The Effect of Developing Attack-Footwork Synchronization on Performance Effectiveness in Sanda Kung Fu Matches

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Abstract

The research aims to develop attack synchronization with foot movements and to determine its impact on performance effectiveness in Sanda Kung Fu. The researchers used an experimental approach, as it was appropriate for the nature and procedures of the research, with a single-group experimental design, using pre- and post-test measurements. The research population included 52 Sanda players aged 14-18 in the Minya region, registered with the Egyptian Kung Fu Federation for the 2023/2024 sports season. The research population was intentionally selected, and from this population, the research sample was intentionally selected. It included (10) players from the Minya Youth Team, representing (19.2%) of the total research population. (12) players were selected from within the research population and from outside the research sample, representing (23.1%). The most important results were the presence of statistically significant differences between the average of the pre- and post-measurements of the main research sample in the effectiveness of offensive performance was (32.79%), which indicated the superiority of the post-measurement. There were statistically significant differences between the average of the pre- and post-measurements of the main research sample in the effectiveness of defensive performance, with a percentage of (40.39%), which indicated the superiority of the post-measurement. There were statistically significant differences between the average of the pre- and post-measurements of the main research sample in the effectiveness of tactical performance, with a percentage of (36.59%), which indicated the superiority of the post-measurement. There were statistically significant differences between the values of the arithmetic indicators (the amount of effect size) between the average of the pre- and post-measurements of the main research sample in favor of the post-measurement in the variables under study. In light of the procedures conducted in this research, and based on the results and conclusions reached by the researchers, the following recommendations can be presented (benefiting from the training program to improve offensive synchronization - benefiting from the training program to enhance the tactical variables "attack, defense, counterattack" for Sanda players - applying research and studies similar to this research at age levels Other (juniors and generalists) - using advanced techniques such as 3D video analysis to measure synchronization with greater accuracy.

Keywords: Attack synchronization - Foot movements - Performance effectiveness - Sanda Kung Fu

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Introduction and Research Problem:

Athletic training is an organized process aimed at developing athletes' physical abilities, technical skills, and mental capacities to enhance their performance and reach elite competitive levels. It relies on scientific foundations including physiology, sports psychology, nutrition, and strategic planning. Training programs are designed with specific objectives and structured into phases: General Preparation, Specific Preparation, Pre-Competition, Competition, and Recovery. Progress is monitored, and programs are adjusted as needed to ensure desired outcomes.

Sanda Kung Fu is a modern competitive sport derived from traditional martial arts. It employs striking (punches/kicks), throwing, and defensive techniques as primary methods of unarmed combat. International Sanda competitions are weight-categorized into youth divisions: 48kg, 52kg, 56kg, 60kg, 65kg, 70kg, 75kg, 80kg, 85kg, and 90kg (24).

Sanda's attacking techniques feature two movement patterns: linear and circular. These include:

- **Boxing techniques**: Straight punches, hooks, uppercuts, backfists.
- **Kicking techniques**: Front kicks, roundhouse kicks, sidekicks, spinning back kicks (high/low).
- **Wrestling techniques**: Focused on rapid takedowns and destabilization without prolonged grappling.
- **Defensive methods**: Contact defense (blocking/parrying) and non-contact defense (evasion) (32:5).

Footwork—the movement of the body forward, backward, and laterally—is fundamental in Sanda. Agile footwork adjusts the center of gravity, maintains balance, and positions athletes optimally for attack/defense. Mastering footwork (e.g., sliding steps, skipping steps) allows controlling distance, executing techniques, and disrupting opponents' intentions (5:22).

Sanda training integrates offensive/defensive movements (punches, kicks, throws) with footwork synchronization. This synergy enables fluid application of techniques in combat. Attack synchronization—the art of blending power, speed, and tactical intelligence—creates unpredictable, decisive assaults. Though requiring years of disciplined training, it exemplifies a fighter's ingenuity and is a hallmark of Sanda (29:46).

Fundamentals of Attack Synchronization in Sanda:

1. **Hybrid Range Integration**:
    - Combining short-range strikes (e.g., lead-hand straight punch) with mid/long-range techniques (e.g., rear-leg side kick) followed by a takedown.
2. **Sequential Attack Chains**:
    - Rapid, uninterrupted combinations (e.g., hook punch → roundhouse kick → takedown) to disrupt opponent recovery.
3. **Opportunistic Exploitation**:
    - Capitalizing on opponent imbalances (e.g., evading a kick → countering with punch + low kick → takedown).
4. **Strategic Footwork**:
    - Using steps (advancing, retreating, pivoting) to control distance/angles (e.g., lateral movement → off-angle attack) (31).

Motor synchronization is vital for athletic performance, enhancing harmony between movements for optimal execution. Kung Fu demands high-precision, synchronized techniques, directly improving players' offensive/defensive coordination (33:14).

Previous Research:

Foreign studies addressing this topic include Lee & Hwang (2006) (27), Sarma & Dhar (2018) (31), Estevan et al. (2011) (22), Shouzheng (2006) (33), Tsai et al. (2007) (34), Wasik (2011) (35), Hong et al. (2021) (21), Han et al. (2021) (30), Lei & Lv (2022) (38). Arabic studies include: Alaa Hamdi Azmi (2014) (9), Omar Hashim Abdel Aziz (2020) (11), Issmat Mohamed Said et al. (2023) (8), Mohamed Labeeb Abdel Aziz (2012) (15), Ahmed Khamis Abdel Hameed (2014) (1). Key findings from these studies indicate:

- **Attack synchronization relies on neuromuscular coordination** to activate different muscles with precise timing.
- **Experienced players develop muscle memory**, enabling smoother execution of synchronized attacks. These attacks utilize kinetic energy from the initial movement (e.g., a punch) to amplify subsequent techniques (e.g., a kick), enhancing overall striking power.
- **Players skilled in synchronized attacks demonstrate**:

  - 40% faster visual information processing
  - Quicker tactical decision-making
  - Enhanced ability to predict opponents' movements and exploit weaknesses

- **Compound attacks increase scoring probability by 40%** compared to single techniques.
- **Synchronized attacks disrupt opponents** through tactical misdirection (e.g., feints followed by strikes from unexpected angles). Repeated training enhances neuromuscular efficiency, making execution automatic during competition.
- **Force distribution across muscle groups** reduces fatigue compared to isolated attacks. Training attack chains improves eye-hand coordination by 25%.

Through the work of a researcher in the field of refereeing and training Sanda, he noticed shortcomings in the construction and finishing of attacks due to changing playing situations, as well as shortcomings in player training, similar to the changing skills of the match, as in international competitions, and the tendency of more players to use the simple face in the game, which allows for opportunities to score points. They conducted a live analysis of the World Championship and identified some of the factors that have a direct impact. The two researchers arrived at a program that represents the reality of competitors and enables offensive tactics to cooperate, especially for athletes. This was achieved through experience in a prominent field and teaching. They came up with the idea for this research, titled "Developing Synchronized Communication with Footwork to Effective Performance in Kung Fu Sanda." This program involved creating tactics for both active and counter-offensive elements, using Sanda techniques such as the realer, punch, and throw, and integrating them with footwork. The goal is to develop athletes' comprehensive skills, from responding to changing directions to changing directions, within the context of tactical methods for dealing with them, and the skill performance of youth Sanda players.

The two researchers believe that synchronization is of great importance in Sanda competitions, by increasing the chances of scoring against competitors. Synchronization gives its strength to the difficulty of it, in addition to confusing an opponent, as it succeeds in penetrating an opponent's anticipation between different techniques (such as a strong strike and a lowering partner). This is achieved through

contracting with combat, by transferring partners from different teams into a comprehensive strategy and integrating it with Futuna participation.

Synchronization between 6 Fighting movements is an important element of effectiveness, as they are limited to variety, strength, speed, and accuracy, and this research aims to explore how to develop this synchronization to achieve it by players in Sanda.

Significance of the Research:

1 .This research represents a new scientific contribution to the field of Sanda training by utilizing synchronized attack with foot movements to enhance the skill and tactical performance of Sanda kung fu players.

2. The results of this research may contribute to the development of Sanda kung fu training programs in clubs, youth centers, gyms, and sports science colleges, with the aim of improving the performance of players.

Research Aim:

"To develop attack-footwork synchronization and evaluate its impact on performance effectiveness in Sanda Kung Fu."

Research Hypotheses:

Considering the research objective, the researchers formulated the following hypotheses:

1 .There are statistically significant differences between the pre- and post-test averages of the primary research sample regarding the performance effectiveness of Kung Fu Sanda players, using the measurement method.

2 .There are statistically significant differences between the pre- and post-test averages of the primary research sample regarding the defensive effectiveness of Kung Fu Sanda players, using the measurement method.

3 .There are statistically significant differences between the pre- and post-test averages of the primary research sample regarding the performance effectiveness of Kung Fu Sanda players, using the measurement method.

4. There are statistically significant differences between the statistical values (effect size) between the pre- and post-test averages of the primary research sample and the measurement methods in the research.

Operational Definitions:

Synchronized Attack

It means coordination and cooperation with different techniques (punches, kicks, throws) in part, and partnership cooperation to enhance the effectiveness and break the opponent's defense, with precision in timing, sharing distance, and tactical intelligence to

achieve quick and surprising results. (Operational definition)

Performance Effectiveness

It refers to a player's ability to score the greatest possible number of points during a match by executing a variety of successful offensive, counter-offensive, and defensive technical moves without diminishing their physical, functional, and skill capabilities, while capitalizing on every mistake made by their opponent and turning it to their advantage (18:27).

Executing moves and tactics with precision, speed, and perfect timing, achieving superiority over their opponent and minimizing wasted effort. (Operational definition)

Research Methodology:

The nature of the problem, the objectives of the research, and its hypotheses determined the appropriate method. The researchers used the experimental method, as it was appropriate for the nature and procedures of the research, using a single-group experimental design, using pre- and post-test measurements.

Research Population:

The research population included 52 young Sanda players (14-18 years old) in the Minya region, registered with the Egyptian Wushu Kung Fu Federation for the 2023/2024 sports season. The research population was intentionally selected.

Research Sample:

From the research population, the research sample was intentionally selected, comprising (10) players from the Minya Youth National Team, representing (19.2%) of the total research population. (12) players were selected from within the research population and from outside the research sample, representing (23.1%), for the exploratory study.

Sample Selection Criteria:

- Players must be registered with the Egyptian Wushu Kung Fu Federation.
- Players must be between 14-18 years old.
- Players must agree to participate in the research group.
- Players must attend training sessions and implement the program.
- Players must have at least 5 years of training.
- Players must hold a red belt.

The normality of the frequency distribution of the research sample:

The researchers verified the normality of the frequency distribution of the research sample members considering the growth variables, specific physical variables, and the effectiveness of performance (offensive, defensive, tactical) before beginning the implementation of the proposed program. This was done to ensure the normality of the distribution of the research sample members. The following table illustrates this:

Table (1) Mean, median, standard deviation, skewness coefficient, and kurtosis coefficient for the primary and exploratory research sample in terms of the growth variables, specific physical variables, and skill variables under study (n = 22)

Variable	Unit	Mean	SE Mean	Median	Std. Dev.	Skewness	Kurtosis
Height	cm	164.55	0.53	164.50	2.46	0.06	-1.10
Weight	kg	59.77	0.56	59.50	2.62	0.31	-0.78
Chronological Age	year	16.63	0.20	16.95	0.94	-1.02	0.94
Training Age	year	4.06	0.09	4.05	0.43	0.10	0.63
Right arm measuring ruler	cm	22.50	0.48	22.00	2.26	0.66	-0.31
left arm measuring ruler	cm	22.09	0.55	22.00	2.60	0.10	1.03
Right leg measuring ruler	cm	22.91	0.64	23.00	3.02	-0.09	2.63
Left leg measuring ruler	cm	22.82	0.56	23.00	2.65	-0.21	-0.08
Walking on a balance beam	sec	40.00	4.64	23.00	21.75	2.35	-2.00
numbered circles	sec	19.82	0.38	20.00	1.76	-0.31	-0.13
Attack effectiveness	%	34.24	3.30	22.50	15.49	2.27	-2.04
Defense effectiveness	%	40.25	2.41	38.50	11.31	0.46	-1.15
Effectiveness of plans	%	28.70	2.35	21.00	11.02	2.09	-2.02

The results of Table (1) show that the value of the flattening tradeoff appears between (+3, -3), which is less than twice the elastic elasticity of the flattening factor. The value of the flattening resistance also appeared between (-2.04: 2.63), which is less than the contraction of the elastic elasticity of the flattening factor. This indicates a moderate sample distribution in terms of growth differences and variables related to efficiency and effectiveness of experimental performance, which indicates their normal distribution.

Data Collection Tools: The researchers used the following to track the data for the research:

References and Scientific Studies:

The researchers reviewed specialized scientific references in the field of sports training in general and for home training in particular, as well as previous studies (1), (2), (3), (5), (19), (6), (15), (11), (12), (17), (13), (14) of these studies and reviews in determining specifications, determining the design, and designing the training design.

Second: Scientific equipment and tools:

1 .A RestaMeter for measuring height.
2 .A medical scale for measuring weight in kilograms.
3 .A tape measure.
4 .A laptop.
5 .A video camera.
6 .A whistle.
7 .Sanda ounces.
8 .Cones.
9 .Medicine balls.
10 .A stopwatch.
11 .Hoops.
12 .Swedish benches.
13. An 8x8 Sanda mat.

The devices used were calibrated against similar devices to ensure their validity. Measurements were taken on scientific devices like those used in the research, and the results obtained were compared to excluding any devices that provided results that did not conform to scientific standards.

Third: Data Collection Tools:

1 .Player data registration form (name, age, height, weight, training age, belt level, and championships won) - Appendix.(١)

2 .Expert opinion survey questionnaire to determine the content of the training program - Appendix.(٢)

3 .Kung Fu Sanda players' physical abilities registration form - Appendix.(٦)

4 .Performance effectiveness evaluation form - Appendix.(٦)

The researcher selected eleven experts in the field of Kung Fu training - faculty members in the wrestling department - and briefed them on the importance and objectives of the research and provided them with the necessary information to respond to the survey questionnaires. These experts were selected based on the following criteria:

- At least 10 years of experience in Kung Fu training.
- At least 10 years of experience in teaching and training wrestling.

Fourth: Physical and skill tests under consideration:

A- Physical tests: Based on an expert opinion poll, the following were identified:

- Numbered circuit test
- Balance beam walking test
- Hand ruler test
- Graduated foot ruler test Appendix (6)

B- Skill and tactical tests:

Performance effectiveness is measured through:

1 .Quantitative measures:

a. Number of points scored in a competition.

b. Ratio of successful to unsuccessful attacks.

c. Reaction time (in milliseconds).

2 .Qualitative measures:

a. Coach's assessment of the fluidity and mastery of movements.

b. Extent to which the established tactical plan is achieved.

The level of performance effectiveness of the research sample (youth 14:18) was evaluated by a committee of three referees from the Egyptian Kung Fu Federation, who were assisted in recording the overall performance results for each player through his participation in three matches with three players in the same age group and weight category and with different

bodies. The match time was two minutes, as the players' performance was recorded by a video camera, and the performance was evaluated through the performance effectiveness evaluation form that was previously presented to the experts, as the recorded tapes were transcribed using the remote control method, slow playback, stopping and replaying using a recording form prepared for this purpose, Appendix (3).

1 .The effectiveness of offensive performance is calculated using the following equation: (10)

$$\frac{\text{Number of successful offensive plays by the player as a whole}}{\text{Number of offensive performances executed by the player as a whole}} \times 100$$

2. The effectiveness of defensive performance is calculated using the following equation: (10)

$$\frac{\text{The number of successful offensive plays by the opponent as a whole - 100}}{\text{The number of offensive plays executed by the opponent as a whole}} \times 100$$

3. The effectiveness of the planning activity is calculated using the following equation: (10)

$$\frac{\text{Effective offensive performance + Effective defensive performance}}{2}$$

Scientific parameters for the tests under study:

Triple Comparison Validity:

The scales were applied to a pilot sample of (12) players outside the primary sample. Cross-sectional validity was calculated by arranging the players' scores in ascending order to determine the lower and upper groups. 27% were then selected from the upper group, and 27% from the lower group. The lower group included (4) players, and the upper group included (4) players. The averages of the two groups were compared, as illustrated in the following table.

First Exploratory Study:

The researchers conducted the survey study on a 12-player youth sample from Sunday, May 26, 2024, to Thursday, May 30, 2024. The study aimed to:

- Ensure the safety and suitability of the tools and equipment used.
- Verify the validity and reliability of the tests (scientific criteria).
- Identify the difficulties the researchers might encounter when conducting physical and skill tests, how to overcome them, and arrange the sequence of their application.

Table (2) Discrimination validity

coefficient between the lower and upper groups in the research variables

Variable	Unit	Groups	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Significance (p-value)
[Right arm measuring ruler	cm	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.34**	**0.02**
		Lower Group	**6.50**	**26.00**				
left arm measuring ruler	**cm**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.38**	**0.02**
		Lower Group	**6.50**	**26.00**				
Right leg measuring ruler	**cm**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.43**	**0.02**
		Lower Group	**6.50**	**26.00**				
Left leg measuring ruler	**cm**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.48**	**0.01**
		Lower Group	**6.50**	**26.00**				
Walking on a balance beam	**sec**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.32**	**0.02**
		Lower Group	**6.50**	**26.00**				
Numbered Circles	**sec**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.38**	**0.02**
		Lower Group	**6.50**	**26.00**				
Attack Effectiveness	**%**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.31**	**0.02**
		Lower Group	**6.50**	**26.00**				
Defense Effectiveness	**%**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.31**	**0.02**
		Lower Group	**6.50**	**26.00**				
Effectiveness of plans	**%**	**Lower Group**	**2.50**	**10.00**	**0.00**	**10.00**	**2.31**	**0.02**
		Lower Group	**6.50**	**26.00**				

The value of (z) at a significant level of (0.05) = 1.96

Table (2) shows that there are statistically significant differences between the upper group and the lower group in the research variables in favor of the upper group, which indicates the validity of the variables and their ability to distinguish between different groups.

Reliability Calculation:

The reliability coefficient between the players' scores on the variables under study was determined by using the test-and-retest method on a survey sample of (12) players. The following table shows the correlation coefficients between the first and second applications.

Table (3) Correlation Coefficient between the First and Second Applications for Research Variables

Variable	Unit	Implementation		re-implementation		value of (r)	The significance
		Median	SE Mean	Median	SE Mean		
Right arm measuring ruler	cm	21.58	1.88	21.00	1.86	٠,٧٢٨	٠,٠٠١
left arm measuring ruler	cm	22.67	2.50	21.92	2.07	٠,٨٤٠	٠,٠٠١
Right leg measuring ruler	cm	20.92	1.56	20.75	1.22	٠,٨٩٧	٠,٠٠١
Left leg measuring ruler	cm	20.58	1.38	20.42	1.16	٠,٩١١	٠,٠٠١
Walking on a balance beam	sec	48.75	7.78	48.33	7.61	٠,٩٩٥	٠,٠٠١
numbered circles	sec	19.00	1.21	18.83	1.11	٠,٩٤٧	٠,٠٠١
Attack effectiveness	%	54.32	5.09	54.30	5.09	٠,٩٨٤	٠,٠٠١
Defense effectiveness	%	43.11	14.69	43.01	14.37	٠,٩٩٩	٠,٠٠١
Effectiveness of plans	%	48.72	9.70	48.65	9.49	٠,٩٩٧	٠,٠٠١

Table (r) value at (10) degrees of freedom and (0.05) significance level = 0.576

Table (3) shows that the values of Pearson's correlation coefficient indicating the values of the reliability coefficient for the specific physical tests and the effectiveness of performance (offensive, defensive, tactical) under study ranged between (0.728) and (0.999), all of which are greater than the table (r) value of (0.579) at a statistical significance level of (0.05), indicating the high reliability of the physical and skill tests under study.

The Second Exploratory Study:

This study was conducted from Sunday, June 2, 2024, to Thursday, June 6, 2024. The aim was to identify any difficulties the researchers might encounter during implementation and work to resolve them before beginning the main experiment. The study also aimed to verify the implementation of the training program using "Football Synchronization Drills." The first three units were tested on a sample of youth Kung Fu Sanda players. The study results indicated:

-The researchers verified the research sample's understanding of how to perform the various exercises (physical, skill, and tactical).

-The assistants' understanding and comprehension of their various duties and tasks.

Research Implementation Steps:

Pre-test:

The researchers conducted a pre-test on the experimental group from Sunday, June 9, 2024, to Monday, June 10, 2024. The researchers considered the results obtained as a pre-test for the physical and skill variables of the research.

Programming Implementation:

Following the completion of the pre-test, the researchers implemented the training program using "Footwork Synchronization Drills" on the experimental group from Sunday, June 16, 2024, to Thursday, August 5, 2024. The program consisted of (36) thirty-six units over (12) twelve weeks, with (3) units per week, on Sundays, Tuesdays, and Thursdays. The training program included the following:

-Technique Integration: Combining punches (such as the straight punch or hook) with kicks (such as the side kick or front kick) or throws (such as catching and taking down an opponent). Example: a straight punch, a side kick, or a quick throw.

-Precise Timing: Executing attacks at a moment when the opponent is unable to anticipate or respond, such as an attack after dodging a blow or when there is a gap in the opponent's defense.

-Distance Control: Using movements to strategically approach or move away to direct successive attacks.

-Counterattack: Exploiting an opponent's attack to launch a simultaneous counterattack, such as dodging a kick and then responding with a quick punch and a throw.

-Mental tactics: Reading an opponent's movements, anticipating their reactions, and executing simultaneous attacks to confuse them.

The load levels were distributed over the training weeks as follows:

-Determining the number of weeks for the preparation phases:

1 .General preparation (3) weeks.

2 .Specific preparation (6) weeks.

3 .Pre-competition (3) weeks.

-Determining the number of units per week: (3) units per week (Sunday, Tuesday, and Thursday).

-Determining the load cycle: Interval = (2:1), Weekly.(٢:١) =

-Determining the load intensity: Based on the players' performance levels, the load intensity was determined as follows:

- Maximum load = 90%: 100% of the maximum load the player can withstand.
- High load = 75%: Less than 90% of the maximum load the player can withstand.
- Average load = 60%: less than 75% of the maximum load the player can tolerate.

-Determine the duration of the training unit: Based on references and in line with expert opinions, the duration was (90) minutes.

-Determine the duration of the training program and divide it by settings:

٢٧٠ =x 12 weeks = 3240 minutes

Total program time = 3240 minutes divided by settings as follows:

- Physical preparation percentage (30%) = 972 minutes.
- Skill preparation percentage (40%) = 1296 minutes.
- Tactical preparation percentage (30%) = 972 minutes.

Post-test:

The researchers conducted the post-test after completing the training program for footwork synchronization exercises on the experimental group, during the period from Friday, August 6, 2024, to Saturday, August 7, 2024. All measurements were conducted in the same manner as in the pre-test.

Statistical Methods Used: The researchers used the following statistical methods:

- arithmetic mean, median, standard deviation, skewness coefficient, kurtosis coefficient, one-tiredness test, correlation coefficient, non-barometric Mann–Whitney test, and effect size coefficient. The effect size values are:

small 0.10-0.30, medium >0.30-0.50, large < or = 0.50.

- The researchers settled on a significant level of 0.05. They also used the Statistical Package for the Social Sciences program to calculate the statistical coefficients.

Discussion of the hypotheses:

Table (4) Significance of differences between the pre- and post-tests in performance effectiveness (offensive, defensive, tactical) (n = 10)

Variable	Unit	Pre-measurement		Post-measurement		Mean Rank		Sum of Ranks		Z	Significance	Effect size
		Median	SE Mean	Median	SE Mean	positive	Negative	positive	negative			
Attack Effectiveness	%	50.62	3.23	83.41	3.82	0.00	5.50	0.00	55.00	2.803	0.05	0.89
Defense effectiveness	%	30.05	3.55	70.44	3.08	0.00	5.50	0.00	55.00	2.807	0.05	0.89
Effectiveness of plans	%	40.34	2.43	76.93	3.28	0.00	5.50	0.00	55.00	2.803	0.05	0.89

The z-value at 0.05 level = 1.645

Table (4) shows that there are statistically significant differences between the pre- and post-tests in the effectiveness of the performance (offensive, defensive, and tactical) under study, in favor of the post-test. The calculated z-value is greater than its tabular value at a significance level of 0.05, and it also showed a large effect size of 0.89.

The researcher attributes the statistically significant improvement in offensive performance to improved synchronization between foot movements and attack timing, which allowed Sanda players to execute strikes, kicks, and throws with greater accuracy and more effective power. Foot movements allowed the player to remain within the offensive or defensive range as needed and helped maintain stability during attack or defense. They also enabled the player to move quickly and change directions easily, creating opportunities for counterattacks by changing angles and positions.

The training program improved coordination between movements and attacks, enhancing communication between the nervous and muscular systems. This led to improved performance efficiency and reduced the time required for decision-making, as it reduced the transition time between the planning and execution phases.

Improved defensive performance was also linked to increased flexibility in footwork, enabling players to avoid or repel attacks more effectively. Synchronization training improved dynamic balance, a crucial factor in successful defense. Synchronization between offense and defense is not separate but relies on the same basic motor skills, supporting the idea of integrated training.

Improved tactical performance reflects players' ability to implement complex strategies (such as counterattacks or feints) more smoothly. According to the "thinking motor" model, synchronization improves decision-making under pressure. Training in synchronization is not limited to individual skills but also enhances the player's tactical intelligence.

The high effect size values also indicate that the improvement in these variables was not only statistically significant but also has practical relevance on the training field.

The proposed training program resulted in the following:

- Achieving dynamic balance, as proficient footwork (such as advancing, retreating, or rotating) helped maintain balance during attacks and defenses, reducing the chances of falling or losing control.
- Increasing attack power, as footwork generates momentum from the ground that is transmitted through the body to the point of attack (such as a punch or kick).
- Improving timing and distance, as quick and precise footwork allows the player to approach or move away from an opponent at the appropriate time, increasing the chances of successfully executing attacks, such as using a quick step to enter

attacking range and then executing a quick kick.

- Tactical flexibility, as synchronization between the feet and attacks helps the player seamlessly switch between attack and defense, such as avoiding an opponent's attack and then responding with a quick throw. This increased tactical performance effectiveness by 36.59%.
- Increasing attack success rate, as the effectiveness of offensive performance increased by 32.79%. Reducing energy consumption: Coordinated movements reduce excess muscle effort, increasing the player's endurance during rounds.
- Enhancing defensive ability: Quick footwork allows players to effectively exit their opponent's attack range, increasing defensive performance by 40.39%.
- Psychological impact: A player who can synchronize their attack with their feet demonstrates greater confidence, which weakens their opponent's morale.

The research results are consistent with several Arab studies that have used offensive techniques in combat sports. Training using offensive techniques has a positive impact on skill performance in these sports. These results are consistent with the findings of Ahmed Khamis Abdel Hamid's (2014) (1) study, which indicated that the proposed training program using an offensive construction strategy within the structure of the training unit had a positive impact on the effectiveness of tactical activity indicators in kumite.

They also align with the results of Alaa Hamdi Azzam's (2014) (9) study, which indicated that the use of offensive movement phrases led to the development of some of the attack indicators under study in actual kumite competitions.

This is consistent with the results of Mohamed Labib Abdel Aziz's (2012) (15) study, which indicated differences between international and local level players in the sport of total combat (kumite), favoring international level players in most aspects of offensive activity, such as timing of attacks, skillful technique, number of steps to prepare for an attack, and effectiveness of offensive activity during a match. Thus, the research hypotheses were confirmed. This also agrees with the results of the study by Esmat Mohamed Saeed, Abdel Latif Sayed Abdel Latif, and Mervat Fathy El Sayed (2013) (8), which indicated that offensive formations have a positive impact on the specific skill variables of Sanda players and played a role in positively influencing all skill variables under study (kicking, punching, and throwing). They also played a role in positively influencing all tactical variables under study (attack, defense, and counterattack).

The results of this research are also consistent with a group of foreign studies such as “Lee, C. L., and Hwang, C” (2006) (27), “Sarma, S. & Dhar, K” (2018) (31), “C., Estevan, I., & Vieten, M” (2011) (22), “Shouzheng, F” (2006) (33), “Tsai, Y. J., Huang, C. F. & Gu, G. H” (2007) (34), “Wasik, J” (2011) (35), “C. Hong, K. Kim, and J. Park” (2021) (21), “Q. Han, M. theeeboom, and D. Zhu” (2021) (30), “Zhe Lei and Wu Lv” (2022) (38), which indicated that attack synchronization depends on the coordination between the nervous system Muscular to activate different muscles at precise timing, combination attacks (punch + kick + throw) increase the chances of scoring points by 40% compared to single attacks, simultaneous attacks confuse the opponent by directing his attention to a fake attack, then executing a real attack from another angle, players anticipate the opponent's moves and design simultaneous attacks to exploit weaknesses.

In this regard, Risan Khuraibat Majeed (2011) (7) points out that motor synchronization plays an important role in improving the harmony between different movements, which helps in achieving balanced and accurate performance. Motor synchronization is one of the basic factors that directly affect the improvement of athletic performance. (7: 252).

Thus, the research hypotheses are met, which state that:

- There are statistically significant differences between the averages of the pre- and post-tests of the primary research sample regarding the effectiveness of the offensive performance of Kung Fu Sanda players, in favor of the post-test.

- There are statistically significant differences between the averages of the pre- and post-tests of the primary research sample regarding the effectiveness of the defensive performance of Kung Fu Sanda players, in favor of the post-test.

- There are statistically significant differences between the averages of the pre- and post-tests of the primary research sample regarding the effectiveness of the tactical performance of Kung Fu Sanda players, in favor of the post-test.

- There are statistically significant differences between the values of the arithmetic indicators (effect size) between the averages of the pre- and post-tests of the primary research sample, in favor of the post-test, regarding the variables under study.

Conclusions:

Considering the research results, the researchers reached the following conclusions:

1. There were statistically significant differences between the averages of the pre- and post-tests for the primary research sample in offensive performance effectiveness, at a rate of (32.79%), indicating the superiority of the post-test.

2. There were statistically significant differences between the averages of the pre- and post-tests for the primary research sample in defensive performance effectiveness, at a rate of (40.39%), indicating the superiority of the post-test.

3. There were statistically significant differences between the averages of the pre- and post-tests for the primary research sample in tactical performance effectiveness, at a rate of (36.59%), indicating the superiority of the post-test.

4. There were statistically significant differences between the values of the arithmetic indicators (effect size) between the averages of the pre- and post-tests for the primary research sample, in favor of the post-test, regarding the variables under investigation.

Recommendations:

Considering the procedures conducted in this research, and based on the results and conclusions reached by the researchers, the following recommendations can be made:

1 .Utilize the training program to improve offensive synchronization, considering the following:

-Focus on breathing, as controlling breathing ensures energy stability during an attack.

-Avoid rushing by starting with simple attack sequences and then progressing to complex attacks.

-Monitor your opponent by exploiting their weaknesses (such as delayed response or leaning to one side).

-Mental flexibility, through the ability to immediately change tactics if the initial attack fails.

-Avoid losing balance if footwork does not support the attack.

-Avoid over-attacking, as this may expose the player to a counterattack.

2 .Utilize the training program to enhance tactical variables (attack, defense, counterattack) for Sanda players.

3. Apply similar research and studies to other age groups (juniors and general).

4.Using advanced technologies such as 3D video analysis to measure synchronization with higher accuracy.

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