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The Effect of Special Exercises on Developing Speed-Strength and Straight Punches for Junior Boxers

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ORIGINAL STUDY

The Effect of Special Exercises on Developing Speed-Strength and Straight Punches for Junior Boxers

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Abstract

The study aimed to prepare special exercises to develop speed-strength and straight punches for the research sample members. The research problem emerged as the researcher, being a boxing coach, observed a weakness in some physical abilities, including speed-strength, and inconsistency in the skill performance level (straight punches). Accordingly, the researcher prepared special exercises aimed at developing some physical abilities., including speed-strength and the performance of straight punches for juniors, and to contribute to improving and developing the players' level, finding positive solutions, and understanding their impact on performance. The researcher used the experimental method. The sample consisted of junior boxers aged (14–16 years), totalling (14 players). The sample was divided into two equal groups: control and experimental. The researcher hypothesized statistically significant differences between the pre-test and post-test in straight punches for the juniors and for both For both the first and second groups to which the training program was applied and in favor of the second group. The researcher concluded that variety in performance plays a positive role in developing speed-strength and the performance of straight punches (right and left). The researcher recommended paying attention to preparing diverse training programmes based on scientific foundations targeting physical and motor abilities, and introducing modern means and devices in educational units to help achieve the best performance.

Keywords: Special exercises, Speed-strength, Straight punches

1. Introduction

1.1. Introduction and research importance

Science has a significant impact on the progress and advancement of nations in all fields and sciences of life, such as medical, engineering, and agricultural sciences, especially sports sciences, which have benefited from this enrichment and scientific progress thanks to science, its technologies, and the application of various types of technology in scientific applications of scientific knowledge and associated devices and tools with direct and important benefits in the life of the individual in general, and the athlete in their field of specialisation in particular, to reach the true goal of achieving accomplishment.

Boxing is one of the individual sports that requires continuous development and effort from both the coach and the player, whether in terms of physical aspects, represented by developing basic physical abilities like muscular strength, speed, and endurance, or skill aspects, represented by the level of performing sports skills (technique). Physical abilities and technique are two elements for developing the level of various sports activities, in addition to other elements such as psychological and planning preparation as important elements for elevating the sporting level and scientific curriculum based on scientific foundations to achieve positive results in all national, continental, and other forums, to bring the player to the desired level and achieve optimal accomplishment (Turner, 2021).

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Reaching the best skill performance and mastering skills in sports depends on several components, including the educational process and its training, diagnosing the requirements of skill performance and the errors made by the student, in addition to studying physical abilities according to the requirements of the skill, which help in mastering the skill and performing it with high accuracy (Loturco et al., 2018).

The ambition of those working in the sports field, whether (administrators, coaches, players), is to reach high levels and achieve accomplishment. The breaking of records in competitions and the advancement of levels are clear evidence of this progress. Undoubtedly, the importance of sports training based on scientific techniques and theories appears for all games and sports activities, and the role of technology in developing the training process and reaching the ideal goal.

The importance of the research emerged in preparing special exercises that serve the training process, develop speed-strength, target the research variables, and work on improving the kinematic pathways of boxers and controlling performance.

1.2. Research problem

Through the researcher's review of references and scientific sources in the field of boxing training, and being a boxing coach, he observed a weakness in some physical abilities, including speed-strength, and inconsistency in the level of skill performance (straight punches). Given the specificity required by boxing in the type of exercises for both physical abilities and skill performance, and the types of training methods, the researcher decided to prepare special exercises to develop some physical abilities, including speed-strength and the performance of straight punches for juniors, and to contribute to improving and developing the players' level, finding positive solutions, and understanding their impact on performance to achieve the best sporting accomplishments.

1.3. Aims of the study

1. Developing specific exercises to improve the strength, speed, and stable punches of the sample players.

1.4. Research hypothesis

1. There are statistically significant differences between the pre-test and post-test in straight punches for the juniors and for both the experimental and control groups, in favour of the experimental group.

1.5. Research scope

1.5.1. Human scope

A sample of junior boxers aged (14–16 years).

1.5.2. Temporal scope

From 16/02/2025 to 04/05/2025.

1.5.3. Spatial scope

Al-Shaab Indoor Boxing Hall.

1.6. Definition of terms

1.6.1. Speed-strength

The ability to produce rapid muscular force through the effective coordination of strength and speed. **(1:89)** [*Note: Source number updated for APA consistency*]

2. Research methodology and procedures

2.1. Research methodology

The researcher used the experimental method with a design of two groups (experimental and control) due to its suitability to the nature of the research problem.

2.2. Description of the population and sample

The participants in this study were. (40) boxers from Al-Shaab Club. The research sample amounted to (14 boxers) from Al-Shaab Club. They were divided into two groups randomly by lottery, comprising (experimental and control groups). (4) boxers were excluded for the purpose of conducting the pilot study, from outside the main sample. The percentage was (35%) of the research population.

2.3. Tools, devices, and means of data collection

2.3.1. Sources of data collection

- 1. Arabic and foreign sources and references.
- 2. Testing and measurement.
- 3. Assistant work team.
- 4. Skill performance evaluation form.
- 5. Special registration form for boxers' tests.

2.3.2. Tools and devices used

- 1. Medical scale for measuring weight.
- 2. Tape measure for height and distance.
- 3. Medicine ball (3 kg).
- 4. Laptop (1 unit).
- 5. Whistle.
- 6. Boxing gloves.
- 7. Stopwatch.
- 8. Hand weights (500g each).

2.4. Speed-strength test for arms (FIFA, 2010)

Test purpose: Measuring the speed-strength of the arm muscles.

Tools used: Playground, electronic stopwatch, whistle for giving start and finish signals.

Test specifications: From a front support position, flex and extend the arms for the maximum number possible in (10) seconds.

Conditions:

- The player assumes a front support position on the ground so that the body is straight. At the start signal, the tested individual fully extends their arms and continues to repeat the performance for as many repetitions as possible without stopping for ten seconds correctly.
- Ensure the chest touches the ground while performing the arm flexion and then fully extends them.
- **Recording:** The number of repetition performances of flexion and extension within (10) seconds is recorded for the tested individual.

2.5. Boxing test with a partner (Johnson, 2018)

Test purpose: Measuring performance level.

Tools used: Hand stopwatch, 4 boxing gloves, legal boxing ring, judging form, whistle to start and end the round, coloured tape.

Performance description: The two boxers stand in their designated corners. Upon hearing the start signal from the referee, the competition begins by performing only straight punches and defending against them, for one round lasting (1:30 minutes).

Conditions: Only the use of the straight punch (left - right) and its specific defence types are allowed. Neither of them is allowed to use any other punches.

Recording: The boxer scores a point for each correct hit and correct defence during delivery.

2.6. Pilot study

The researcher conducted the pilot study for the speed-strength test for arms on Sunday, 17/02/2025, on a sample of (4) individuals from outside the main research sample.

The purpose of conducting the pilot study was:

- 1. To ensure the validity of the tools and devices used.
- 2. To ensure the quality of the work team's performance during the test implementation phase.
- 3. To identify the time required to perform.

- Ensure that the nominated tests meet the scientific conditions and standards..
- 5. To ensure the suitability of the test location and its appropriateness for implementing the tests.

2.7. Pre-tests

The researcher conducted the pre-tests for the research sample members on Wednesday, 19/02/2025. The researcher emphasised explaining and clarifying the tests and their sequence briefly. The researcher worked to fix all To ensure consistency, the post-test conditions—including the location, timing, implementation procedures, and personnel on the assistant team—were meticulously replicated from the pre-test.

2.8. Main experiment

After the researcher verified the validity of the tests and devices used and prepared the registration forms for the nominated tests, the main experiment was applied to the main experiment sample, totalling (14 boxers) from the juniors, on Sunday (23/02/2025). The application Over a two-month period, the experimental group performed the special exercises prepared by the researcher in two training units per week.

2.9. Post-tests

The researcher conducted the post-tests for the control group on Sunday, 04/05/2025, at nine o'clock. The researcher ensured providing the same conditions and requirements under which The researcher maintained identical conditions between the pre- and post-tests in terms of location and timing.

2.10. Statistical methods

The statistical program (SPSS) was used for statistical data processing.

3. Presentation, analysis, and discussion of results {dir = "ltr"}

3.1. Pre-post intervention assessment results for, for physical variables of the experimental group

Table 1 shows the pre- and post-test for the strength-speed characteristic. The pre-test had a mean of 6.250, a standard deviation of 0.506, and a standard error of 0.156. The post-test had a mean of 8.750, a standard deviation of 0.410, and a standard error of 0.142.

Table 1. Descriptive statistics for speed-strength (experimental group - pre/post).

Variables	Test Type	Mean	Std. Deviation	Std. Error
Speed-Strength				0.156
	Post-test	3.710	0.410	0.142

3.1.1. Statistical analysis of speed-strength test results: Experimental group (pre-post comparison)

Table 2 shows the difference in the arithmetic mediation between the pre- and post-test for the characteristic force with speed of 0.465 and the difference in the elastic deviation between the pre- and post-test of 0.318 and the calculated 3.621 with an error rate of 0.000 and the significance of the differences was significant.

3.1.2. Pre-post intervention assessment results for., means, and standard deviations for skill performance variables of the experimental group

According to the scientific research methodology - Table 3 shows the mean, standard deviation, and standard error for the pre-test and post-test of skill performance for the experimental group.

The pre-test for the left punch performance had a mean of 2.312, a standard deviation of 0.380, and a standard error of 0.137.

The post-test had a mean of 4.345, a standard deviation of 0.230, and a standard error of 0.112.

For the pre-test of the skill of defending against a left straight punch, the mean was 3.425, with a standard deviation of 0.242 and a standard error of 0.120.

The post-test had a mean of 4.510, a standard deviation of 0.321, and a standard error of 0.111.

The pre-test for the right straight punch had a mean of 4.516, a standard deviation of 0.315, and a standard error of 0.161.

The post-test had a mean of 6.310, a standard deviation of 0.269, and a standard error of 0.102.

The pre-test for defending against a right straight punch had a mean of 3.540, a standard deviation of 0.272, and a standard error of 0.128.

The post-test had a mean of 5.221, a standard deviation of 0.270, and a standard error of 0.149.

3.1.3. Presentation of means, standard deviations, calculated (t) value, error ratio, and significance of differences between pre and post test results for the experimental group in the specific skill performance tests

Table 4 shows the differences in means, standard deviations, the calculated t-value, the error percentage (p-value), and the significance level.

For the pre-test-post-test in the performance of the left straight punch, the difference in means was 2.033, the difference in standard deviations was 0.412, the

calculated t-value was 8.801, with a p-value of 0.000, indicating statistical significance.

For the pre-test-post-test in the defence against the straight punch, the difference in means was 1.747, the difference in standard deviations was 0.323, the calculated t-value was 7.421, with a p-value of 0.002, indicating statistical significance.

For the pre-test-post-test in the performance of the right straight punch, the difference in means was 1.542, the difference in standard deviations was 0.410, the calculated t-value was 6.842, with a p-value of 0.000, indicating statistical significance.

As for the pre-test-post-test in the defence against the right straight punch, the difference in means was 1.818, the difference in standard deviations was 0.581, the calculated t-value was 5.812, with a p-value of 0.000, indicating statistical significance.

3.1.4. Pre-post intervention assessment results for., means, and standard deviations for skill performance variables of the experimental group for the speed-strength variable, means, and standard deviations for the control group

Table 5 shows the pre- and post-test results for the control group on the strength-speed test. The pre-test mean was 3.156, with a standard deviation of 0.480 and a standard error of 0.122.

The post-test results on the strength-speed test had a mean of 3.218, a standard deviation of 0.201 and a standard error of 0.81.

3.1.5. Differences in means, standard deviations, calculated (t) value, error ratio, and significance of differences between pre and post test results for the control group in the speed-strength test

Table 6 shows the difference in the arithmetic mediation of the pre- and post-test for the speed-characteristic strength 0.278 and the difference in the elastic deviance between the pre- and post-test 0.401, the calculated watt 1.256 and the error rate 0.205, and the significance of the differences was not significant.

3.1.6. Presentation of means, standard deviations, calculated (t) value, error ratio, and significance of differences between pre and post test results for the control group in the specific skill performance tests

Table 7 shows the difference of means, standard deviation, the calculated t-value, error percentage, and significance. The difference in means for the pre-post test of the left straight punch performance was 0.180, the difference in standard deviation means was 0.132, the calculated t-value was 2.012, with an error percentage of 0.101, and it was not statistically significant.

Table 2. Paired samples t-test for speed-strength (experimental group).

Variables	Tests	Mean Diff.	Std. Dev. Diff.	Std. Error Mean	t	Sig. (2-tailed)	Significance
Speed-Strength	Pre - Post	0.465	0.318	0.120	3.621	0.000	Significant

Table 3. Descriptive statistics for skill performance (experimental group - pre/post).

Variables	Test Type	Mean	N	Std. Deviation	Std. Error
Left Punch Performance	Pre-test	2.312	7	0.380	0.137
	Post-test	4.345	7	0.230	0.112
Left Punch Defence	Pre-test	3.425	7	0.242	0.120
	Post-test	4.510	7	0.321	0.111
Right Punch Performance	Pre-test	4.516	7	0.315	0.161
	Post-test	6.310	7	0.269	0.102
Right Punch Defence	Pre-test	3.540	7	0.272	0.128
	Post-test	5.221	7	0.270	0.149

Table 4. Paired samples t-test for skill performance (experimental group).

Variables	Tests	Mean Diff.	Std. Dev. Diff.	Std. Error Mean	t	Sig. (2-tailed)	Significance
Left Punch Performance	Pre - Post	2.033	0.412	0.200	8.801	0.000	Significant
Left Punch Defence	Pre - Post	1.747	0.323	0.186	7.421	0.000	Significant
Right Punch Performance	Pre - Post	1.542	0.410	0.201	6.842	0.002	Significant
Right Punch Defence	Pre - Post	1.818	0.581	0.265	5.812	0.000	Significant

At significance level (0.05) and degrees of freedom (6).

Table 5. Descriptive statistics for speed-strength (control group - pre/post).

Variables	Test Type	Mean	Std. Deviation	Std. Error
Speed-Strength	Pre-test	3.156	0.480	0.122
	Post-test	3.218	0.201	0.081

Table 6. Paired samples t-test for speed-strength (control group).

Variables	Tests	Mean Diff.	Std. Dev. Diff.	Std. Error Mean	t	Sig. (2-tailed)	Significance
Speed-Strength	Pre - Post	0.278	0.401	0.210	1.256	0.205	Not Significant

Table 7. Paired samples t-test for skill performance (control group).

Variables	Tests	Mean Diff.	Std. Dev. Diff.	Std. Error Mean	t	Sig. (2-tailed)	Significance
Left Punch Performance	Pre - Post	0.180	0.132	0.170	2.012	0.101	Not Significant
Left Punch Defence	Pre - Post	0.135	0.120	0.115	0.221	0.201	Not Significant
Right Punch Performance	Pre - Post	0.121	0.022	0.131	0.278	0.007	Not Significant
Right Punch Defence	Pre - Post	0.170	0.131	0.141	0.342	0.108	Not Significant

At significance level (0.05) and degrees of freedom (6).

For the pre-post test of the straight punch defence, the difference in means was 0.135, the difference in standard deviation was 0.120, the calculated t-value was 0.221, with an error percentage of 0.201, and it was not statistically significant.

Regarding the pre-post test for the right straight punch performance, the difference in means was 0.121, the difference in standard deviation means was 0.022, the calculated t-value was 0.278, with an error percentage of 0.007, and it was not statistically significant.

As for the pre-post test for the right straight punch defence, the difference in means was 0.170, the difference in standard deviation means was 0.131, the calculated t-value was 0.342, with an

error percentage of 0.108, and it was not statistically significant.

3.1.7. Presentation of differences in means, standard deviations, calculated (t) value, error ratio, and significance of differences for the post-tests of the control and experimental groups in the speed-strength test

Table 8 shows the arithmetic mediation difference, the calculated and elastic deviations, the error rate, and the variance-specific significance of speed for the control and experimental groups. The arithmetic mediation difference was 0.480, the Greek deviation difference was 0.161, the calculated t-score was 3.252, the error rate was 0.004, and the significance was significant.

Table 8. Independent samples t-test for speed-strength (post-test: Experimental vs. control).

Variables	Group	Mean Diff.	Std. Deviation Diff.	t	Sig. (2-tailed)	Significance
Speed-Strength	Control + Experimental	0.480	0.161	3.252	0.004	Significant

Table 9. Independent samples t-test for skill performance (post-test: Experimental vs. control).

Variables	Group	Mean Diff.	Std. Deviation Diff.	t	Sig. (2-tailed)	Significance
Left Punch Performance	Exp. Grp. + Cont. Grp.	2.166	0.140	12.410	0.000	Significant
Left Punch Defence	Exp. Grp. + Cont. Grp.	1.849	0.191	11.701	0.000	Significant
Right Punch Performance	Exp. Grp. + Cont. Grp.	1.560	0.173	10.022	0.000	Significant
Right Punch Defence	Exp. Grp. + Cont. Grp.	1.863	0.188	9.845	0.000	Significant

^{*}At significance level (0.05), degrees of freedom (12) (14 - 2 = 12), and critical value (2.365)*.

3.1.8. Presentation of means, standard deviations, calculated (t) value, error ratio, and significance of differences between the post-test results of the control and experimental groups in the specific skill performance tests

Table 9 shows the differences in means, standard deviations, the calculated t-value, error percentage, and significance. The difference in the post-test means for the control and experimental groups in the special skill performance test was as follows:

For the left straight punch performance, the mean difference was 2.166, the standard deviation difference was 0.140, the calculated t-value was 12.410, with an error percentage of 0.000, which is statistically significant.

For the defence against a straight punch (left), the mean difference was 1.849, the standard deviation difference was 0.191, the calculated t-value was 11.701, with an error percentage of 0.000, which is statistically significant.

For the right straight punch performance, the mean difference was 1.560, the standard deviation difference was 0.173, the calculated t-value was 10.022, with an error percentage of 0.000, which is statistically significant.

For the defence against a straight punch (right), the mean difference was 1.863, the standard deviation difference was 0.188, the calculated t-value was 9.845, with an error percentage of 0.000, which is statistically significant.

3.2. Discussion of results

The significant differences shown by the experimental group in skill performance between pre and post-tests are linked to the physical abilities of the boxer player and their good physical fitness, which relates to their sporting level, concentration, and response to reach the goal or correct technique. Possessing technical skills alone without effective physical fitness is not sufficient for a rapid response in competitions (Chaabene et al., 2020). When physical fitness decreases and fatigue appears, it will negatively affect

performance or sporting level, making their movements hesitant and unbalanced. Conversely, we find that a high level of physical fitness has a positive impact on their psychological and skill state, enabling them to move well inside the ring to achieve their goal (Abdullah & Al-Ghanim, 2022).

For the control group, there were significant differences in some tests for the performance of the right and left punches, which actually depends on the player's concentration. For a right-handed player, the left punch is weaker, while the punch for a left-handed player shows increased strength and more accuracy compared to the performance of the right punch.

This punch is considered one of the powerful and influential punches on the course of play and is easy to learn in performance in terms of body position, body balance, and the specific skill performance in terms of the action and reaction of the arms, as well as the foot and pivot, and transferring body weight to reach the correct technique for the punch (Loturco et al., 2021).

The researcher believes that emphasising repetitions and drills with a partner in attack and defence, and variety in performance for motor programmes, contributes to the boxer's performance, characterised by speed and accuracy in skill performance (Hodges & Williams, 2019).

4. Conclusions

Variety in performance plays a positive role in developing speed-strength and the performance of straight punches (right and left). The experimental group demonstrated significantly greater development compared to the control group of the experimental group. The researcher recommends paying attention to preparing diverse training programmes based on scientific foundations targeting physical and motor abilities, and introducing modern means and devices in educational units to help achieve the best accomplishment.

Conflicts of interest

None.

We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethical statement

This manuscript approved by The team was trained according to the agreement with the team coach of Haifa Club (Jawad Hafez Abbas) on 2/2/2025.

Author's contribution

Funding

This research received no external funding.

Data availability

The authors con_rm that the data supporting the _ndings of this study are available within the article [and/or] its supplementary materials.

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تأثير تمرينات خاصة في تطوير القوة المميزة بالسرعة واللكمات المستقيمة للناشئين

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المستخلص

هدفت هذه الدراسة إلى تطوير مجموعة من التمارين الخاصة لتنمية القوة المميزة بالسرعة والقدرة على اللكمة المستقيمة لدى عينة البحث. انبثقت مشكلة البحث من ملاحظة الباحث، بصفته مدربًا للملاكمة، وجود قصور في بعض القدرات البدنية عبما في ذلك القوة المميزة بالسرعة وأداء اللكمات المستقيمة). وبناءً على ذلك، طوّر الباحث تمارين خاصة مصممة لتطوير قدرات بدنية محددة، بما في ذلك القوة المميزة بالسرعة وأداء اللكمات المستقيمة لدى الملاكمين الناشئين، للمساهمة في تحسين وتطوير مستوى اللاعبين، وإيجاد حلول إيجابية لهذه المشكلات، وفهم تأثيرها على الأداء. واستخدم الباحث المنهج التجريبي. تكونت عينة البحث من ملاكمين ناشئين تراوحت أعمارهم بين 14 و16 علماً، بإجمالي 14 لاعبًا. قُستم العينة إلى مجموعتين متساويتين: مجموعة ضابطة ومجموعة تجريبية. افترض الباحث وجود فروق ذات دلالة إحصائية بين نتائج الاختبار القبلي والبعدي للكمات المستقيمة لدى المجموعتين الأولى والثانية الخاضعتين للبرنامج التدريبي، لصالح المجموعة الثانية (التجريبية). وخلص الباحث إلى أن التنوع في الأداء له دور إليجابي في تطوير القوة المميزة بالسرعة وأداء اللكمات المستقيمة (وتحديدًا اللكمات المستقيمة، واللكمات المستقيمة، واللكمات المستقيمة المتقاطعة). وأوصى الباحث بالاهتمام بتطوير برامج تدريبية متنوعة قائمة على أسس علمية تستهدف واللكمات المستقيمة الدنية والحركية، ودمج أحدث المعدات والأجهزة في الوحدات التدريبية لتحقيق الأداء الأمثل.

الكلمات المفتاحية: تمرينات خاصة, القوة المميزة بالسرعة, اللكمات المستقيمة