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The effect of using a training program based on the small-sided games (1 vs 1) and (2 vs 2) on the development of the explosive power and the direction change speed of u-17 footballers

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ABSTRACT

This study aimed to identify the effect of using a training program based on the small-sided games (1 vs 1) and (2 vs 2) on the development explosive power and the direction change speed of u-17 footballers. the author relied on the experimental method with a sample of 20 players who had been chosen on purpose from the club of sidi abdel aziz, which plays in the honorary league of the wilaya of jijel. As for the study tools, the author used squat jump test and cazorla 20m run. After statistical procession, findings showed that the suggested training program has a positive effect on the development of the explosive power and direction change speed of u-17 footballers. The refore, the author recommends adopting the small-sided games in the development of the physical characteristics under study.

Keywords: training program, small-sided games, explosive power, direction change speed, football.

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INTRODUCTION

Football has become the most famous game worldwide thanks to its competitive nature and the will to provide the best physical, technical, and planning forms to win and entertain the audience (Bouachicha & Nacer, 2021, pp. 252-270)

In this line, it witnessed a great development in the last years and its nature changed due to the increase of the speed, the diversity of the performance, and due to the motor, defensive, and attacking skills. The game relies on the physical, skillful, planning, and psychological abilities the players show to win the game (Hedjab, 2018, pp. 380-398)

Football is among the sports where the players' efforts change. Turpin (2002) states that the football player makes an explosive movement each 43 seconds, 57 tactical movement, 30 technical movement, 72-109 fast run, and 40-70 direction change (Dehbazi & Djebali, 2020).

Besides, qualitative analyses made by Gregory showed that the footballer repeats about 150-250 fast and high-density movements in a match. (Gregory, 2011)

Scientists and coaches shifted attention more to the physical side, which makes the difference in the sport competitions. In this regard, they look for how to develop the physical skills according to age phases of the athlete (al Basstaouissi, 1999). (Dellal, 2008) mentions that integrating the ball in the physical work allows acquiring physical abilities and skills. Besides, the training schools turned towards developing the physical characteristics of football in a way that serves the technical side. Thus, these characteristics, including the explosive power and the direction change speed, developed to a high level. (Mohamadi, Cheraïet, & Kadri, 2021, pp. 65-77)

The explosive power has a big importance in football as it is produced through the complementary link between the speed and power to achieve a better performance. In this regard, the importance of the explosive power for the footballer manifests in getting the high balls mainly in the head kicks. Besides, it manifests in the fast departure to get the ball, during the defense, during shooting on the goal, etc. (Ouadeh, Kharoubi, & Ouareth, 2023, pp. 1-15). The speed is among the most important factors that predict a good

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performance in football (Ben Rouissi & Seddouki, 2023, pp. 434-452). In the football matches analyses, it was found that the footballer makes 200 high-density attacks, 822 direction changes for the defender, 700 turns in 0 and 90°, and fast run that is accompanied by the direction change (Sadou & Bouhadj, 2022, pp. 173-193). In this regard, Panariello states that the explosive power and the speed are among the necessary physical skills in the high levels (Panariello, 2016, p. 2). Hence, the explosive power and the direction change speed are among the basic pillars in the motor ability in the modern football.

In this line, the recent years witnessed a clear development and scientific boom in the field of physical training thanks to the technological advance, which helped look for the best training to develop the physical characteristics. In addition, it helped find a way that increases the competency of the players with what suits the football activity and helps achieve the optimal training (Hassan al Sayad, 2008). Among the modern training methods used by trainers in developing the various physical, skillful, and planning abilities, we find the small sided games, which became a subject of wide research. In this vein, their use increased in the two last decades thanks to their efficiency in developing the footballers' performance (Khelif & Mezari, 2022, pp. 370-379). These games use various shapes according to the philosophy and goal of the training through changing the variables and rules of the game such as the number of players, size and surface of the game, the number of the allowed touches, and the method of scoring (Guerroumi & Ouadeh, 2021, pp. 299-345)

About the Algerian football, reality shows a lack of training programs that use the small side games that aim at developing the explosive power and the direction change speed. Thus, the problematic of this paper emerges to suggest a training program using the small sided games (1 VS 1) and (2 VS 2) in order to develop the explosive power and the direction change speed. In this vein, we raise the following questions:

1-1- General question: Does the training program using the small sided games (1 VS 1) and (2 VS 2) have an effect on the development of the explosive power and the direction change speed of U-17 footballers?

1-2- Sub-questions: -Does the training program using the small sided games (1 VS 1) and (2 VS 2) have an effect on the development of the explosive power of U-17 footballers?

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- Does the training program using the small sided games (1 VS 1) and (2 VS 2) have an effect on the development of the direction change speed of U-17 footballers

2- Hypotheses of the study:

2-1- General hypothesis: The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the explosive power and the direction change speed of U-17 footballers.

2-2- Sub-hypotheses: - The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the explosive power of U-17 footballers.

- The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the direction change speed of U-17 footballers.

3- Aims of the study:

-Knowing the effect of using the small sided games (1 VS 1) and (2 VS 2) on the development of the explosive power of U-17 footballers.

-Knowing the effect of using the small side games (1 VS 1) and (2 VS 2) on the development of the direction change speed of U-17 footballers.

4- Terms and concepts of the study:

4-1 Training program: It is one of the elements of the plan without which the planning would be missing. It is a planning bulletin that shows the training actions that must be made. In addition, it is a set of executive steps in the form of detailed activities that must be carried out to achieve the target objectives (al Bik & AbouZayd, 2003)

4-2- Small Sided games: Hanafi Mahmoud Mokhtar defines them as those drills loved by the athletes and are made in narrow surfaces with a specific number of players. The number may be equal or unequal according to the target objectives (Hanafi, 1992, p. 135)

-In addition, they are defined as one of the training methods similar to the situations of the real performance during the matches. They take place in small

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surfaces in a limited time span between small numbers of players (1 VS 1, 2 VS 2, 3 VS 3...etc)

4-3-The explosive power: It is defined as the ability of the body to produce the highest acceleration through the ability to push with the highest force or the ability to accelerate something in the least time (Brévost, 2013, p. 333)

4-4 The direction change speed: It is the ability of the body to change the direction in a known path based on 50% of the relative speed and time and the muscular volume without fat. The other 50% of the good performance is linked to the level of the motor adjustment and the technical level of the player (Cazorla, 2006, p. 35)

4-5- Football: it is a collective game where two teams of 11 players with different positions and tasks compete. It is played inside a rectangular stadium where the players attempt to score the highest number of goals against the adversary. The team that scores more wins (Guerroumi & Ouadeh, 2021, p. 403)

5- Literature review:

5-1 The study of HedjabIssam (2017): It is entitled “the effect of a suggested training program using the small sided games on the development of the explosive power and the power marked with speed of the U-17 footballers”. It aimed at knowing the contribution of a training program based on the small sided games on the development of the explosive power and the power marked with speed of the U-17 footballers. The author relied on the experimental method and applied his study on the regional championship of the Wilaya of Annaba, Algeria. The pilot sample included 20 players from Sedrata United and the control sample included 20 players from Khadraoui Ahmed Club who had been chosen on purpose. Findings show that the training program positively contributed to the development of the studied physical characteristics.

5-2- The study of Dehbazi Mohamed Seghir&DjebaliRedouane (2020): It is entitled the effect of using the small sided games in the program of the physical preparation on the VO₂Max and the explosive power of the lower limbs of the footballers. The study aimed at knowing the efficiency of a suggested training program in the development of VO₂Max and the explosive power of the footballers. The study used the one group experimental method

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and the sample included 12 players as an experimental group that had been chosen on purpose through shuttle run test and Sargent test. Findings show that the program using the small sided games affects the $\dot{V}O_2$ max and the explosive power of the footballers.

5-3 The study of Abdel Kader Khelif&FatehMezari (2022): It is entitled “the effect of a suggested training program using the small side games on developing the ability of fast repetition and the explosive power of U-19 footballers”. It aimed at knowing the effect of a suggested training program using the small sided games on developing the ability of fast repetition and the explosive power of footballers. The study used the experimental method and relied on the experimental group that included 11 players and the control that included 11 players. The program was applied on the experimental group for 08 weeks. Besides, the study used the test of speed repetition, the vertical jump, and Ruffier Dickson test between the repetitions. Findings show that the small side games positively affect the development of the speedrepetition and the ability tolookback between the repeated sprint. On the other hand, there were no differences in the explosive power using the small sided games.

5-4- The study of Dellal et al (2012): It is entitled “the effect of the small sided games compared to the periodical training on the aerobic volume and the ability to perform unattached drills with changes in the direction for amateur footballers”. The aim was to compare the effects of the small sided games to the high-density periodical training. The study relied on the experimental method and used 22 amateur players who had been divided into 03 groups as follows: the control group with 06 players, the small side games group with 08 players, and the high-density periodical training group with 08 players. The study used VMA-Eval and IFT15-30. Findings showed that the small sided games training and the high-density periodical training have the same efficiency in developing the aerobic ability and the ability to perform discontinuous drills with changesin direction for the amateur footballers.

5-5 The study of Warren Young & Nathan Rongers (2014): It is entitled “the effect of the small sided games and the direction change on the interactive movement speed and the direction change speed”. It aimed at identifying the effect of the training on the direction change and the small side games on the planned AFL and fitness. The study used the experimental method and a random sample of 25 elite footballers. Moreover, it used the

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Planned-AFL test for agility and the interactive fitness test. Findings show that the small sided games improve the fitness and accelerate the decision-making.

6- The practical side:

6-1- The pilot study: It is a primary experiment made by the researcher to test his research tools and know their validity. The pilot study in this paper covered 5 U-19 players from Sidi Abdel Aziz United from the honorary league of the Wilaya of Jijel. These 05 players were excluded later from the main study. In this line, we used the method of testing and retesting. The experiment took place on 10-12-2022 and was remade on 13-12-2022. Then, results were statistically treated and the validity and consistency of the tests were calculated as shown in table 01.

6-2- Limitations of the study:

The human limitations: The study covers U-17 footballers from Sidi Abdel Aziz United from the honorary league in Jijel.

The spatial limitations: The study took place in the municipal stadium “BouhrinCherif” in the municipality of Sidi Abdel Aziz, Jijel.

The temporal limitations: The study was divided into two parts:

- The pilot study: the tests were made on 10-12-2022 and remade on 13-12-2022.
- The main study: here, the pre-tests were made on 16-12-2022 and the training program was applied. Later, the post-tests were made on 19-02-2023.

6-3- Method of the study: The nature of the study determines the method. Therefore, the value of the results depends on the value of the methods used (Angers, 2004) In this study, we used the experimental method using one group.

6-4 Population and sample of the study: The population of the study includes U-17 footballers from the honorary league in Jijel. As for the sample, it covers 20 U-17 players in Sidi Abdel Aziz United. They had been chosen on purpose.

6-5 Tools of data collection:

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To solve the problematic and check the validity of the hypotheses, we used the following tools:

6-5-1- References: They include Arabic and foreign books, theses, magazines...etc whose contents revolve around our topic.

6-5-2 Tests:

-Test one: squat jump:

- Aim of the test: it measures the explosive power of the lower limbs.

- Tools: Plank marked with centimeters on a wall and chalk stick used by the players when jumping.

- Description of the test: The player stands with one of his sides facing the wall and the clavicles together and takes the chalk with his hand keeping his clavicles on the ground. Then, he makes a mark on the highest point he reaches with his fingers. After that, he bends his legs and arms to the hips, jumps up to the maximum with the highest force, and makes another mark with the same hand. Thus, the distance between the points is recorded. The player gets 03 trials.

Test 02: Cazorla 20 m test:

-Aim: It measures the direction change speed of the player in a winding distance of 20 m.

- Tools: football stadium, whistle, stopwatch, registration ticket, cones.

- Description of the test: The player stands in the start line and runs with the highest speed to the finish line when he hears the whistle. The player must follow the path and should not deviate or change the direction when reaching each cone.

6-6- The scientific bases of the test:

+Consistency: Van Deal says that the test is consistent if it gives the same results continuously when reapplied on the same informants in the same conditions (SobhiHassanine, 1995, p. 193). To check the consistency of the test, the author uses the testing and retesting method and, then, calculates the correlation coefficient between the two tests.

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+ **Intrinsic validity of the test:** It means that the test must measure what it really wants to measure, not another point (Boudaoud & Atallah, 2009, p. 105) To check the intrinsic validity of the test, the author used tests, which cover the experimental degrees of the test attributed to the degrees that are flawless. The intrinsic validity is measured with the square root of the consistency coefficient.

Intrinsic validity= consistency coefficient $\sqrt{}$

-Based on what has been said, we found these results:

Table 01: the consistency and validity coefficients of the tests of the pilot sample

Tests	measurement unit	Size of the sample	Consistency coefficient	Validity coefficient	Degree of freedom	Table value of the correlation coefficient at significance level 0.05	Correlation degree
Explosive power test	Centimeter	05	0.87	0.96	04	0.811	Very strong
Direction change speed test	Second	05	0.90	0.94	04	0.811	Very strong

-Table 01 shows that the value of the consistency coefficient is very high with (0.87) in the explosive power test and (0.90) in the direction change speed which exceeds the table value of Pearson correlation coefficient (0.811) at

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significance level 0.05 and freedom degree 4. This indicates the strong correlation between the pre and post-tests of the pilot sample. Hence, we can say that the two tests have a high degree of consistency.

- In addition, we see from the same table that the value of the validity coefficient is very high (0.93 in the explosive power test and 0.94 in the direction change speed). These are values that are higher than the table value of the correlation coefficient that reached (0.811) at significance level 0.05 and freedom degree 4. Hence, the two tests have a high degree of validity.

6-7- Building the training program:

-After having a look on many scientific studies that suggested training programs to develop the different physical characteristics, we designed our training program, which was reviewed by trainers and competent teachers. This program covers 08 training weeks with 03 sessions in each week. We took into consideration the specificities of the studied sample regarding the effort and rest. The program was applied in the phase of competition. The training sessions include the small sided games (1 VS 1) and (2 VS 2) in different surfaces and limited rules.

- The period of the training units was between 90 and 120 mn, including the preparatory and final phases.

- The used density was between 50 and 100% from what the player can afford.

- The used density in the training units is determined through the duration of training, the degree of hardship, the number of players, the surface used in the drill, and the inclusion of the goalkeeper or no.

- As for the training size, it was based on the repetitions of the drill taking into consideration the density used in the training unit.

- We relied on the heartbeats to follow the training density as follows:

- The average load from 50 to 70% of what the player can afford; i.e. equal to 165 b/mn.

- The sub maximal reaches 90% of what the player can afford; i.e., equal to 180-190 b/mn.

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-The maximum load 100% where the heartbeats reach 190 b/mn.

Table 02: the protocol of the training program:

Field procedures	Small side games (1 VS 1)	Small side games (2 VS 2)
Duration of the drill	30 seconds to 1 mn 30 seconds	45 seconds to 2 mn
Number of series	2 to 4	2 to 6
Rest interval	30 seconds to 3 mn and 30 seconds	45 seconds to 3 mn and 30 seconds
Type of rest	Negative/positive	Negative/positive
Dimensions of the stadium (m)	5X5, 5X10	10X10, 10X20
Form of training	Discontinuous	discontinuous

6-8 The statistical styles:

-We relied on SPSSv.23 through the arithmetic mean, the standard deviation, Pearson correlation coefficient, and T Student for the one group.

7-Analysis and discussion of the results:

7-1 Presentation and analysis of the first hypothesis: It states that “The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the explosive power of U-17 footballers”

Table 03: The results of the pre and post tests of the experimental group in the explosive power:

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Test	Samp le	Arithme tic mean	Standar d deviati on	Degre e of freedo m	Significan ce level	Tabl e T	Calculat ed T	Statistica l significan ce
Pre- test	20	38.55	1.43	19	0.05	2.09	6.78	Statistical ly significan t
Pos t- test	20	41.25	2.51					

We notice from table 03 that the experimental group achieved an average arithmetic mean of 38.55 and standard deviation of 1.43 in the pre-test. As for the post-test, the arithmetic mean is 41.25 and the standard deviation is 2.51. Besides, calculated T is 6.78 which is higher than table T that is 2.09 at significance level 0.05 and freedom degree 19. Thus, we deduce that there are significant differences between the arithmetic means, and, therefore, statistically significant differences between the pre and post-tests of the experimental group in the explosive power test.

7-2 Presentation and analysis of the second hypothesis: It states that “The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the direction change speed of U-17 footballers”

Table 04: The results of the pre and post tests of the experimental group in the direction change speed test:

Test	Samp le	Arithme tic mean	Standar d deviati on	Degre e of freedo m	Significan ce level	Tabl e T	Calculat ed T	Statistica l significan ce
Pre- test	20	6.40	0.99	19	0.05	2.09	7.42	Statistical ly significan t
Pos t- test	20	5.05	0.75					

Table 04 shows that the experimental group achieved a good arithmetic mean of 6.40 and standard deviation of 0.99 in the pre-test. As for the post-test,

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the arithmetic mean is 5.05 and the standard deviation is 0.75. Besides, calculated T is 7.42 which is higher than table T that is 2.09 at significance level 0.05 and freedom degree 19. Thus, we deduce that there are significant differences between the arithmetic means, and, therefore, statistically significant differences between the pre and post-tests of the experimental group in the direction change speed test.

7-3- Discussion of the results:

7-3-1- Discussion of the results of the 1st hypothesis:

From the results shown in table 03 and from the statistical procession, there are statistically significant differences between the pre and post tests for the training with the small sided ages (1 VS 1) and (2 VS 2) in the development of the explosive power of the U-17 footballers on behalf of the post test. The author attributes this to the efficiency of the training program that is built on the small sided games (1 VS 1) and (2 VS 2). In this line, the studies of (Hedjab Issam, 2017) and (Dehbazi & Djebali, 2020) agree with our study. They found that the training program that is built on the small side games contribute a lot to the development of the explosive power. In addition, the study of (Rabeh et al., 2018) pointed out that training with the small side games has clear effects on the Sargenttest, which means an improvement in the explosive power of the lower limbs for the footballers; this agrees with our study. Based on these studies and results, we confirm the first hypothesis that says “The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the explosive power of U-17 footballers”

7-3-2- Discussion of the results of the 2nd hypothesis:

From results shown in table 04 and from the statistical procession, there are statistically significant differences between the pre and post tests for training with the small sided games (1 VS 1) and (2 VS 2) in the development of the direction change speed for the U-17 footballers on behalf of the post test. The author attributes this to the efficiency of the training program that is built on the small sided games (1 VS 1) and (2 VS 2). In this line, the study of (Dellal, 2008) agrees with ours as it found out that training with small side games develops the ability to perform discontinuous drills with a change in the direction for the amateur footballers. Besides, the study of (Warren, Young, & Nathan Rongers, 2014) agrees with ours as it found out that the small side games improve the fitness through accelerating the decision-making. In

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addition, our results go with those of (Abdullah HouilFerhan, 2010) which found out that footballers need the skills of running in a divergent path and how to rapidly stop and resume running; this creates skillful and planning differences during the match. Based on these studies and results, we confirm the second hypothesis that says “The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the direction change speed of U-17 footballers”.

7-3-3- Discussion of the general hypothesis:

After discussing the results of this study, and in the light of the previous studies and the theoretical background, we confirmed the two sub-hypotheses. This allows us to say that the main hypothesis which says “The training program using the small sided games (1 VS 1) and (2 VS 2) has an effect on the development of the explosive power and the direction change speed of U-17 footballers” is confirmed.

8- Conclusion and recommendations:

From the discussion of the results, we reach a set of conclusions as follows:

- The training program that is built on the small sided games (1 VS 1) and (2 VS 2) has a positive effect on the development of the explosive power of the U-17 footballers.
- The training program that is built on the small sided games (1 VS 1) and (2 VS 2) has a positive effect on the development of the direction change speed of the U-17 footballers.

In the light of these conclusions, we can suggest the following:

- It is necessary to suggest a training program that includes various small side games with various rules and methods.
- It is necessary to rely on training programs that are based on small sided games (1 VS 1) and (2 VS 2) in improving and developing the explosive power and the direction change speed for the footballers.
- It is necessary to follow this study through suggesting this training program to other clubs and adjusting it to other age categories to know

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its deep effects on the components of agility in general, and on the explosive power and the direction change speed in particular.

- It is necessary to set training programs using the small side games that are built on scientific bases that go with each age category to avoid the big pressure on the player and respect the natural growth.

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