactive quickness*, and a corresponding questionnaire was used to record the results of the research sample. The objectives of each test were modified to align with the variables of the current study:

1. **Arm Quickness response Speed Test**
   Designed to measure the ability to quickly respond to offensive counter-punches (e.g., countering single punches, double punches, and punch combinations).
2. **Punch Force Kinesthetic Sensation Test**
   Aimed at evaluating the ability to sense the muscular force behind counter-offensive punches (single, double, and combination punches).
3. **Quickness -Performance Linkage Test**
   Measures the ability to coordinate and execute punch combinations that include offensive and counter-offensive actions (single, double, and combination punches).
4. **Kinesthetic Sense of Movement Distance Test**
   Designed to assess the athlete's ability to perceive muscular movement and the distance covered during forward motion.

Homogeneity of the participants groups:

To ensure homogeneity within the research sample, the researchers calculated the skewness coefficients for all participants (in both exploratory and experimental groups) across growth-related variables: age, height, weight, resting heart rate, and training age. They also assessed the skill-based coordination tests used to measure reactive quickness.

The sample consisted of Eliite Boxers aged between ,s. Data collection was conducted over the period from Saturday, April 20, 2024, to Saturday, April 27, 2024, as presented in Tables 2 and 3.

Table 2 Homogeneity of the research groups (exploratory, experimental) in the growth variables and Heart Rate and training experience (n = 20)

Variables	Units	Arithmetic mean	Median	standard deviation	Skewness	Kurtosis
Age	Year	19.70	19.00	0.993	2.11	1.83
Height	Cm	171.60	173.00	3.13	-1.34	-0.66
Weight	Kg	69.35	68.50	1.44	1.77	1.04
Pulse rate	pulse/ min	72.30	71.00	2.01	1.86	-3.80
Training experience	Year	4.45	4.00	1.68	0.80	-1.23

As shown in Table (2), the skewness and kurtosis coefficients for the research sample (exploratory and experimental groups) in the growth-related variables (age, height, weight, pulse rate), as well as training age, ranged between (–1.34 to 2.11) and (–1.23 to 1.83), respectively. These values fall within the acceptable range of (±3), indicating that the sample is homogeneous across these variables.

Table 3. Homogeneity of the research groups (exploratory - experimental) in skill test battery for the harmonic capabilities as variables of the reactive Quickness (n =20)

Variables for reactive kinetic velocity	Units	arithmetic mean	The median	standard deviation	Skewness	Kurtosis
Arm Quickness response speed test	Th	0.33	0.31	0.12	0.50	-0.185
Muscle kinesthetic ability test for punch strength	Kg	2.30	2.10	1.26	0.48	-1.447
Coordinative performance linking ability test	Nr	29.00	28.00	2.41	1.24	-0.546
Muscle-kinesthetic ability test for distance movement	Cm	4.10	3.50	1.17	1.54	-0.147

As shown in Table (3), the skewness and kurtosis coefficients of the experimental research sample in the skill test battery for coordination abilities—used as variables for reactive quickness—ranged between (0.48 to 1.54) and (–1.447 to –0.147), respectively. These values fall within the acceptable statistical range of (±3), indicating homogeneity among the sample participants in these tests.

Pilot Study

The second exploratory study was conducted by the researchers during the period from Saturday, July 13, 2024, to Saturday, July 27, 2024. The aim was to determine the scientific parameters (validity and reliability) of the skill test battery for coordination abilities used as indicators of reactive quickness among Eliite Boxers

Testing the Validity

To assess validity, the researchers employed discriminant validity by examining differences in performance among boxers on the coordination abilities test battery. The study sample consisted of 10 boxers, divided into two groups:

- Group 1: Distinguished boxers who had achieved advanced positions in previous championships (n = 5).
- Group 2: Non-distinguished boxers who had not achieved advanced rankings in past championships (n = 5).

This validation process was carried out on the exploratory sample during the period from Saturday, July 13, 2024, to Saturday, July 20, 2024, as shown in Table (4).

It is clear from Table (4) that there are statistically significant differences between the two groups (distinguished and non-distinguished) in the exploratory research sample, based on the skill test battery for coordination abilities, used as variables for reactive Quickness speed. The differences favor the distinguished group, with the calculated t values ranging from (3.32* to 4.53*), which are greater than the tabular t at a significance level of 0.05. This indicates that the test battery effectively discriminates between the two groups, confirming the high degree of validity of the tests

Table 4. Significance of sample differences Exploratory research for the two groups (the Distinctive – Non-Distinctive) in Test battery the skill of coordination abilities as variables of the reactive Quickness (n1 = n2 = 5)

Variables for reactive kinetic velocity	Unit	Distinguished group (N_1 = 5)		Non-distinguished group (N_2 = 5)		value "T"
		mean	St.Dv	mean	St.Dv	
Arm Quickness test	Th	0,38	0.12	0,46	0,14	4,53*
Muscle kinesthetic ability test for punch strength	kg	2,43	1.08	2,60	0,95	3,67*
Coordinative performance linking ability test	number	24,43	2,32	18,42	2,07	3,89*
Muscle-kinesthetic ability test for distance movement	cm	4,65	1,12	4,37	2,32	3,32*

* Tabular value of "T" at (0.05) = 1.99

Testing the Reliability

To assess reliability, the researchers employed a test-retest method. The test was applied twice to the exploratory research sample (n = 10 boxers) with a one-week interval between the two applications, from Saturday, July 20, 2024, to Saturday, July 27, 2024. The Pearson correlation coefficient was calculated between the results of the two test administrations (first and second) for the skill test battery measuring coordination abilities as variables for reactive Quickness . The sample consisted of Eliite Boxers, as shown in Table (5).

It is clear from Table (5) that there are statistically significant correlation coefficients between the first and second test administrations for the exploratory research sample, based on the skill test battery for coordination abilities used as variables for reactive Quickness speed. The correlation coefficients ranged from (0.74* to 0.87*), which fall within the acceptable range of (±1). These values are statistically significant at a significance level of 0.05, indicating the stability and high reliability of the tests.

Table 5. The correlation coefficient between the first and second applications of inTest battery Skillful coordinating abilities as variables of reactive Quickness (n = 10)

Variables for reactive kinetic velocity	Unit	First application		The second application		Correlation coefficient "R"
		mean	St.Dv	mean	St.Dv	
Arm Quickness test	Th	0.43	0.15	0.42	0.16	0.74*
Muscle kinesthetic ability test for punch strength	kg	2.73	1.14	2.71	1.18	0.87*
Coordinative performance linking ability test	number	22,23	2.36	22.01	2.21	0.79*
Muscle-kinesthetic ability test for distance movement	cm	5.31	1.29	5.40	1.26	0.84*

* Value of "r" at a significant level (0.05) = (0.632)

Main Study

Pre-measurements

The researchers conducted pre-measurements on the experimental research sample by applying the skill test battery for coordination abilities as variables for reactive Quickness to Eliite Boxers . during the period from Saturday 8/31/2024 to Thursday 9/12/2024.

Training Program

Rxperimental research sample, focusing on the impact of interactive Quickness training on certain coordination abilities of Eliite Boxers . during the period from Saturday 9/14/2024 to Thursday 12/5/2024.

The program is to assess the impact of reactive Quickness speed training on the effectiveness of counter-attack performance in Eliite Boxers. This will be done through applying the skill test battery for coordination abilities, used as variables for reactive Quickness, for Eliite Boxers

Basis of the training program

Through the reference survey and expert opinion poll to identify the relative importance of the elements of the proposed program and conduct some exploratory studies, the researcher considered the following principles when implementing the program on the research sample:

1. Consideration of training principles when developing the program.
2. Flexibility and adaptability of the program.
3. The program should align with the established objectives.
4. The program should be suitable for the selected sample's age group.

5. The training period should be appropriate for developing advanced planning methods.
6. Consistency in practicing the exercises to achieve the desired benefits.

The researchers conducted a reference survey of both Arab and foreign references and previous studies related to the research variables, as well as seeking the opinions of experts from faculty members and coaches. Based on this, the main aspects of preparing the program were identified, including:

Temporal Distribution of Average Load Intensity for daily, weekly, and monthly program units, and the training program's intensity based on heart rate, as well as the nature of the exercises used. The training program includes the following specifications:

- Program duration: 12 weeks (3 months), as shown in Attachment (6).
- Training program during the special preparation period and before competitions.
- Training unit duration: 120 minutes.
- Training load distribution: 1:1 (one day of training followed by one day of rest).
- The number of training units is divided into 6 weeks with 4 training units, and 6 weeks with 3 training units. Thus, the first week includes 4 training units, followed by the second week with 3 units, and so on until the end of the program.
- Total number of training units: 42 units (Attachment 7).
- Number of training days: 42 days.
- Number of rest days: 41 days.
- Total training load duration: 5040 minutes (84 hours).
- Overall intensity of the program: 83% (High load).
- Training methods: Low and high-intensity intervals, repetitions.
- Warm-up duration: 10%, Main part duration: 85%, Cool-down duration: 5%.

As pointed out by Adel Abdel Basir (1999) , the basic elements of the program include:

- Warm-up Phase: The warm-up aims to prepare the athlete by increasing muscle elasticity, heart rate, and blood circulation. This phase also activates the central nervous system and prepares the body for physical exertion.
- Main Training Phase: This phase focuses on developing physical strength and reactive Quickness speed, helping to enhance the coordination abilities of Eliite Boxers (18–21 years).
- Cool-down Phase: The purpose of this phase is to gradually reduce the body's physical load, lower the heart rate, and assist in the recovery process by returning the athlete to a normal physiological state.

It is clear from Table (6**)** The distribution of the number of training weeks and their respective times according to the type and intensity of the load within the training program is shown. Medium load was used during weeks 1, 3, and 5 with a time of 1440 minutes. High load was applied during weeks 2, 4, 7, 9, and 11 with a time of 2160 minutes. Maximum load was used during weeks 6, 8, 10, and 12 with a time of 1440 minutes. The program's load distribution predominantly favors high load during the special preparation period before the competitions.

Table 6. Distribution of the Number and Duration of Training Weeks According to the Type and Intensity of Load Within the Proposed Training Program Using Reactive Quickness Exercises for Eliite Boxers in the Research Sample

variable	severity of the load%	Pulse rates	Number of weeks	Week numbers	Time of the week (Q)	Total (Q)
Al-Aqsa	(90%:100%)	(188:201) N/Q	4	6, 8, 10, 12	360+360+360+360	BC
High	(75%: 89.5%)	(168.5 : 187.35) n/q	5	2, 4, 7, 9, 11	360+360+480+ 480+480	2160 BC
Average	(50%: 74.5%)	(136: 167,85) N/Q	3	1, 3, 5	480+480+480	1440 AH
Total training load time						5040 BC

Hassan Alawi, Nasr al-Din Radwan (1991) , and Abu al-Ala Abd al-Fattah, Nasr al-Din Radwan (2003) indicated that to standardize training loads using heart rate, the following formula should be applied:

1 Maximum Heart Rate = 220 - Age = ... bpm.
2 Maximum Heart Rate Reserve = Maximum Heart Rate - Resting Heart Rate = ... bpm.
3 To standardize the training loads:
   a. Determine the average resting heart rate for the sample = (72 bpm).
   b. Determine the average chronological age of the sample = (19 years).
   c. Determine the maximum pulse rate = (220) - (19) = (201 bpm).
   d. Pulse reserve = (201) - (72) = (129 bpm).
   e. Target heart rate for training (THR) = Resting heart rate + [Training intensity % x (Maximum heart rate - Resting heart rate) / 100].

Post measurements

The researchers conducted post-training dimensional measurements on the experimental research sample by applying the skill test battery for coordination abilities as variables for reactive Quickness to Eliite Boxers ., during the period from Saturday 12/7/2024 to Saturday 12/21/2024, under the same conditions as the pre-measurements..

Tools and devices

- Restmate devicer (RESTAMETER) To measure the total body length to the nearest (cm).
- Electronic scale to measure weight to the nearest kilogram.
- A stopwatch for measuring time in seconds.
- Polar heart rate monitor (HRM).
- A video camera to record the friendly matches of the research sample.
- Laptop with my program (Filmora9) (MV2 player) to display Matches at speeds Different
- Punching bags (heavy, medium, light).
- Trainer Pads (Training Gloves) Swedish seats, Ajump rope.
- Gloves, wall pillows Hanging and free, indicator, dancing ball, speed ball.

Statistical Analysis

The researcher used the statistical program to process the data statistically. SPSS for the research results and the following processors were used:

- Arithmetic mean.
- Median.
- Standard deviation.
- Skewness.
- Kurtosis.
- Pearson's simple correlation coefficient (r).
- Significance of differences (t-test).
- Improvement rate equation.

Results and Discussion

Based on the research objectives and hypotheses, the researchers presented and discussed the results. The analysis showed that there were statistically significant differences between the pre- and post-measurements of the effect of the proposed training program using interactive Quickness exercises on the special coordination abilities of Eliite Boxers , with the post-measurement results favoring the experimental group**.**

It is clear from Table (7) and Figure (1): There are statistically significant differences between the pre- and post-measurements of the effect of the proposed training program using interactive Quickness exercises on the special coordination abilities of Eliite Boxers aged (18–21) years, with the results favoring the post-measurement. The calculated t-value was greater than the table t-value at the 0.05 significance level.

1. **Quickness Test:**

- Pre-measurement average: (0.31) seconds
- Post-measurement average: (0.24) seconds (in favor of the post-measurement)

2. **Muscle Movement Sensation and Punch Power Test:**
– Pre-measurement average: (2.17) kg
– Post-measurement average: (1.71) kg (in favor of the post-measurement)
3. **Quickness Linking Ability Test for Performance:**
– Pre-measurement average: (29.31) repetitions
– Post-measurement average: (33.58) repetitions (in favor of the post-measurement)
4. **Muscular Kinesthetic Sensation for Moving Distance Test:**
– Pre-measurement average: (3.99) cm
– Post-measurement average: (2.73) cm (in favor of the post-measurement)

Table 7. Significance of the Differences Between the Mean Scores of the Pre- and Post-Measurements Resulting from the Proposed Training Program Using Reactive Quickness Exercises on Certain Specific Coordinative Abilities of Eliite Boxers Aged 18–21 in the Research Sample (n = 10)

Variables for reactive kinetic velocity	Unit	Pre-measurement		Post measurement		T Value
		mean	St.Dv	mean	St.Dv	
Arm Quickness test	Th	0.31	0.3	0.24	0.27	6.926*
Muscle kinesthetic ability test for punch strength	kg	2.17	2.07	1.71	2.02	5.453*
Coordinative performance linking ability test	number	29.31	28.09	33.58	28.32	6.120*
Muscle-kinesthetic ability test for distance movement	cm	3.99	3.42	2.73	3.31	5.921*

*Table t-value at level Moral(0.05) =2,07

The researchers attribute the higher post-test averages to the effect of the proposed training program, which focused on interactive Quickness exercises. The training program was specifically designed for Eliite Boxers aged (18–21) years, with exercises that progressively adapted to the age group. These exercises were intended to enhance special coordination abilities, with varying degrees of improvement. This aligns with findings by McEvoy, K., & Neuten, R. (1991), Zehr, Sale, & Doling (1994), Al-Basiti (1998), who emphasized that sports training is based on a scientific foundation aimed at building a comprehensive athletic structure for athletes. This structure enables athletes to meet the requirements of competitive activity and perform at the highest level, ultimately achieving victory in sports competitions.

Researchers also suggest that the Quickness of the arm is critical in boxing, as the arms are used to perform most boxing skills. These skills are aimed at scoring points by exploiting gaps in the opponent's defenses to launch offensive moves. This is supported by the work of Salah Qadous (1993), Abdel Fattah Khader (1996), and Yahya Al-Hawi (1997), who

highlighted that the use of the front arm in punching is one of the best ways to create openings in the opponent's defense.

Furthermore, the training process aims to provide the athlete with Quickness skills that depend on physical conditions, allowing the athlete to direct and control their movements in a coordinated and purposeful manner. This perspective is supported by Abdul Maqsoud (1997), Abdul Aziz Al-Nimr, Nariman Al-Khatib (2000), Tomasz (2001), Hassan Alawi (2002), and Ahmed Saeed (2008), who emphasized that physical variables can be developed through comprehensive general sports training or by focusing on specific abilities. The sport of boxing requires a combination of technical skills, which are linked to the athlete's physical fitness, Quickness experience, and ability to apply these skills in different competitive situations.

The muscular kinesthetic sensation of punch power is also a key factor in boxing, as discussed by Moran & McGlynn (1990), Muhammad Ismail (1998), Abdul Aziz Al-Nimr, Nariman Al-Khatib (2000), and Speed and strength training are commonly used methods to develop muscle endurance, particularly for activities requiring maximum strength and speed, such as boxing.

Muscular strength is considered one of the most essential physical variables in all sports, especially in contact sports like boxing. It forms the basis for developing and improving other physical variables, as noted by Abdel Maqsoud (1991), Abu Al-Ala Abdel Fattah (1997), Sobhi Hassanein (1998), Muhammad Ismail (1998), and Mufti Ibrahim (2004). These experts agree that muscular strength is fundamental for achieving success in sports championships.

The importance of physical variables for any sporting activity is acknowledged by Atef Maghawry, Abdel Rahman Seif (1990), Yahya Al-Hawi (2000), Ismail Hamed, Abdel Aziz Ghanem, Diaa Al-Azab, Atef Maghawry (2005), Ahmed Saeed, Ahmed Kamal, Ahmed Salem (2020). They emphasize that the importance of each physical variable varies depending on the specific sport. In boxing, high-level athletes rely on a variety of methods to attract, evade, and deceive their opponents. Modern counterattacks, in particular, require a combination of muscle power, flexibility, speed, and quick decision-making.

Adel Abdel Al-Basir (1999), Baha Salam (2000), Abu Al-Ala Abdel Fattah, Sobhi Hassanein (2003), Ahmed Saeed (2004), and Slave Rahman Saif (2010) highlighted that interval training is one of the most effective methods for shaping physical load, as it alternates between work periods and rest periods, enhancing the body's ability to adapt to frequent, short bursts of activity. Interval training, both high and low intensity, is an excellent method for developing physical variables.

In conclusion, the research findings support the first hypothesis, which states that there are statistically significant differences between the pre- and post-measurements of the effect of the proposed training program using interactive Quickness exercises on the special

coordination abilities of Eliite Boxers aged (18–21) years, with the results favoring the post-measurement.

Second Hypothesis: The researchers also found significant differences in improvement rates between the pre- and post-measurement averages, further supporting the positive impact of the proposed training program on the coordination abilities of Eliite Boxers aged (18–21) years.

Table 8. Significance of the differences between the (pre- and post-) measurements of of the effect of the proposed training program using interactive Quickness speed drillsOn some special coordination abilities of Eliite Boxers aged (18:21) years

Variables for reactive kinetic velocity	Unit	Pre-measurement mean	Post measurement mean	Differences in improvement rates%
Arm Quickness test	Th	0.31	0.24	22.58%
Muscle kinesthetic ability test for punch strength	kg	2.17	1.71	21.20%
Coordinative performance linking ability test	number	29.31	33.58	14.57%
Muscle-kinesthetic ability test for distance movement	cm	3.99	2.73	31.58%

It is evident from Table 8 and Figure 2 that there are significant differences in the rates of improvement between the pre- and post-measurement averages regarding the effect of the proposed training program, which utilized interactive Quickness exercises. This effect was observed on the special coordination abilities of Eliite Boxers, in the research sample, with improvements favoring the post-test measurements. The results are as follows:

Arm Quickness : The pre-measurement average was 0.31 seconds, while the post-measurement average was 0.24 seconds, resulting in an improvement of 22.58%, favoring the post-measurement.

Ability to Sense Muscle Movement and Punch Power: The pre-measurement average was 2.17 kg, while the post-measurement average was 1.71 kg, reflecting an improvement of 21.20%, favoring the post-measurement.

Quickness Linking Ability for Performance: The pre-measurement average was 29.31 repetitions, while the post-measurement average was 33.58 repetitions, indicating an improvement of 14.57%, favoring the post-measurement.

Muscular Kinesthetic Sensation for Distance Moved: The pre-measurement average was 3.99 cm, while the post-measurement average was 2.73 cm, showing an improvement of 31.58%, favoring the post-measurement.

The researchers attribute these differences in improvement rates between the pre- and post-test averages to the impact of the proposed training program. This program, which utilized interactive Quickness exercises, positively influenced the special coordination abilities of the Eliite Boxers in the research sample, as evidenced by the post-test results.

The proposed training program, designed with exercises appropriate to the age group of the research sample, gradually contributed to the improvement of certain physical variables among the boxers. Modern sports training science is based on scientific principles that aim to develop comprehensive physical abilities for athletes. It also helps in building the athletic structure of athletes, enabling them to meet the demands of competitive activities. As seen with world champions in various sports, improvements in physical performance are closely related to the athlete's physical level. Consequently, competitive sports have become a space for discovering new methods of development, with cutting-edge scientific techniques employed to outperform competitors and reach the highest levels of achievement and success in sports competitions (Maghawry, Ghanem, Saeed, et al., 2020).

According to Susan Victor (1996), Karim Abu Al-Khair (2009), and Ahmed Saeed (2012), the strength and speed of punches are of paramount importance in boxing. A boxer’s ability to initiate strong and fast punches, execute defensive movements, and launch attacks swiftly are critical factors in achieving victory in the ring. The level of a player’s Quickness depends on the flexibility of the joints and the rate of muscle contraction and expansion. Muscle capacity is one of the most important physical qualities that plays a pivotal role in mastering and developing a player's skillful and tactical performance. It significantly impacts the development of other physical qualities such as speed, endurance, agility, and flexibility. Muscle strength is categorized into three forms: maximum strength, explosive strength, and strength endurance. Muscle capacity involves the ability to generate both power and speed, which is crucial for athletes, particularly those who possess the ability to integrate these features for superior performance (Victor, 1996; Abu Al-Khair, 2009; Saeed, 2012).

Researchers assert that the ability to respond quickly to Quickness helps boxers react swiftly to both expected and unexpected stimuli. This response is crucial for executing tactical and technical actions appropriate for specific Quickness tasks and for quickly responding to the competitor’s movements. Salah Qadous (1993), Abdel Fattah Khader (1996), Arafa Al-Sayed (1997), Steven J. Fleck, William J. Kramer (1997), Esmat Afifi (1998), and ROHLAND (2000) also stress the importance of precision in punching techniques. They suggest that excessive force in punches can negatively impact technical performance. Accurate execution of punches, ensuring they travel the shortest path to the target in the quickest possible time, is vital for increasing muscle strength and required speed (Qadous, 1993; Khader, 1996; Al-Sayed, 1997; Fleck & Kramer, 1997; Afifi, 1998; ROHLAND, 2000).

Furthermore, researchers explain that the boxer's understanding of the force required when performing offensive skills is crucial for maintaining control of the competitive situation.

Bahaa Salama (2000) and Ahmed Saeed (2004) emphasize the significance of interval training. This method consists of alternating periods of work and recovery, proving that the body adapts better to repeated periods of exercise interspersed with rest than continuous exercise. Interval training, especially when focused on anaerobic exercises, enhances muscle performance by inducing chemical changes in the muscles, which enable maximum muscle contraction in the shortest possible time. These changes also encourage the use of different energy systems, including the lactic acid system, which is essential for high-intensity efforts in short durations (Salama, 2000; Saeed, 2004).

As noted by Issam Helmy, Muhammad Bariq (1997), Abu Al-Ala Abdel Fattah, and Subhi Hassanein (2003), the resultant power of a muscle contraction varies with the duration of the contraction. Muscle force peaks at the beginning of the contraction and gradually decreases until it fades completely. The shorter the contraction period, the greater the force produced. Both heart rate and perceived exertion are key indicators of training intensity during lactic endurance training, with the heart rate reaching maximum levels at the end of each repetition (Helmy & Bariq, 1997; Abdel Fattah & Hassanein, 2003).

Heart rate measurements provide valuable insights into a player's training status and the intensity of their efforts. Scott and Edward (1994), Abu Al-Ala Abdel Fattah, and Sobhi Hassanein (2003) suggest that heart rate, measured through palpation near major arteries, is a useful tool to assess the intensity of training loads and recovery periods. A higher heart rate (190 bpm or more) indicates greater training intensity and the engagement of anaerobic energy systems (Scott & Edward, 1994; Abdel Fattah & Hassanein, 2003).

Researchers believe that speed takes precedence over strength, followed by the ability to link Quickness skills such as punching, movement, defense, or deception into fluid combinations. Mohsen Ramadan (1990), Ismail Hamed, Abdel Aziz Ghoneim, Diaa El-Azab, Atef Maghawry (2000), Diaa El-Azab, Mahmoud Hussein (2006), and Ahmed Saeed (2007) emphasize that higher-level boxers rely on linking offensive skills into punch combinations to achieve specific tactical goals. They also integrate counter-offensive punches to execute effective defensive tactics (Ramadan, 1990; Hamed, Ghoneim, El-Azab, Maghawry, 2000; El-Azab & Hussein, 2006; Saeed, 2007).

The boxer's ability to combine and link a series of skills to control the competitive situation varies based on their physical abilities, weight class, and individual differences. As noted by word my friend (1993), Bastawisi Ahmed (1999), Abu Al-Ala Abdel Fattah, and Nasr Radwan (2003), successful trainers plan their training programs to develop the physical variables specific to the sport. The training focuses on the muscle groups engaged in the specialized movements of the sport, ensuring optimal performance (Ahmed, 1999; Abdel Fattah & Radwan, 2003).

Based on the results, the second hypothesis of the research is confirmed, which states that there are significant differences in the rates of improvement between the pre- and post-measurements. The effect of the proposed training program using interactive Quickness speed exercises on the special coordination abilities of Eliite Boxers, ,, favored the post-measurement results.

Conclusion

Based on the research objectives, hypotheses, and the findings, the following conclusions.

1. The proposed training program, which utilizes interactive Quickness drills, has a positive effect on the special coordination abilities of Eliite Boxers , within the research sample Statistically significant differences between the pre- and post-test measurements of the effect of the proposed training program, with improvements in the special coordination abilities of the Eliite Boxers, favoring the post-test results.
2. The proposed training program, which utilizes interactive Quickness drills, has a significant impact on improving the special coordination abilities of Eliite Boxers , within the research sample. The improvement rates between the pre- and post-test measurements showed significant differences, with the post-test measurements reflecting greater improvements.

Recommendations

Based on the research objectives, hypotheses, and the results obtained, the following recommendations are made:

1. Trainer Utilization of the Proposed Program: It is crucial for trainers to incorporate the proposed training program, utilizing interactive Quickness drills, as it has proven to have a positive effect on enhancing the special coordination abilities of Eliite Boxers ,.
2. Promotion of Interval and Repetitive Training Methods: Trainers should emphasize the use of interval and repetitive training methods, ensuring individualized training plans for each boxer. This approach is essential for improving their physical performance in a coordinated manner.
3. Regulation of Training Loads: Trainers should regulate training loads by conducting pre-training measurements to assess the players' physical condition. This will guide the design of appropriate training programs, allowing for more effective load management within sports teams.
4. Application to Other Age Groups: The proposed training program should be applied to different age groups within boxing to determine its effectiveness across various developmental stages.

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