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A Comparative Analysis of the Effects of Reduced Positional Games and Traditional Training on the Physical and Technical Performance of Young Soccer Players in Training

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Abstract

Background. Implementing reduced positional games as a training method in modern soccer has been represented as an important determinant in improving and developing the skills of young soccer players in training.

Objectives. The study aimed to determine the effect of a 12-week period of reduced positional games on the physical and technical performance of young soccer players in training.

Materials and methods. Forty male soccer players in training of the Moroccan U17 national championship club CFC participated in this study. The players were divided, according to their club, into an experimental group with reduced positional games and a control group engaged in traditional training. Both teams took part in training sessions three times a week for 12 weeks. Each session lasted 90 minutes. Before and after the intervention, both groups performed physical tests (Yo-Yo intermittent test, linear sprint of 10 m, 20 m and 20 m with a change of direction, SJ — Squat Jump, CMJ — Countermovement Jump) and technical tests (LSPT — The Loughborough Soccer Passing Test, LSST — The Loughborough Soccer Shooting Test), all performances achieved by both groups were evaluated. The OptoJump, My Jump application, and technical test grid were used to quantify the results.

Results. The results revealed significant improvements in MAS ($p < .001$; $n^2 = 0.017$); 10 m sprint ($p < .001$; $n^2 = 0.102$), 20 m sprint ($p = 0.002$; $n^2 = 0.022$), 20 m sprint ($p < .001$; $n^2 = 0.022$), 20 m sprint with a change of direction ($p < .001$, $n^2 = 0.087$), as well as an increase in height in the SJ ($p < .001$; $n^2 = 0.012$) and CMJ ($p < .001$; $n^2 = -0.016$). Compared to the LSPT results, an increase in the number of passes was observed in the experimental group ($p < .001$; $n^2 = 0.175$) and a notable enhancement in pass control ($p < .001$; $n^2 = 0.131$). The LSST test showed a significant increase in shooting performance ($p = .001$; n^2 (right foot) = 0.045; n^2 (left foot) = 0.049) and a decrease in shooting time ($p = .001$; n^2 (right foot) = 0.045, n^2 (left foot) = 0.005). Post-hoc tests demonstrated that training involving reduced positional games resulted in greater improvements in the SJ, CMJ, 10 m sprint, 20 m sprint, 20 m sprint with a change of direction, LSPT, and LSST.

Conclusions. The findings indicate that a 12-week training program based on reduced positional games, incorporating 3 sessions per week, led to a considerable enhancement in the physical and technical performance of young soccer players in training. Therefore, it is recommended to coaches and physical trainers to include training sessions based on reduced positional games into the team's annual program.

Keywords: training, reduced positional games, young footballers, physical, technical.

Introduction

Training methodology plays an increasingly important role in the world of soccer. In the past, the disparity in performance between teams depended largely on the talent of the players. Some teams stood out for their more intense physical, technical, tactical, or psychological commitment. Today, all four parameters are equally important.

A team's overall performance can be affected by a number of factors, such as poor physical condition, weak technical skills, a lack of tactical understanding, or a mental deficiency in a player, depending on his or her position on the pitch and the patterns of play and instructions from the coaches. To succeed at the highest level of modern soccer, certain qualities are essential. When a player fails to meet the

required standards in one of these qualities, this can have an impact on the team's overall performance (Abarghoueinejad et al., 2021). A player who cannot fulfill his role will upset the collective balance (Gréhaigne & Godbout, 2021), depending on the positions occupied on the pitch and the strategies put in place by the coach.

To date, different training methods have been used to improve physical performance in soccer (Milanovic et al., 2015; Morgans et al., 2018). In addition, matching these training models with players' general skills can promote progression during matches. Today, more and more soccer coaches are opting for reduced games as a teaching method. Games played in small groups with position are essential for the development of young footballers during their training. Through these exercises, young players have the opportunity to come into contact with the ball more frequently, thus improving their ball handling skills, and to develop understanding of space and movement, as well as overall game intelligence in relation to physical, technical, tactical, and mental performance; an alternative proposed is reduced games with position (RGP). This approach offers a more realistic representation of the game than conventional reduced games or traditional training. In recent years, there has been an increase in the popularity of RGP due to their ability to recreate real game situations (Olthof et al., 2015).

Reduced games with position (RGP), on the other hand, aim to strengthen the specific skills of players within a team, using small groups. These games are characterized by a reduced number of players and a smaller playing surface, and a positioning of players in the different sections of the field while respecting the roles defined by the coach, namely roles in defense, midfield, and attack. This positioning promotes interactions between players in restricted spaces. The aim is to mimic the movements and displacements observed in real game situations (Clemente et al., 2014).

High-intensity reduced games with position (RGP) enhance players' fitness, both aerobically and anaerobically. Kokstejn et al. (2024) observed that even low-intensity games can improve overall fitness, as players continuously perform high-intensity actions within them. Furthermore, these types of games contribute to the development of endurance, speed, and agility, essential qualities for excelling in soccer (Clemente et al., 2021). By reducing the number of players, RGP also offer participants the opportunity to become more involved in the game. Extensive studies have suggested that they can be used to improve physical skills in restricted game environments, which require reactions and quick decision-making. The comparison is made between intensive playing conditions, and this helps to improve players' overall fitness.

In terms of technical performance, several studies highlight the technical benefits of RGP for young players. According to Sarmento et al. (2018), it was found that young players involved in RGP experienced notable improvements in their technical performance, as well as in their ability to understand the tactical aspects of the game. Players need to develop technical skills such as ball control, passing accuracy, and their ability to maintain possession in a tight space despite pressure. This is crucial to their personal and collective technical training, as it helps them improve not only their individual performance but also harmonize their actions with those of the team (Sgrò et al., 2018; Praça, G et al., 2016).

Role-playing on the pitch helps players acquire skills and try out different tactical combinations and approaches. By encouraging players to make quick and accurate decisions, this improves their tactical understanding of the game. According to Ometto et al. (2018), players are able to adapt quickly to changes in the game and respond better to tactical challenges posed by their opponents thanks to these direct experiences. RGP are a derivative version of classic RGP. They require greater mobility while observing the positions assigned to each player. In a live role-playing game, progression depends on the position occupied by the player, the transitions made, individual technical skills, and the collective intelligence of the players.

It can be advantageous to use traditional training methods to improve individual technical skills. According to Slaidins and Fernate (2021), it is suggested that repeated practice of individual exercises can lead to significant improvements in technical skill. In 2021, Oliva-Lozano and his team made an interesting discovery of traditional training that proved to be particularly effective in improving both shooting accuracy and dribbling skills (Oliva-Lozano, 2021).

While these methods may improve specific skills, they may not guarantee the contextual application that is offered by RGP. According to Grün (2016) and More-Chevalier (2020), it is possible for players to succeed in acquiring a technical skill but encounter difficulties when it comes to applying it effectively in a real match situation.

Researchers advocate an integrated approach because of the unique advantages offered by RGP and traditional training methods. According to Clemente et al. (2021), by combining the contextual and decision-making advantages of RGP with conventional training methods geared towards improving targeted skills, it is possible to develop a more comprehensive training program. This hybrid approach ensures that players improve their physical and technical skills while developing tactical understanding, contributing to an overall improvement in performance.

Taking these various observations into account, it is clear that reduced games with position can help improve the physical, technical, tactical, and mental skills of young soccer players in training. This study aims to analyze the impact of RGP on the development of physical and technical qualities in young players in training. We seek to determine whether RGP can provide a significant competitive advantage over traditional training methods.

Materials and Methods

Study Participants

The study included 40 soccer players in the under-17 category from a team of 20 players from the federal club of Kenitra and another team of 20 players from the federal club of sale, Morocco, with at least 3 years' experience in competitions. They were selected by their technical manager, so that the teams would be balanced in terms of player positions (defenders, midfielders and strikers). This precaution was taken to enable the teams to maintain a high level of competitiveness and concentration during the matches. To reduce variability between participants, the same teams trained 3 times a week. During the sessions, training with

reduced games with position was introduced into the program for the experimental team, and conventional training for the control team. All participants were tested as part of the team training program. Data were collected between winter and spring (December 2023-March 2024). The study was approved by the local ethics committee, and all participants were informed of the experimental protocol and gave informed consent for participation in the study. Appropriate ethical standards were observed.

Protocol

To measure the influence of reduced games with position on players' physical and technical qualities, the researcher set up a series of tests. These tests, carried out before and after a 12-week training intervention based on RGP for the experimental group and conventional training for the control group, were designed to assess the players' physical and technical performance. Anthropometric measurements only describe the characteristics of the sample; this parameter is not taken into account in the study, serving only to show the balance between the players of the two teams, a yo-yo test (YYIRT1) to determine maximum aerobic speed (MAS), assessment of muscular power and elasticity of the lower limbs using the squat jump test (SJ) and the counter movement jump test (CMJ). Linear and angular velocity were assessed over distances of 10 m, 20 m linear and 20m with change of direction. Technical tests using the Loughborough Soccer Passing Test (LSPT) for ball control and the Loughborough Soccer Shooting Test (LSST) for shooting, and a game test in the form of an official match (treatment team and control team). The same tests will be repeated after 12 weeks of training to assess the effect of reduced games with position on the players' physical and technical performance.

Design

The first game situation [situation 1: maintaining possession of the ball: Rondo] was conducted according to a set of game rules. The second game situation [situation 2: ball possession in a defense, midfield and attack configuration, example 5vs5 with the following layout (2-1-2)], the third game situation [situation 3: Rondo with transition 6vs6 with a configuration: 4vs2(1-2-1vs2) in a square, which becomes a 6vs4(2-2-2vs4) on a rectangular pitch that projects to a 6vs4+2(2-2-2vs4+2)] and the fourth specific game situation [situation 4: 7vs7(2-3-2, with goalkeeper)] matches, in the different game situations we used configurations without goal and with small and large goal. This study did not analyze goalkeeper performance. The games were preceded by 15 minutes of standardized warm-up and took place in the afternoon.

Physical Tests

Yo-Yo Intermittent Recovery Test (YYIRT1): This is a field test designed to measure players' aerobic capacity. The yo-yo test was carried out on a synthetic pitch. The test consisted of two repeated runs of 20 m (out and back) at progressively increasing speed, controlled by a sound signal from a tape recorder and separated by a 10-second recovery time. Running speed was increased in stages, and players continued the test until they were no longer able to keep up with the pace imposed by the audio file. When a player failed to reach the finish line on time on two consecutive occasions, the distance covered (m) was recorded as the test result. The test was preceded by a standardized 10-minute warm-up (Gogte, Srivastav, & Miyaru, 2017).

Linear sprint speed test: Players performed two linear sprints over distances of 10m and 20 m. The fastest time of the two trials was recorded for the final analysis (Drozd, Krzysztofik, Nawrocka, Krawczyk, Kotuła, Langer, & Maszczyk, 2017).

Speed of change of direction (VCD) test: Georges Cazorla's VCD test is a football-specific tool for assessing players' ability to change direction and re-accelerate at high speed. The course measures 20 meters in actual running, but the actual distance covered is 16 meters. The player had to complete the course as quickly as possible, making 4 changes of direction. Players conducted two trials, and the fastest result was selected for further analysis. An adequate warm-up is crucial for preventing injuries prior to the test. A proper warm-up is essential before carrying out the test.

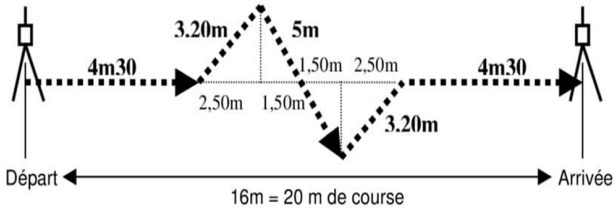

Fig. 1. Schematic representation of the speed test with direction change (Semenick, 1990)

Vertical jump tests: the vertical jump test is widely used to assess leg strength. Measurements were taken prior to the squat jump (SJ) and counter-movement jump (CMJ) training programs. For the SJ, players remained in a static semi-squat position with a knee flexion angle 90 for 1 second before executing a maximal vertical jump. For the CMJ, players started in a standing position and had to perform a downward movement to a semi-crouched position followed by a full, explosive vertical extension of the legs. Hands on hips during SJ and CMJ. Players performed two jumps and the average of the two jumps was taken for the final analysis. To assess jump height, Opto-jump and the My jump application were used to deduce jump height.

Technical Tests

Loughborough Soccer Pass Control Test (LSPT): The LSPT test was developed and validated by Ali, Foskett, and Gant (2008) to assess various football-related technical skills (Figure 2). The LSPT examines various soccer skills, including the assessment of passing accuracy and technique. Assessment of a player's ability to handle the ball in motion. Evaluation of the speed with which a player processes information and makes decisions during play. This is a comprehensive test that provides information on a soccer player's general skills. Players started the LSPT with the ball

in the center of the test area, then were asked to complete 16 passes against benches with colored parts on each bench. LSPT performances included the original time to determine the 16 passes, the penalty time, and the execution time. Players were asked to complete the test as quickly as possible with the fewest errors.

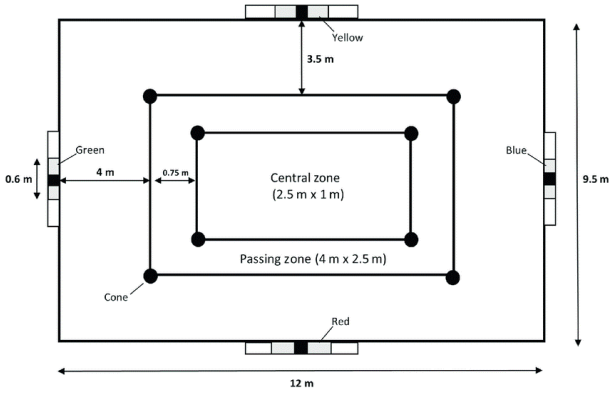

Fig. 2. Schematic representation of the Loughborough Soccer passing Test (LSPT)

Loughborough Soccer Shooting Test (LSST): The Loughborough Soccer Shooting Test (LSST) is widely used to assess footballers' shooting skills (figure 3). It combines performance time with positive and negative point scoring for technical performance as well as errors. The LSST was designed to assess a player's accuracy, strength and consistency when shooting at goal.

Statistical Analysis

Data were analyzed by the repeated-measures ANOVA II test, and post hoc analyses (pairwise comparison) were analyzed by the Bonferroni test. All data analyses were performed with SPSS 24 (IBM Corp., Armonk, NY, USA). A significance level of 5 % was adopted for cases.

Results

The results in Table 1 highlight the impact of training on the physical performance of both the experimental and control groups, using repeated measures via ANOVA II, followed by Bonferroni post hoc tests. The results reveal significant improvements in several parameters for the experimental group, while the control group shows little change.

Analysis of changes in the physical variables of young footballers in training

Maximum Aerobic Speed (VMA). The results show an increase in VMA for both groups after training. Repeated measures ANOVA revealed a significant effect of training ($F_{(1,34)} = 18.602$, $p < 0.001$), but the interaction between training and groups was not significant ($p = 0.811$). Post hoc comparisons indicate a significant average increase in VMA for the experimental group, rising from 15.749 to 15.932, representing a significant increase of 1.16 % ($p_{bonf} < 0.0041$).

10-meter speed. Analysis of 10-meter speed performance showed a significant decrease in time for the experimental group (from 2,072 to 1,971 seconds), corresponding to a reduction of 4.87 %, while the control group remained stable. Repeated measures ANOVA revealed a significant effect of training ($F_{(1,34)} = 45.061$, $p < 0.001$) and a significant interaction between training and groups ($F_{(1,34)} = 9.222$, $p = 0.005$). Post hoc tests confirmed that the reduction in speed time was significant for the experimental group ($p_{bonf} < 0.001$).

20-meter speed. A similar trend was observed for 20-meter speed, with a decrease in time for the experimental group (from 3,470 to 3,392 seconds), a reduction of 2.25 %, and stability for the control group. ANOVA showed a significant effect of training ($F_{(1,34)} = 11.719$, $p < 0.002$), but the interaction between training and groups was not significant ($p = 0.328$). Post hoc tests show a significant decrease for the experimental group ($p_{bonf} < 0.001$).

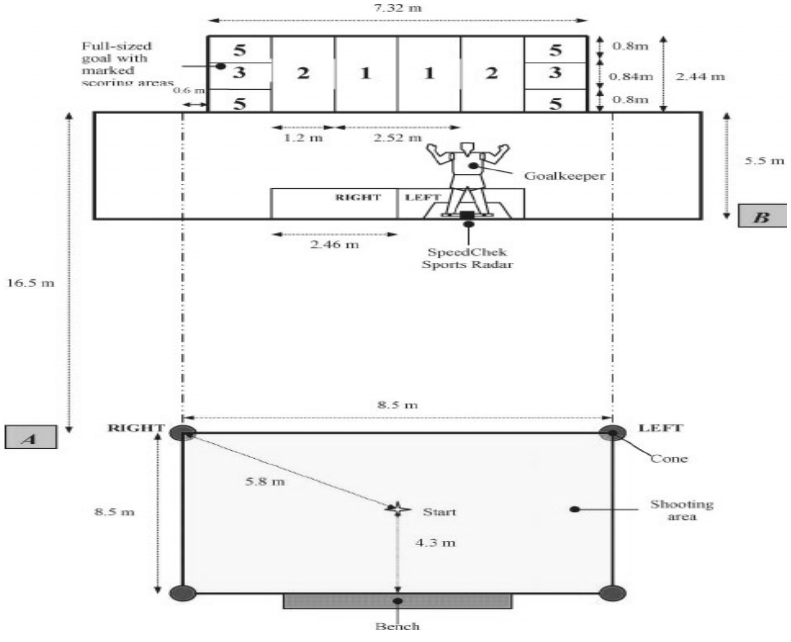

Fig. 3. Schematic representation of the Loughborough Soccer Shooting Test (LSST)

Table 1. Effect of a 12-week training program based on reduced games with position versus a traditional training program on the physical qualities of players in training

Variables	Group	Pré	Post	Cohen d	ANOVA p-value (n^2)		
					Formation	Group	Formation x group interaction
VMA	Control	15.705	15.910	-0.268	<.001 (0.001)	0.896 (0.004)	0.811 (0.005)
	Exp	15.749	15.932	-0.240			
V10 m	Control	2.092	2.053	0.374	<.001 (0.102)	0.125 (0.054)	0.005 (0.021)
	Exp	2.072	1.971	0.992			
V20 m	Control	3.851	3.709	0.423	0.002 (0.022)	0.003 (0.217)	0.328 (0.002)
	Exp	3.470	3.392	0.233			
VCD20 m	Control	5.864	5.761	0.464	<.001 (0.087)	0.515 (0.011)	0.023 (0.005)
	Exp	5.847	5.681	0.742			
SJ	Control	34.889	36.556	-0.236	<.001 (0.012)	0.931 (0.001)	0.620 (0.001)
	Exp	35.222	36.611	-0.197			
CMJ	Control	38.222	39.556	-0.179	<.001 (0.016)	0.991 (0.003)	0.012 (0.001)
	Exp	37.667	40.056	-0.321			

VMA: maximun aerobic spead; V10 m: linear sprint speed test; V20 m: linear sprint speed test; VCD20 m: speed of change of direction; SJ: squat jump; CMJ: countre mouvement jump

20-meter speed with change of direction. For angular 20-meter speed, the results also indicate a significant reduction in time for the experimental group (from 5,847 to 5,681 seconds), representing a reduction of 2.84 %, but not for the control group. Repeated measures ANOVA reveals a significant effect of training ($F_{(1,34)}$ = 106.808, p < 0.001) and a significant interaction ($F_{(1,34)}$ = 5.672, p = 0.023). Post hoc comparisons confirmed that the improvement was significant for the experimental group (p_{bonf} < 0.001).

Squat jump (SJ). Regarding static jump performance, a significant increase was observed for the experimental group (from 35.222 to 36.611 cm), i.e. an increase of 3.94 %, while the control group remained stable. ANOVA shows a significant effect of training ($F_{(1,34)}$ = 30.303, p < 0.001), but no significant interaction (p = 0.620). Post hoc results indicate that the increase in SJ is significant for the experimental group (p_{bonf} < 0.001), although training improved jumping performance for both groups.

Countermovement jumping (CMJ). Finally, the increase in countermovement jumping (CMJ) performance was also significant for the experimental group (from 37.667 to 40.056 cm), representing an increase of 6.34 %. ANOVA revealed a significant effect of training ($F_{(1,34)}$ = 87.817, p < 0.001) and a significant interaction between training and groups ($F_{(1,34)}$ = 7.062, p = 0.012). Post hoc tests confirmed that the increase was significant for the experimental group (p_{bonf} < 0.001), suggesting that this type of training has a specific positive influence on CMJ for this group.

Analysis of changes in the technical variables of young footballers in training

With regard to technical performance, the results in Table 2 highlight the impact of training on the technical performance of both the experimental and control groups, using repeated measures via ANOVA II, followed by Bonferroni post hoc tests. The results reveal significant improvements in several parameters for the experimental group, while the control group shows little improvement.

Number of passes. The results show a significant increase in the number of passes for the experimental group after training, rising from 10,000 to 12,667, an increase of 21.05 %. In contrast, the control group remained stable. The repeated measures ANOVA indicates a significant effect of training ($F_{(1,34)}$ = 39.535, p < 0.001) and a significant interaction between training and groups ($F_{(1,34)}$ = 4.421, p = 0.043). Post hoc tests confirmed that the increase was significant for the experimental group (p_{bonf} < 0.001).

Pass control time. The experimental group showed a significant reduction in pass control time, from 49.284 to 43.012, a reduction of 12.73 %, while the control group remained stable. Repeated measures ANOVA revealed a significant effect of training ($F_{(1,34)}$ = 39.014, p < 0.001) and a significant interaction between training and groups ($F_{(1,34)}$ = 28.689, p < 0.001). Post hoc comparisons show that this reduction is significant for the experimental group (p_{bonf} < 0.001).

Shooting with the right foot. Right-foot shooting performance increased significantly for the experimental group, from 7.833 to 12.500, representing an increase of 59.58 %, while the control group remained stable. ANOVA shows a significant effect of training ($F_{(1,34)}$ = 73.174, p < 0.001) and a significant interaction between training and groups ($F_{(1,34)}$ = 35.545, p < 0.001). Post hoc results indicate that the increase is significant for the experimental group (p_{bonf} < 0.001).

Shooting with the left foot. Shooting with the left foot also showed a significant increase for the experimental group, rising from 5.833 to 10.056, an increase of 72.40 %. The control group remained stable. Repeated measures ANOVA revealed a significant effect of training ($F_{(1,34)}$ = 74.293, p < 0.001) and a significant interaction ($F_{(1,34)}$ = 23.885, p < 0.001). Post hoc comparisons show that the increase is significant for the experimental group (p_{bonf} < 0.001).

Table 2. Effect of a 12-week training program based on reduced games with position versus a traditional training program on the technical qualities of players in training

Variables	Group	Pré	Post	Cohen d	ANOVA p-value (n^2)		
					Formation	Group	Formation x group interaction
NBR PASSE	Control	9.941	10.611	-0.391	<.001 (0.175)	0.043 (0.070)	<.001 (0.063)
	Exp	10.000	12.667	-1.566			
TPS DE CONTROLE	Control	49.361	48.879	0.122	<.001 (0.131)	0.018 (0.101)	<.001 (0.096)
	Exp	49.284	43.012	1.594			
TIR P D	Control	7.889	8.722	-0.249	<.001 (0.133)	0.091 (0.061)	<.001 (0.064)
	Exp	7.833	12.500	-1.394			
TIR P G	Control	5.833	7.000	-0.380	<.001 (0.153)	0.126 (0.049)	<.001 (0.049)
	Exp	5.833	10.056	-1.376			
TPS T P D	Control	9.363	9.236	0.136	<.001 (0.045)	0.186 (0.041)	0.018 (0.022)
	Exp	9.254	8.559	0.741			
TPS T P G	Control	9.190	9.184	0.007	0.447 (0.005)	0.498 (0.010)	0.473 (0.004)
	Exp	9.132	8.921	0.257			

$p < 0.05$, LSPT: Loughborough soccer pass control test; LSST: Loughborough soccer shooting test; NP: number of pass; PCT:pass control time; SRF: shooting with the right foot; SLF: soothing with the left foot; STRF: shooting time with the right foot; STLF: shooting time with the left foot

Shooting time with the right foot. The time taken to shoot with the right foot decreased significantly for the experimental group, from 9.254 to 8.559, a reduction of 7.51 %, while the control group remained stable. The ANOVA shows a significant effect of training ($F_{(1,34)} = 13.020$, $p < 0.001$) and a significant interaction ($F_{(1,34)} = 6.184$, $p = 0.018$). Post hoc tests confirm that this reduction is significant for the experimental group ($p_{bonf} < 0.001$).

Shooting time with left foot. Performance in terms of shooting time with the left foot also showed a decrease for the experimental group, from 9.132 to 8.921, a reduction of 2.31 %. However, the effects of training and the interaction between training and groups were not significant ($F_{(1,34)} = 0.591$, $p = 0.447$, and $F_{(1,34)} = 0.527$, $p = 0.473$ respectively). Post-hoc tests show that the decrease is not significant ($p_{bonf} = 1.000$), although performance did decrease slightly for the experimental group.

The overall results of the study show that the training significantly improved both the technical skills and physical performance of the young footballers in the experimental group, compared with the control group. Notable improvements were observed in the number of passes, shooting accuracy with both feet, as well as significant reductions in pass control time and shooting time with the right foot. In terms of physical performance, significant improvements were observed in maximum aerobic speed (VMA), speed over 10 and 20 meters, angular velocity over 20 meters, as well as in squat jump (SJ) and countermovement jump (CMJ) abilities.

The results of statistical tests, including repeated measures ANOVA and Bonferroni post hoc tests, supported by percentages of change, confirm the effectiveness of the training methods used to optimize technical and athletic performance. However, the differences observed between groups for certain variables, such as speed and CMJ jumping ability, suggest that specific, targeted training approaches may be required to maximize gains in different areas of performance. These findings highlight the importance of tailored training strategies to improve both technical skills and physical abilities in the context of soccer.

Discussion

To the best of our knowledge, this is the first study to compare the effects of reduced games with position (RGP) versus traditional training applied during the competition period on the physical and technical qualities of players in training. The initial hypothesis was that RGP, with characteristics and rules similar to those of competition, would provide strong evidence supporting the effectiveness of reduced games with position (RGP) in improving the physical and technical performance of young soccer players compared to traditional training methods. RGP offer a more integrated and realistic approach, improving various performance parameters more effectively (Sarmento, Clemente et al., 2018; Olthof, Frencken, & Lemmink, 2015).

The results of the study showed that there were significant differences in the pre-test and post-test for the experimental group using the reduced position sets. These results indicate that several factors influenced the improvement in subject performance for the experimental group at posttest. The factors influencing the improvement in player performance were the implementation of training sessions over 12 weeks and the process of training in the reduced position game throughout the experimental period.

The study showed that 12 weeks of training based on reduced games with position at maximum intensity significantly improved all the physical performance characteristics tested ($p < 0.05$). RGP, due to their high intensity and short recovery periods, also promote speed endurance. This translate into a better ability to maintain

high speed over extended periods. Akdoğan, Yılmaz, Köklü, Alemdaroğlu, and Cerrah (2021) found that RGP improve speed endurance, and more recent studies confirm this observation, indicating a better ability of players to repeat intense efforts (Castillo et al., 2021). The 10 m and 20 m sprint results are in line with those of Rebelo, Silva, Rago, Barreira, and Krustrup (2016), who showed that regular RGP sessions increase players' maximum speed through frequent repetitions of short sprints. Similarly, more recent studies confirm these findings, indicating a significant improvement in maximum speed after prolonged periods of RGP (Hammami, Gabbett, Slimani, & Bouhlel, 2018). The present study indicated that training based on reduced games with position also affected 20 m speed with a change of direction.

The more restricted environment and density of players force participants to react quickly to a variety of stimuli, improving their reaction speed. A study by Querido and Clemente (2020) observed that players trained with RGP showed significant improvements in acceleration compared to those trained with traditional methods. These findings are supported by recent research showing that RGP can increase reaction speed through frequent exposure to intense game situations (Bujalance-Moreno, Latorre-Román, & García-Pinillos, 2018).

RGP are known to increase exercise intensity, raising heart rate and oxygen consumption (Sarmento et al., 2018). These conditions favor the development of physical qualities such as power and explosiveness. The squat jump is an indicator of the explosive strength concentrated in the legs. RGP, because of their requirement for rapid changes of direction and short sprints, can improve lower limb strength. A study by Rebelo, Silva, Rago, Barreira, and Krustrup (2016) showed that players who regularly participated in RGP improved their squat jump (SJ) performance. More recent research corroborates these findings, indicating significant gains in explosive strength after periods of RGP training (Hammami et al., 2018). For example, the countermovement jump (CMJ), which measures elastic power and leg explosiveness using a stretch-shortening cycle, can improve CMJ performance. Springham et al. (2024) observed significant improvements in CMJ performance after regular RGP sessions. Other recent studies support these findings, showing gains in explosive power and jump height after RGP training (Bujalance-Moreno et al., 2018).

RGP significantly improved VMA (1.16 %), 10 m linear speed (4.87 % reduction), 20 m speed (2.25 % reduction), 20 m speed with change of direction (2.84 % reduction), SJ vertical jump height (3.94 % increase), and CMJ (5.96 % increase) compared with traditional training. Consequently, the results of this study reveal that RGP may be more appropriate than traditional training for improving the physical performance of young soccer players in training.

RGP have also proven effective in improving technical skills, as evidenced by the LSPT and LSST results. Frequent interaction with the ball and realistic game scenarios in RGP help players develop better ball control, passing accuracy, and shooting accuracy (Clemente & Sarmento, 2020). Our data showed that selected players increased the number of post-test passes ($p < 0.001$). Reduced play has been shown to increase the frequency of interactions with the ball, providing more opportunities to practice passing. The more restricted environment of the RGP requires greater precision and speed in passing. A study by Sarmento et al. (2018) showed that RGP significantly improve passing accuracy through the repetition and intensity of playing situations. Furthermore, recent research indicates that RGP can increase the number of successful passes due to the constant pressure exerted by opponents (Sarmento et al., 2018). Our results for this study in reduced games with position are consistent with previous studies, as players in pressing situations can move according to their positions on the pitch, which implies intelligent movement that enables them to be effective in controlling passes.

What's more, players are constantly under pressure in the RGP. Ball control, which is a key skill in passing mastery, poses many problems for young players in training, as they have to make quick decisions to pass the ball to their partner in the best possible conditions. RGP offer an ideal framework for improving initial control and ball handling. Rebelo, Silva, Rago, Barreira, and Krustrup (2016) found that players who regularly participated in RGP showed a significant improvement in ball control. Recent studies confirm these results, highlighting that RGP increase the frequency and quality of ball touches (Bujalance-Moreno et al., 2018).

As far as shooting is concerned, RGP increase the number of shooting situations due to the constant proximity of the goal. Players often have to shoot under pressure, which improves their ability to take accurate, powerful shots in matches. This confirmation is consistent with our results. Rusdiana, Rahmatillah, and Asidik (2017) found that RGP promote improved shot accuracy and power. Other recent research shows that RGP training can increase the number of shots attempted and taken in matches due to frequent opportunities to practice this technical skill (Hammami, Gabbett, Slimani, & Bouhlel, 2018).

The results indicated that the experimental group had significantly higher values than the control group. RGP offer additional advantages over traditional training, as they integrate physical and technical aspects into the game, enabling players to develop specific skills in relation to the actual game of the match while improving the tactical side (Sgrò, Bracco, Pignato, & Lipoma, 2018). What's more, the variety of RGP formats means that sessions can be tailored to players' specific needs (Halouani, Chtourou, Gabbett, Chaouachi, & Chamari, 2014).

This study has certain limitations. It involved two teams of 20 players (experimental team and control team), which constitutes a small sample size. In addition, the level of the players could influence the results of the study. Furthermore, the assessment of off-game performance and the impact of the game context in terms of field size, number of players, and specific rules applied (Santos et al., 2018; Clemente et al., 2023) could limit the results obtained. Secondly, it is important to note that our study was conducted in a single club. Consequently, the results should be interpreted with caution, as they may not apply to all clubs in Morocco. Future research should include larger samples involving multiple clubs to enhance the generalizability of results and reduce specific biases related to the skill level of a single group of players. Additionally, it would be pertinent to diversify participant profiles by including varying levels of skill and experience, to explore the impact of small-sided games (SSGs) across a wider range of players.

It would also be useful to conduct longitudinal studies that allow the observation of SSG effects over extended periods. By tracking players over multiple seasons, researchers

could assess the long-term effects of SSGs on players' technical, physical, and tactical performance compared to traditional training.

Furthermore, an in-depth analysis of contextual variables, such as field size, the number of players, and specific rules, could provide a better understanding of their influence on SSG outcomes. Future research could therefore explore different SSG formats, adjusting these parameters to optimize training according to specific objectives (e.g., developing game vision, pressing ability, or endurance).

Finally, to enrich the understanding of SSG impacts, it would be beneficial to integrate more precise measurement tools, such as GPS technology to track players' movements, or video analysis to examine tactical behaviors. These methods could provide more detailed quantitative and qualitative data on observed improvements, allowing for more tailored adaptation of SSGs to the individual needs of players and the specific characteristics of each game context.

Conclusions

This study shows that twelve weeks of training with reduced games with position during the competition period improves physical and technical qualities. Indeed, our results indicate that a twelve-week training program with 3 weekly sessions of reduced games with position aimed at improving endurance, muscular strength and power, linear sprinting and speed with change of direction, as well as specific technical skills, ball control, passing and shooting, led to significant improvements in young footballers in training. Our results may help soccer coaches to better select the most effective training methods during the competition period.

Conflict of Interest

The authors state that they have no competing interests.

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Порівняльний аналіз впливу редукованих позиційних ігор та традиційного тренування на показники фізичної та технічної результативності юних футболістів у процесі підготовки

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 10 с., 2 табл., 3 рис., 33 джерела.

Історія питання. Впровадження редукованих позиційних ігор як методу тренування в сучасному футболі є важливим визначальним чинником вдосконалення та розвитку навичок юних футболістів у процесі підготовки.

Мета дослідження. Метою дослідження було визначити вплив 12-тижневого періоду застосування редукованих позиційних ігор на показники фізичної та технічної результативності юних футболістів під час тренувань.

Матеріали та методи. У дослідженні взяли участь 40 футболістів чоловічої статі, які тренуються в клубі CFC, що представляє національний чемпіонат Марокко U17. Відповідно до клубної приналежності, гравців було розподілено на експериментальну групу, в якій застосовувалася практика редукованих позиційних ігор, та контрольну групу, яка займалася в рамках традиційних тренувань. Обидві команди брали участь у тренувальних заняттях тричі на тиждень протягом 12 тижнів. Кожне заняття тривало 90 хвилин. Перед початком і після завершення курсу обидві групи виконували тести з фізичної підготовки (Yo-Yo інтервальний тест на визначення рівня загальної фізичної витривалості, лінійний спринт на 10 м, 20 м і 20 м зі зміною напрямку, стрибок із положення присіду, вертикальний стрибок із контррухом), а також тести з оцінки рівня технічної підготовки (LSPT — The Loughborough Soccer Passing Test, Лафборський тест на визначення точності пасів; LSST — The Loughborough Soccer Shooting Test, Лафборський тест на визначення точності ударів), під час яких оцінювалися всі показники, досягнуті учасниками обох груп. З метою кількісної оцінки результатів використовувалися наступні програми: OptoJump (оптична система контролю та аналізу кінематичних характеристик локомоторних рухів спортсменів), додаток My Jump (технологія вимірювання результативності стрибків) та матриця контролю технічних елементів.

Результати. Результати дослідження виявили значне покращення показників максимальної аеробної швидкості (МАШ) ($p < 0,001$; $n^2 = 0,017$); спринті на 10 м ($p < 0,001$; $n^2 = 0,102$), спринті на 20 м ($p = 0,002$; $n^2 = 0,022$), спринті на 20 м ($p < 0,001$; $n^2 = 0,022$), спринті на 20 м зі зміною напрямку ($p < 0,001$; $n^2 = 0,087$), а також збільшення висоти стрибків із положення присіду ($p < 0,001$; $n^2 = 0,012$) і вертикальних стрибків із контррухом ($p < 0,001$; $n^2 = -0,016$). Порівняно з результатами Лафборського тесту на визначення точності пасів, в експериментальній групі спостерігалося збільшення кількості передач м'яча ($p < 0,001$; $n^2 = 0,175$) і суттєве поліпшення показників контролю пасів ($p < 0,001$; $n^2 = 0,131$). За результатами Лафборського тесту на визначення точності ударів, встановлено значне підвищення результативності ударів ($p = 0,001$; n^2 (права нога) = 0,045; n^2 (ліва нога) = 0,049) та зменшення часу виконання ударів ($p = 0,001$; n^2 (права нога) = 0,045, n^2 (ліва нога) = 0,005). Post-hoc тести продемонстрували, що тренування із застосуванням редукованих позиційних ігор призвело до суттєвого покращення показників у виконанні стрибків із положення присіду, вертикальних стрибків із контррухом, спринті на 10 м, спринті на 20 м, спринті на 20 м зі зміною напрямку, а також результатів проведення LSPT та LSST.

Висновки. Отримані дані вказують на значне поліпшення показників фізичної та технічної результативності юних футболістів у процесі підготовки за 12-тижневою програмою тренувань на основі редукованих позиційних ігор, що передбачало проведення 3-х тренувальних занять на тиждень. Таким чином, тренерському складу та тренерам з фізичної підготовки рекомендується включити тренувальні заняття на основі редукованих позиційних ігор до програми річного циклу підготовки команди.

Ключові слова: тренування, редуковані позиційні ігри, юні футболісти, фізичний, технічний.

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