

The impact of using small-sided games (3v3) and (4v4) on developing transitional speed and change of direction speed in football players under 19 years old.

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ABSTRACT

This study aimed to investigate the impact of using small-sided games (3v3) and (4v4) on developing transitional speed and change of direction speed among football players under the age of 19. The researcher adopted an experimental methodology with a single-group design, utilizing a sample of 20 players from Union Sidi Abd El Aziz team, who compete in the honorary section of Jijel province, selected purposively. The study employed the 20-meter sprint test and the 20-meter agility test as assessment tools. Following statistical analysis, it was concluded that the training program based on small-sided games (3v3) and (4v4) had a positive impact on developing transitional speed and change of direction speed among football players under the age of 19. Based on these findings, the researcher recommends the incorporation of small-sided game programs in the development of targeted physical attributes.

Keywords: Small-sided games, transitional speed, change of direction speed, football.

Introduction:

Football is known as the most popular sport in the world and has garnered significant importance and research attention (Boutawi & Kharoubi, 2021). Modern football heavily relies on quick execution of movements under various playing conditions, whether with or without the ball. Considering the significant physical effort exerted by players during matches, it greatly impacts their physical fitness, necessitating high physical efficiency (Nasser Bay, 2021). In recent years, football has witnessed considerable evolution and variation in its playing style, characterized by increased speed of play, diversified performance and skills, and repeated defensive and offensive motor movements. This relies on physical, technical,

tactical, and psychological abilities that players employ to achieve athletic success (Hijab, 2018).

Football is among the sports characterized by variations in player exertion levels. B. Turpin (2002), analyzing matches in the French league, noted that players engage in 72-109 fast runs and explosive movements every 43 seconds, in addition to 30 technical and 57 tactical movements, along with 40-70 changes in direction (Dahbaz & Jabali, 2020). Meanwhile, Pellegrino et al. (2020) highlighted that players perform repetitive high-intensity movements followed by short recovery periods. In this regard, Dellal et al. affirm that modern football coaches continually seek training methods capable of enhancing players' physical and tactical capabilities simultaneously (Dellal et al., 2011)

Scientists and coaches have increasingly focused on the physical aspect, which has become decisive in sporting competition outcomes, by researching how to develop physical capabilities according to athletes' age stages (Al-Bustawi, 1999). Dellal (2008) stated that integrating ball exercises into physical training allows players to acquire physical and technical skills. In this context, Asbagh and Mazzari (2023) noted that achieving good results requires high physical fitness and control during competitive periods, as football demands demonstrating this high fitness to execute all offensive and defensive skills.

Among the key elements of physical fitness is speed, which is critically important in football (Qasri & Bafah, 2013). Analyzing football matches revealed that a footballer engages in 200 high-intensity attacks, 822 changes in direction for defenders, and over 700 rotations at 0 and 90 degrees, accompanied by rapid directional changes in each match (Sado and Bouhaj, 2022). Furthermore, Mihoubi and Boukthir (2021) emphasized that achieving the highest physical and technical levels and attaining the greatest sporting achievements is through developing various physical traits, including speed in its various forms. Therefore, transitional speed and agility are among the fundamental pillars of motor ability that modern football players must excel in.

To elevate the level of football, it was essential to research successful and effective training programs, carefully selecting the best and most successful methods in developing various physical, technical, and psychological attributes through a proper scientific approach. Modern training today aims to prepare players comprehensively in all physical and technical aspects (Ben Khoua, Ben Qassed, & Ben Brnou, 2011, p. 207). Among the modern and effective training methods is small-sided games training, which involves preparing players in small areas and tight spaces (Dellal, 2008, p. 154). These games are used in various forms according to the coach's goals and philosophy by modifying game variables and rules such as the number of players, field size, number of ball touches allowed per player, and method of scoring (Casamichana & Castellano, 2010, p. 1615). They are an effective

means to enhance player development and achieve optimal results, suitable for all age groups and skill levels (Sharit, Qadri, & Mohammadi, 2021).

From our observation and interaction with several matches in lower divisions, it became evident that there is inconsistency in the level of teams across all age categories. Additionally, we observed that the style of play is characterized by slowness and lack of speed in player dispersal and movement within the field. Players also showed weakness in one-on-one confrontations and in their ability to evade opponents, whether with or without the ball. Furthermore, these teams lack training programs that include purposeful small-sided games aimed at improving transitional speed and change of direction. Hence, this research problem emerged, prompting us to propose a training program using small-sided games (3v3) and (4v4) aimed at developing transitional speed and change of direction among football players. Based on this, we can pose the following main research question:

1-1- General Question: Do small-sided games (3v3) and (4v4) affect the development of transitional speed and change of direction among football players under 19 years old?

1-2- Sub-questions:

- Are there statistically significant differences between pre-test and post-test measurements in transitional speed among football players under 19 years old?
- Are there statistically significant differences between pre-test and post-test measurements in change of direction speed among football players under 19 years old?

2- Study Hypotheses:

2-1- General Hypothesis: Small-sided games (3v3) and (4v4) positively influence the development of transitional speed and change of direction among football players under 19 years old.

2-2- Sub-hypotheses:

- There are statistically significant differences between pre-test and post-test measurements in transitional speed among football players under the age of 19, favoring the post-test measurements.
- There are statistically significant differences between pre-test and post-test measurements in change of direction speed among football players under the age of 19, favoring the post-test measurements.

3- Study Objectives:

- To investigate the impact of using small-sided games (3v3) and (4v4) on developing transitional speed among football players under the age of 19.
- To examine the impact of using small-sided games (3v3) and (4v4) on developing change of direction speed among football players under the age of 19.

4- Definitions and Concepts:

4-1- Small-sided Games: Defined as training exercises in football presented in modified game formats by coaches, used to enhance physical and technical abilities of players (Sanicandro & Covano, 2017).

4-2- Transitional Speed: Also known as the body's movement and transition at maximum possible speed in the least possible time and across various paths according to the practiced sports activity (Boudiaf, 2021, p. 582).

4-3- Change of Direction Speed: Defined as the body's ability to change path according to a specific direction, dependent 50% on speed factor and the other 50% on good execution linked to the player's motor coordination level (Cazorla, 2006, p. 35).

4-4- Football: A team game where two teams of 11 players each compete, differing in positions and tasks, played on a rectangular field where players attempt to score the most goals against the

opposing team; the team with the most goals wins (Groomi & Wadhi, 2021, p. 403).

5- Previous and Related Studies:

5-1- Study by Mufti Abdul Moneim (2018): Titled "The Impact of Proposed Training Units Using Small-Sided Games on Developing Transitional Speed and Agility Among Youth Handball Players (Aged 13-15)," aimed to develop proposed training units using small-sided games and their impact on developing transitional speed and agility among youth handball players. The researcher used an experimental approach on a sample of 20 youth players (aged 13-15) from the Ain Benian Municipality Union team, dividing them into control and experimental groups with each group consisting of 10 players; the experimental group underwent training with small-sided games while the control group underwent traditional programming. Research tools included a 30-meter standing test and a cone agility test. The study results indicated:

- There were individual differences between the pre-test and post-test in favor of the post-test for transitional speed and agility traits in the experimental group.
- There were statistically significant individual differences in the post-test between the experimental and control groups, favoring the experimental group in terms of transitional speed and agility.

5-2- Study by Ben Rouissi Abdelrahim and Sadouki Bilal (2023): Titled "Impact of intermittent training using plyometric exercises and small-sided game training on the development of explosive strength and transitional speed in soccer players under 17 years old," this study aimed to explore the effects of intermittent training using plyometric exercises and small-sided game training on developing explosive strength and transitional speed in soccer players. The experimental approach was applied to a sample of 18 players, divided into two groups: the first group consisted of 10 players subjected to short-short intermittent plyometric exercises, while the second group comprised 8 players exposed to small-sided game exercises. The study

utilized the 30-meter sprint test and the Sargent test. The findings revealed that short-short intermittent training enhances strength and transitional speed, unlike small-sided games, which did not improve these physical attributes.

5-3- Study by A. Dellal et al. (2012): Titled "Effects of small-sided games compared to high-intensity interval training on aerobic capacity and ability to perform intermittent exercises with directional changes in amateur soccer players," the aim of this study was to compare the effects of small-sided games in soccer with high-intensity interval training. The study involved 22 amateur soccer players divided into 3 groups: a control group of 6 players, a small-sided game group of 8 players, and a high-intensity interval training group of 8 players. The study employed the VMA-eval aerobic capacity test and the IFT15-30 intermittent performance test with directional changes. The study concluded that both small-sided game training and high-intensity interval training were equally effective in developing aerobic capacity and the ability to perform intermittent exercises with directional changes in amateur soccer players.

5-4- Study by Warren Young and Nathan Rongers (2014): Titled "Effects of small-sided games and directional changes on reactive agility and change of direction speed," the objective of this study was to assess the effects of directional change speed training and small-sided games on performance in AFL agility shuttle and agility. The study used an experimental approach with a sample of 25 elite football players, The study relied on the AFL-PLANNED agility test and the interactive agility test, with the study results indicating that small-sided games improve agility performance by enhancing decision-making speed.

- Directional change training was not effective in developing change of direction speed.

6- Applied Aspect:

6-1- Survey Study: A survey study was conducted on a sample of 5 players from

the Union Sidi Abd El Aziz team, active in the honor division of the Jijel state, under the age of 19. We used the "test-retest" method on them, with tests conducted on January 13, 2024, and repeated on January 17, 2024. After obtaining the results, they were statistically processed, and the reliability and stability of the tests were calculated as shown in Table (01).

6-2- Study Fields:

Human Field: Represented by Union Sidi Abd El Aziz players under the age of 19, active in the honor division of Jijel state.

Spatial Field: Represented by the Municipal Stadium "Bouharrin Sherif," Municipality of Sidi Abd El Aziz, Jijel state.

Temporal Field: Divided into two sections:

- Survey Study: Tests were conducted on January 13, 2024, and repeated on January 17, 2024.
- Basic Study: Pre-tests were conducted on January 21, 2024, followed by the implementation of the training program, and post-tests were conducted on March 24, 2024.

6-3- Study Methodology: Our study relied on the experimental method with a single-group design.

6-4- Study Population and Sample: The research population consisted of football players under the age of 19, active in the honor division of Jijel state.

- The research sample consisted of 20 players from the Union Sidi Abd El Aziz team, under the age of 19, purposively selected.

6-5- Data and Information Collection Tools:

6-5-1- Sources and References: Including books, journals, and articles, both Arabic and foreign, relevant to our study topic."

6-5-2- Tests:

First Test: 20-meter sprint from standing start.

- Test Objective: Measure transitional speed.
- Test Protocol: Three parallel lines are drawn on the ground, with 10 meters between the first and second lines, and 20 meters between the second and third lines. The player stands behind the first starting line and begins upon a high start signal. The player runs with increasing speed, reaching maximum speed at the second starting line and finishing at the end of the third line. Each player is allowed two attempts, with the better attempt being recorded. Timing starts from crossing the second line to crossing the finish line, recorded in seconds and fractions thereof.

Second Test: 20-meter agility run (cazorla20m).

- Test Objective: Measure agility in directional change speed.
- Test Protocol: The player stands at the starting line and upon the signal, sprints at maximum speed towards the finish line, which is 20 meters away on a serpentine path. The player must follow the designated running path without deviating, changing direction at each cone, and aiming towards the next cone at maximum speed until crossing the finish line.

6-6- Scientific Basis of the Tests:

- Test Reliability: To ensure test reliability, the researcher used the "test-retest" method and calculated the correlation coefficient between the two applications.
- Test Validity: For test validity, the researcher used self-validity, measuring it by calculating the square root of the

coefficient of reliability. Self-validity = reliability coefficient $\sqrt{\quad}$

Based on the above, we arrived at the results shown in Table (01):

- **Table 01: Represents the reliability and validity coefficients for the survey sample tests :**

Tests	measu rement unit	Siz e of the sa mp le	Consi stency coeffi cient	Valid ity coeff icient	Deg ree of free dom	Table value of the correl ation coeffi cient at signif icanc e level 0.05	Corre lation degre e
Transi tional Speed test	Secon d	05	0.89	0.94	04	0.811	Very stro ng
Direct ion chang e speed test	Secon d	05	0.91	0.95	04	0.811	Very stro ng

From Table 01, it is evident that the calculated value for the test-retest reliability coefficient is very high (0.89) for the Transitional Speed test, (0.91) for the change of direction speed test. These values exceed the critical value of Pearson correlation coefficient (0.811) at a significance level of 0.05 with 4 degrees of freedom. This indicates a strong correlation between the pre-test and post-test scores for the survey sample, suggesting high reliability of both tests.

- Furthermore, the same table shows that the calculated value for the internal consistency reliability coefficient is also

very high (0.94 for Transitional Speed test, 0.95 for change of direction speed test), which surpasses the critical value of the correlation coefficient (0.811) at a significance level of 0.05 with 4 degrees of freedom. Therefore, both tests exhibit high internal consistency reliability.

6-7- Training Program Protocol:

Field procedures	Small side games (3 VS 3)	Small side games (4 VS 4)
Duration of the drill	2mn to 4 mn	2mn and 30 seconds to 6 mn
Number of series	3 to 5	3 to 7
Rest interval	1mn to 3 mn and 30 seconds	2mn to 3 mn and 30 seconds
Type of rest	Negative	Negative
Dimensions of the stadium (m)	10X20, 15X25	20X30, 30X30
Form of training	Discontinuous	Discontinuous

7- Analysis and Discussion of Study Results:

7-1- Presentation and Analysis of the First Hypothesis: The hypothesis states "There are statistically significant differences between pre-test and post-test measurements in transitional speed among football players under 19 years old, favoring the post-test measurement."

Table 03: Shows the pre-test and post-test results for the experimental group in transitional speed testing.

Test	Sam ple	Arithmetic mean	Stand ard deviat ion	Degree of freedo m	Significanc e level	Table T	Calcul ated T	Statis tical signifi cance
Pre-test	20	6.35	0.98	19	0.05	2.09	7.40	Statis tically signifi cant
Post-test	20	5.10	0.75					

From Table (03), we observe that the experimental group achieved an arithmetic mean of (6.35) during the pre-test for agility, with a standard deviation of (0.98). As for the post-test, the arithmetic mean was (5.10), with a standard deviation of (0.75). Additionally, the calculated T-value was (7.40), which is greater than the tabulated T-value of (2.09) at a significance level of 0.05 and 19 degrees of freedom. From this, we conclude that there are significant differences between the arithmetic means. Thus, there are statistically significant differences between the pre-test and post-test for the experimental group in Transitional Speed test

- 7-2- Presentation and Analysis of Hypothesis Two: Stating " There are statistically significant differences between pre-test and post-test measurements in change of direction speed among football players under the age of 19, favoring the post-test measurements."

Table (04): Shows the results of the pre-test and post-test for the experimental group in Direction change speed test:

T e s t	Sam ple	Arit hmet ic me an	Sta nd ard dev iati on	De gre e of fre ed om	Sign ifica nce leve l	T abl e T	Calc ulat ed T	Stati stica l sign ifica nce
P r e- t e s t	20	7.1 3	0.7 1	19	0.05	2. 0 9	6.2 8	Stati stica lly signi fica nt
P o s t - t e s t	20	5.8 0	0.7 3					

We observe from Table (04) that the experimental group during the pre-test for agility change speed achieved an arithmetic mean of (7.13), with a standard deviation of (0.71). As for the post-test, we notice that the arithmetic mean reached (5.80), while achieving a standard deviation of (0.73). Additionally, we observe that the calculated T value was (6.28), which is higher than the tabulated T value estimated at (2.09) at a significance level of 0.05 and 19 degrees of freedom. From this, we conclude that there are significant differences between the arithmetic means, indicating statistically significant differences between the pre-test and post-test for the experimental group in Direction change speed test.

7-3- Discussion of Results:

7-3-1- Discussion of the First Hypothesis: Based on the results obtained in Table (03) and through

statistical analysis, we found statistically significant differences between the pre-test and post-test results for small-sided games training (3v3) and (4v4) in developing Transitional Speed among football players under 19 years of age, favoring the post-test. The researcher attributes this to the effectiveness of the proposed training program. In this context, our study aligns with (Abdulhafiz Qadri, 2015), whose results indicated that the proposed training program with small-sided games influenced the development of Transitional Speed among first-year middle school students (11-12 years old). Similarly, (Mofti Abdelmounaim, 2018) found statistically significant differences between the pre-test and post-test, favoring the post-test in agility and Transitional speed for the experimental group. Based on these studies and findings, we validate the partial hypothesis that there are statistically significant differences between the pre-test and post-test in Transitional speed among football players under 19 years of age, favoring the post-test.

7-3-2- Discussion of the Second Hypothesis:

Based on the results obtained in Table (04) and through statistical analysis, we found statistically significant differences between the pre-test and post-test results for small-sided games training (3v3, 4v4) in developing change of direction speed among football players under 19 years of age, favoring the post-test. The researcher attributes this to the effectiveness of the proposed training program. In this context, our study aligns with (Dellal et al., 2012), whose results showed that small-sided game training improves the ability to perform intermittent exercises with directional changes among amateur football players. Similarly, (Warren Young and Nathan Rongers, 2014) found that small-sided games enhance agility performance by improving decision-making speed. Our study also supports the findings of (Abdullah Hawwil Farhan, 2010), indicating that football players, in addition to straight-line running, also need to run on a curved path by quickly decelerating and accelerating. Based on these studies and findings, we validate the partial hypothesis that there are statistically significant differences between the pre-test and post-test in change of direction speed among

football players under 19 years of age, favoring the post-test.

7-3-3- Discussion of the General Hypothesis:

After discussing the results of this study, we have confirmed the validity of both partial hypotheses (the first and the second). This allows us to conclude that the main hypothesis is supported, which states that " Small-sided games (3v3) and (4v4) positively influence the development of transitional speed and change of direction among football players under 19 years old."

8- Conclusions and Recommendations:

- Through the discussion of the results, it becomes evident that:
- There are statistically significant differences between pre-test and post-test measurements in transitional speed among football players under the age of 19, favoring the post-test measurements.
- There are statistically significant differences between pre-test and post-test measurements in change of direction speed among football players under the age of 19, favoring the post-test measurements.
- Small-sided games (3v3) and (4v4) positively influence the development of transitional speed and change of direction among football players under 19 years old.

Based on the conclusions drawn and within the scope of the findings, the following recommendations and suggestions can be proposed:

- Implement training programs structured around small-sided games (3v3, 4v4) to enhance transitional speed and change of direction speed in football players.
- Propose other training programs incorporating small-sided games with different formats and rules, and study their impact on transitional speed and change of direction speed among football players.
- Explore the current study's topic with other physical variables and different samples.
- Emphasize the future utilization of this study's findings in developing training

programs centered on small-sided game drills for football players.

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