Running technique is more effective than soccer-specific training for improving the sprint and agility performances with ball possession of prepubescent soccer players

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ABSTRACT: Soccer-specific training is easily associable to players' sprint abilities demonstrated during a match. However, no clear evidence has been provided to show whether this approach is more effective than training focused on running techniques for sprints in prepubescent soccer players. Thus, the present study aimed at comparing the effects of these two training approaches on prepubescent soccer players' sprint performances. Ninety-five players (10±2 years) competing in local (Piedmont, Italy) Under-9 (N=21), -10 (N=24), -11 (N=25) and -13 (N=25) championships were recruited for the study. Sixty-three and 32 players were included in the running training group (RTG) and soccer-specific group (SSG), respectively. Before (PRE) and after (POST) the training period (2 weekly sessions for 12 weeks), sprint abilities were evaluated by means of four 20-m sprint tests: linear sprint (20-mL), linear sprint with ball possession (20-mLB), sprint with change of direction (20-mCoD), sprint with change of direction and with ball possession (20-mCoDB). A linear mixed model was applied to evaluate differences (P≤0.05) between the RTG and SSG in the four tests and categories, comparing PRE and POST performances. A main effect emerged for the interaction between groups, sessions (p=0.014; Between PRE ES range=0.03, 0.85; Within PRE-POST ES range=-0.45, 0.09), highlighting a POST improvement of RTG for the 20-mLB (Δ=-7.9%; ES=0.85) and 20-mCoDB (Δ=-5.9%; ES=0.33). In contrast, no improvements emerged for the SSG. The present findings indicate that the training approach of the RTG is more able to improve prepubescent soccer players' sprint performances than that of the SSG, with the emphasis on ball possession executions, which are particularly game-related.

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INTRODUCTION

Soccer is an intense multi-directional and intermittent field sport. During a match, youth players typically cover a variable distance ranging from about 2 to 10 km depending on the considered age [1]. Moreover, youth players cover a total distance during sprinting ranging from about 100 to 300 m with frequency ranging from about 7 to 61 [1]. For example, Castagna et al. [2] observed that U12 soccer players covered a mean of 468±89 m between 13.1 and 18.0 km·h-1, as well as about 33 bouts (mean time for each 2.3±0.6 s) at faster speeds than 18 km·h-1 during a match. Additionally, for the same age category, 9–11% of total match time was spent at high-intensity (movements between 10 and 13 km·h-1) [2,3]. It is well known that linear sprint and repeated sprint ability and speed of changes of direction (CoDs) are the most important factors determining success over time [4]. In particular, soccer players perform approximately 723±203 turns (on average eight per minute)

during a match with a high frequency of turns between 0° and 90° and less in the other directions [5]. In addition, CoDs are fundamental for obtaining the ball possession as well as creating and stopping goal scoring opportunities [6,7]. In fact, according to the literature [8], agility involves both cognitive (perceptual and decision-making) and CoD speed factors. In particular, running technique, anthropometrical features, leg-muscle qualities, and straight-sprinting speeds [8] are recognized as able to influence CoD ability.

In field sports, agility is defined as the open skill which consists in rapidly accelerating or decelerating in a straight line to evade an opponent, who unpredictably moves [9]. However, considering elite soccer, players usually perform CoDs with an angle generally lower than 90° [10]. As consequence, to measure or train players' agility, a timed task involving one or more changes of direction (also known as change of direction speed) is generally used, often reporting

reduced grades of relationship. For example, in male soccer players, a low correlation (r = 0.33) between 20-m straight sprint and 20-m zigzag tests has been reported [11] as well as in comparing 10-m straight sprint, flying 20-m, and 100° zigzag tests (r = 0.35 and r = 0.46, respectively) [12]. By contrast, moderate positive correlations were found between 10, 20, and 30 m sprint performances and the Illinois agility test, but not with the t-test [13]. In addition, Köklü et al. [14] observed a moderate correlation (r = 0.56) between 10 m straight-sprint and 30 m straight-sprint performance, and a strong correlation between 10 m straight-sprint and zigzag tests composed of four 5-m sections set out at 100° angles (r = 0.74), whereas zigzag agility performance with the ball was not correlated with 20-m and 30-m sprint times in young soccer players.

However, it is evident that the skills of sprinting with and without CoDs and ball possession are essential in invasion team sports such as soccer. According to the literature [9], the training of agility has relationships with physical qualities such as strength, power and technique, as well as cognitive components such as visual scanning techniques, visual scanning speed and anticipation. However, no clear finding has been provided about the effects of specific training approaches for improving the above-mentioned skills. The understanding of the real outcome of a systematic training approach, based on running technique for improving sprint capabilities with and without CoDs and ball possession, could be useful for coaches and physical trainers to propose effective exercises training in order to improve those performance factors that are recognized as important in soccer competitions. On the other hand, no clear evidence has been provided for the application of soccer-specific training characterized by soccer-drill exercises or small sided games. In particular, the latter training type is very popular not only in adult but also in young soccer players. In fact, due to the smaller pitch and the smaller number of participants during small-sided games, each player comes into contact with the ball and deals with common game situations more often [15]. These situations require good technical skills such as passing, dribbling and kicking, as well as tactical skills such as running without the ball, unmarking and cooperation with other players.

In addition, this issue is even more complex for prepubescent players who are strongly developing coordination, conditional, and technical skills. Although early specialization (sport-specific approach) in youth competition and training seems not to be useful for improving players' abilities [16], more evidence about the effect of this type of training on sprint, CoD, and ball possession skills is needed. At the same time, in prepubescent players performing team sports such as soccer, no study has evaluated the effects of a systematic training focused on running technique to the sprint and agility skills. Thus, the present study aimed at comparing the effects of training sessions systematically oriented on running technique or soccer-specific workouts in 20-m sprint tests with and without CoDs and ball possession performed by prepubescent soccer players.

MATERIALS AND METHODS

Subjects

Ninety-five soccer players (mean age = 10±2 years) and their parents were fully informed of the experimental procedures prior to providing parental written informed consent to participate in the study. In addition, the players' parents declared the maturity stage of their sons to confirm the prepubescent status (i.e., absence of pubic hairs). After that the persons conducting the study instructed players' parents about the Tanner sexual maturity standards [17].

The players were members of the boys' "*Pulcini (1st year)*" (i.e., Under-9), "*Pulcini (2nd year)*" (i.e., Under-10), "*Esordienti (1st year)*"

TABLE 1. Planning of the training exercises and rest periods between exercises provided for both subgroups (i.e., running technique, sport-specific) during the two week sessions.

Type of training	Day of week	Exercises	Rest periods between exercises
Running technique (U-9, 30±2 min; U-10, 30±2 min; U-11, 45±3 min; U-13, 45±3 min)	Tuesdays	Running patterns to improve the biomechanics of different acceleration, deceleration, and change of direction patterns, especially performed without ball possession	U-9, U-10: >3 min, to provide high intensity level; U-11, U-13: >2 min, to provide high intensity level
	Thursdays	Basic, general, multilateral techniques of movement, and game exercises aiming at improving the quality of running technique mainly with the ball possession	U-9, U-10: <2 min, no particular intensity request; U-11, U-13: <1 min, no particular intensity request;
Sport-specific (U-9, 31±3 min; U-10, 31±2 min; U-11, 46±3 min; U-13, 46±2 min)	Tuesdays	small-side games and soccer-specific technical repetitions	No systematic rest period has been planned
	Thursdays	small-side games and soccer-specific technical repetitions	No systematic rest period has been planned

(i.e., Under-11), and *"Esordienti (3rd year)"* (i.e., Under-13) teams of the *Pro Vercelli* professional Italian soccer club (all championships involving regional clubs; Piedmont, Italy). As inclusion criteria, the under-9 and under-10 players had to train for a minimum of three 60–90 min training sessions per week, with at least 2 years of previous soccer practice, whereas the under-11 and under-13 players had to train for a minimum of four 90–120 min training sessions per week, with at least 3 years of previous soccer practice. The local Institutional Review Board approved this study to evaluate the sprint performances of prepubescent soccer players.

Design

The prepubescent soccer players participating in the study were split into two subgroups for 12 weeks (from September 25, 2017 to December 17, 2017) at the beginning of the competitive season. In particular, Championship matches were performed on Saturdays in all categories from the 7th to the 12th week of the experimental interventions.

Two weekly sessions (i.e., on Tuesdays and Thursdays) were regularly planned by proposing running technique (experimental group) and soccer-specific (control group) exercises, respectively, as specifically reported in Table 1. In particular, the two systematic modalities of training were performed for half of the session duration (i.e., 60 min for U-9 and U-10, and 90 min for U-11 and U-13), whereas in the remaining half session, common exercises and games (excluding small-sided games) were practiced for all players of each category with no systematic rest period.

The criteria for splitting players into the two subgroups depended on their provenance from three different sport centres which were oriented to running technique (two) or sport-specific (one) training. This determined the unbalanced occurrence of participants among subgroups, even enhanced by the fact that not all players included in the sport-specific subgroup took part in both PRE and POST test sessions (Table 2).

Procedures

Before (PRE) and after (POST) the 12 weeks of training, sprint ability was ascertained with a dual infrared reflex photoelectric cell system ("Chrono Time", Globus; Codognè, Treviso, Italy) to record (to the nearest 0.01 s) the times of four 20-m sprint tests performed twice (the best trial was used for statistical analysis): linear sprint (20-mL), linear sprint with ball possession (20-mLB), sprint with two 90° changes of direction (20-mCoD), and sprint with two 90° changes of direction and with ball possession (20-mCoDB).

Each prepubescent soccer player began each test from a standing start with their preferred foot forward, 0.5 m from the first timing gate and the front toe on the start line. Once ready, they sprinted as fast as possible until crossing the stop line. Thus, subjects decelerated after the photoelectric cell system. The same starting procedure was used for the 20-mCoD and 20-mCoDB: once ready, each participant sprinted throughout a 20-m zigzag path (i.e., 3 x 6.67 m) performing two 90° CoDs, one to the right and one to the left, each around a 19-cm-high cone (figure 1). For the 20-mLB and 20-mCoDB, participants were instructed to keep the ball as close as possible to their body and to touch the ball at least 3 times within the 20-m distance of the test (the trial was repeated if the last request did not occur). The time taken when the subject passed the start and stop line was considered as the performance time (s).

To avoid any potential difference as a result of learning, 2 weeks before the experimental session all players were familiarized with the test procedures. All measurements were completed under similar standardized conditions on artificial turf with similar weather conditions (e.g., temperatures range: 20–25°C; not during rainy days), the same day of week and hour, and requiring (to coaches) not to provide intense exercise 48 h before measurements. In addition, prepubescent players (and their parents) were asked to be well fed and hydrated 2 hours before measurements. The same 15-min standardized warm-up before the tests (consisting of jogging and strolling locomotion with and without the ball) was guaranteed during both

TABLE 2. Age, stature, body mass, and body mass index (BMI) of the recruited prepubescent soccer players.

| Youth soccer category	Subgroup	Age (yrs)	Stature (cm)	Body mass (kg)	BMI (kg/m^2)
Under-9 years (n = 21)	Running (n = 12)	8.7±0.3	130.8±7.1	30.5±5.3	17.7±1.5
	Soccer-specific (n = 9)	8.5±0.2	130.6±2.9	26.6±2.3	15.6±1.6
Under-10 years (n = 24)	Running (n = 16)	9.5±0.3	136.1±4.9	29.1±3.9	15.6±1.4
	Soccer-specific (n = 8)	9.5±0.4	132.0±7.9	29.3±5.7	16.7±1.6
Under-11 years (n = 25)	Running (n = 17)	10.7±0.3	143.6±5.4	35.0±5.2	17.0±1.5
	Soccer-specific (n = 8)	10.4±0.3	144.3±8.1	36.0±6.6	17.2±1.5
Under-13 years (n = 25)	Running (n = 18)	12.5±0.3	158.7±8.5	46.1±6.8	18.3±1.6
	Soccer-specific (n = 7)	12.5±0.4	150.8±6.1	42.0±8.5	18.4±2.6
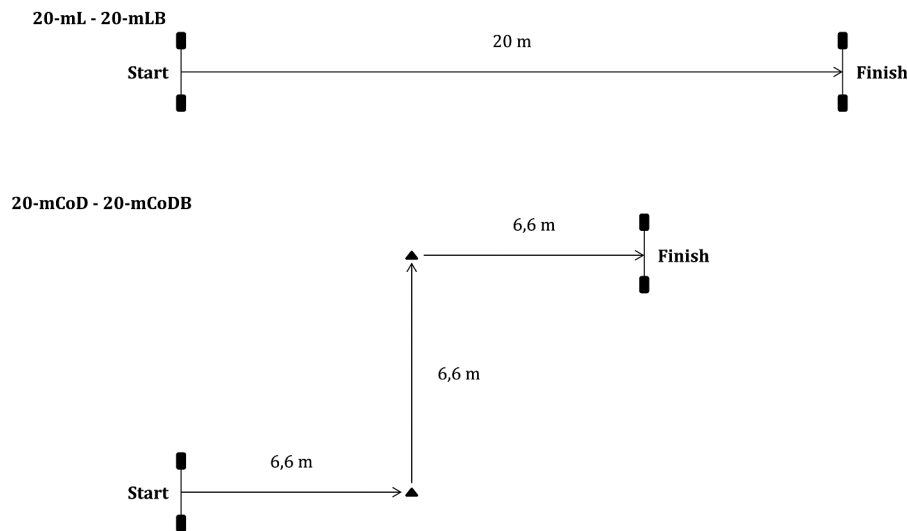
FIG. 1. Schematic representation of the 20-m linear sprint tests without (L) and with (LB) ball possession, and the 20-m sprint with change of direction without (CoD) and with (CoDB) ball possession.

TABLE 3. Estimated mean (EM), standard error (SE), and lower (LCI) and upper (UCI) confidence intervals of each group (running technique group, RTG; soccer-specific group, SSG), test (20-m linear sprint, L; 20-m linear sprint with ball possession, LB; 20-m sprint with change of direction, CoD; 20-m sprint with change of direction and with ball possession, CoDB), and session (before, after period; PRE, POST).

| Youth soccer category	Subgroup	20-mL		20-mLB		20-mCoD		20-mCoDB	
		PRE (s)	POST (s)	PRE (s)	POST (s)	PRE (s)	POST (s)	PRE (s)	POST (s)
Under-9 years (n = 21)	Running (n = 12)	4.4±0.3	4.2±0.3	6.2±0.6	5.6±0.3	6.1±0.4	5.9±0.3	9.2±1.0	8.2±0.6
	Soccer-specific (n = 9)	4.5±0.4	4.4±0.3	6.9±0.8	6.8±0.9	6.1±0.4	6.1±0.5	9.2±1.1	9.2±0.9
Under-10 years (n = 24)	Running (n = 16)	4.1±0.2	4.0±0.2	4.9±0.4	4.7±0.3	5.9±0.3	5.7±0.1	7.6±0.4	7.4±0.7
	Soccer-specific (n = 8)	4.1±0.2	4.1±0.2	6.8±0.9	6.6±1.0	5.9±0.3	5.6±0.2	8.6±0.7	8.4±1.0
Under-11 years (n = 25)	Running (n = 17)	3.9±0.2	3.8±0.2	4.7±0.3	4.5±0.3	5.4±0.3	5.3±0.3	7.1±0.7	7.0±0.7
	Soccer-specific (n = 8)	3.9±0.2	3.9±0.2	5.1±0.3	5.0±0.4	5.5±0.3	5.4±0.2	7.1±0.5	7.1±0.5
Under-13 years (n = 25)	Running (n = 18)	3.7±0.1	3.5±0.2	4.5±0.3	4.1±0.2	5.1±0.2	4.9±0.2	6.6±0.3	6.3±0.3
	Soccer-specific (n = 7)	3.8±0.2	3.7±0.2	4.9±0.5	4.9±0.3	5.3±0.1	5.5±0.2	7.0±0.7	7.5±0.3

test sessions. For both trials, the tests were performed in the same order for each player (i.e., 20-mL, 20-mLB, 20-mCoD, 20-mCoDB), and were separated by 5 minutes of rest. All the tests were conducted by the same trained investigator.

Statistical Analysis
For both groups (i.e., RTG and SSG) related to each category (i.e., U9, U11, U12, and U13), means and standard deviations were calculated in relation to each sprint test (i.e., 20-mL, 20-mLB, 20-mCoD, and 20-mCoDB) and session (i.e., PRE and POST). A t-test analysis was performed for each anthropometric parameter (i.e., height, body mass, body mass index) to exclude differences at the baseline between the experimental and control subgroup.

A linear mixed-effects model was applied to determine differences in time recorded in each sprint test between group (i.e., RTG and SSG), category (i.e., U9, U11, U12, and U13), and session (i.e., PRE and POST). Specifically, the depended variables were time recorded in each sprint test while fixed effects were group, category, session, and their respective interactions. In order to account for error for repeated measure for the same subject, participants were considered as a random intercept effect. Post hoc pairwise comparisons were performed using Bonferroni correction: firstly, only PRE performances were compared to verify that the baseline was homogeneous between groups in each category and test; secondly, PRE-POST comparisons were applied in relation to the interaction of category, group and sprint tests to verify the effects of the training period.

FIG. 2. Times and 95%CI of the prepubescent soccer players in the four performed sprint and agility test (i.e., 20-m linear sprint tests without ball, L; 20-m linear sprint tests with ball, LB; 20-m sprint with change of direction, CoD; 20-m sprint with change of direction and ball possession, CoDB) in relation to group (running technique group, RTG; soccer-specific group, SSG) and session (i.e., before the training period, PRE; after the training period, POST).
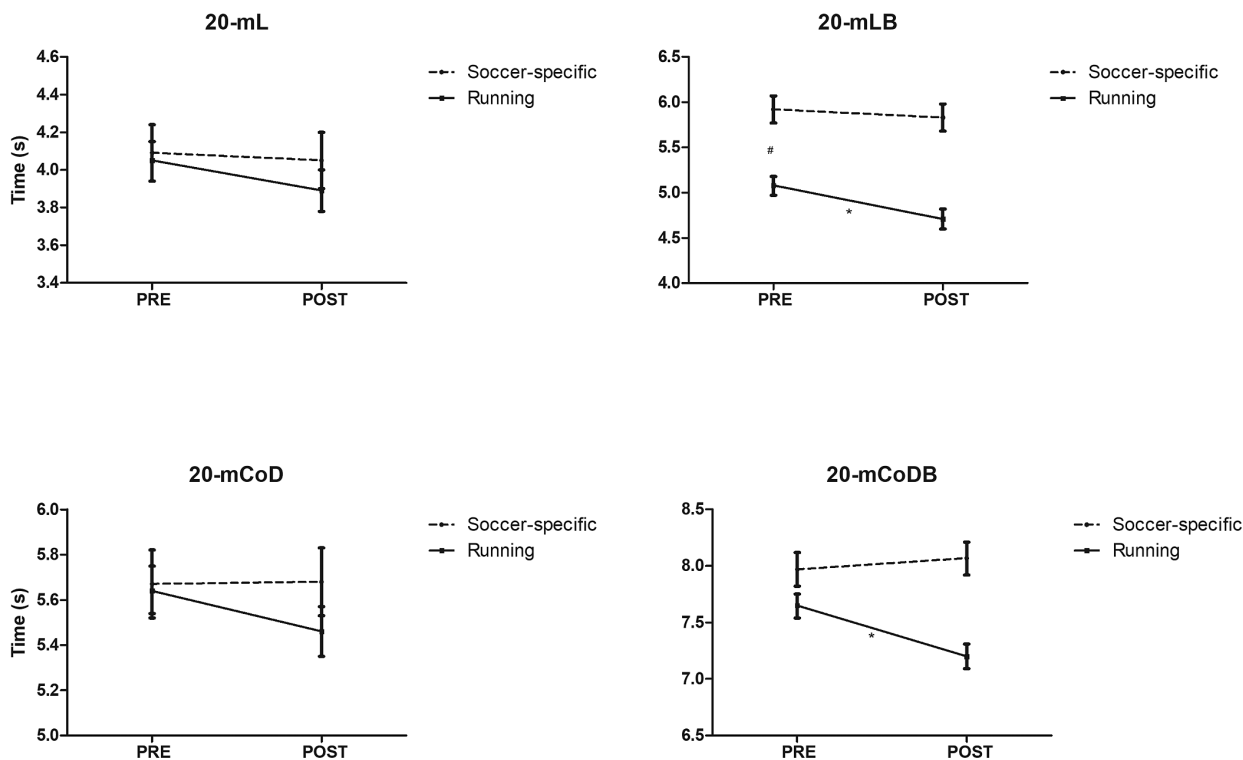
*p<0.0001 different with respect to the corresponding (same test) RTG PRE performance. #p<0.001 different with respect to the corresponding (same test) SSG PRE performance.

TABLE 4. Estimated mean (EM) and lower and upper confidence intervals [95%CI], standard error (SE), and effect size (ES) of each group (running technique group, RTG; soccer-specific group, SSG), test (20-m linear sprint, 20-mL; 20-m linear sprint with ball possession, 20-mLB; 20-m sprint with change of direction, 20-mCoD; 20-m sprint with change of direction and with ball possession, 20-mCoDB), and session (before, after period; PRE, POST).

Test	Group	Session	EM [95%CI]	SE	ES [95%CI] Between PRE	ES [95%CI] Within PRE-POST
20-mL	RTG	PRE	4.05 [3.94, 4.15]	0.0545		0.09 [-0.41, 0.59]
		POST	3.89 [3.78, 4.00]	0.0545	0.04 [-0.39, 0.47]	
	SSG	PRE	4.09 [3.94, 4.24]	0.0759		-0.16 [-0.51, 0.2]
		POST	4.05 [3.9, 4.2]	0.0759		
20-mLB	RTG	PRE	5.08# [4.97, 5.18]	0.0545		-0.37 [-0.72, -0.01]
		POST	4.71* [4.6, 4.82]	0.0545	0.85 [0.4, 1.3]	
	SSG	PRE	5.92 [5.77, 6.07]	0.0759		-0.09 [-0.59, 0.41]
		POST	5.83 [5.68, 5.98]	0.0759		
20-mCoD	RTG	PRE	5.64 [5.54, 5.75]	0.0545		-0.18 [-0.54, 0.17]
		POST	5.46 [5.35, 5.57]	0.0545	0.03 [-0.4, 0.46]	
	SSG	PRE	5.67 [5.52, 5.82]	0.0759		0.01 [-0.49, 0.51]
		POST	5.68 [5.53, 5.83]	0.0759		
20-mCoDB	RTG	PRE	7.65 [7.54, 7.75]	0.0545		-0.45 [-0.8, -0.09]
		POST	7.2* [7.09, 7.31]	0.0545	0.33 [-0.11, 0.76]	
	SSG	PRE	7.97 [7.82, 8.12]	0.0759		0.09 [-0.41, 0.59]
		POST	8.07 [7.92, 8.21]	0.0759		

*p<0.0001 different with respect to the corresponding (same test) RTG PRE performance;

#p<0.001 different with respect to the corresponding (same test) SSG PRE performance.

Finally, to provide meaningful analysis for significant comparisons, Cohen's effect sizes (ESs) were also calculated [18] for significant differences. For all significant findings, effect sizes were determined with values (negative or positive) of 0.2, 0.6, 1.2, and >1.2 indicating trivial, small, moderate, and large effect sizes, respectively [19].

The level of significance was set at 5% ($p < 0.05$). All data were analyzed using the statistical package R [version 3.5.2; 20] with the packages "lme4" [21] and "emmeans" [22].

RESULTS

Descriptive values (means and standard deviations) of each soccer player group and category in relation to performed tests and sessions are reported in Table 3. Considering each player category, no baseline differences ($p > 0.05$) between the experimental and control group emerged for the anthropometric parameters.

According to the experimental aim of the study and the applied linear mixed model, no effect ($p > 0.05$) emerged for the interaction of sessions, groups, categories, and sprint tests. However, differences were reported regardless of the category discrimination ($p = 0.014$; Between PRE ES range = 0.03–0.85; Within PRE-POST ES range = -0.45 to 0.09), thus determining post hoc analyses for the interaction of sessions, groups, and sprint tests. Firstly, the comparisons between groups for the PRE performances showed differences in 20-mLB ($p < 0.0001$), where RTG had a better result ($\Delta = -14\%$, estimated differences = -0.85 s) than SSG. Also 20-mCoDB reported better PRE performances for RTG ($\Delta = -4\%$, estimated differences = -0.33 s) than SSG, but only approaching significance ($p = 0.061$). Despite this initial scenario, differences between PRE-POST sessions emerged only for 20-mLB ($\Delta = -7.3\%$, estimated differences = -0.37 s, $p < 0.001$) and 20-mCoDB ($\Delta = -5.9\%$; estimated differences = -0.45 s, $p < 0.001$) performed by RTG, whereas no effect emerged for 20-mL and 20-mCoD performed by RTG and all tests performed by SSG (Figure 2, Table 4). In Table 4, the estimated mean (EM) and lower and upper confidence intervals (95% CI), standard error (SE), and effect size (ES) of each group, test, and session are reported.

DISCUSSION

Sprinting with and without CODs and ball possession represent essential agility skills in invasion team sports such as soccer. However, these tasks are complex and require a combination of technical features, coordination skills, and physical qualities [9]. In addition, no clear training guidelines have been provided to improve sprint performances associated with technical tasks, especially in prepubescent soccer players. Therefore, the purpose of the present study was to examine the effects of training sessions systematically oriented on running technique or soccer-specific workouts by means of the 20-m sprint test performed with and without CODs and ball possession.

Although the recruited prepubescent soccer players derived from four different age categories (i.e., U9, U10, U11, and U13), the main finding of this study was that sprint performances with ball possession (with and without CoDs) can be improved by means of running technique training regardless of category. In particular, this effect was substantially verified for sprint performance associated with ball possession with and without CoDs (with moderate ESs). The present findings appear relevant because the RTG showed significantly better performance in linear sprint with ball and borderline significantly better performance in changes of direction sprint with ball compared to the SSG.

According to the contents of training sessions, improvements in sprinting could be expected in the RTG for 20-mL and 20-mCoD, and in the SSG for tests with ball possession. Actually, a different and surprising picture emerged, highlighting how running technique can be crucial in improving those sprint patterns mostly associated with the game of soccer. In addition, the RTG showed better sprint performances at POST in 20-mL ($\Delta = 3.95\%$) and 20-mCoD ($\Delta = 3.19\%$). In contrast, the SSG did not show a difference in sprint performances in both tests ($\Delta = -0.18\%$ for the 20-mCoD; $\Delta = -1.25\%$ for the 20-mCoDB). Therefore, it could be speculated that running technique is an important drill to improve the sprint skills which are linked with technical tasks such as CoD, ball possession, and their combination. However, although the literature [9] reported that agility consists of physical qualities (such as strength, power and technique) and cognitive components (such as visual scanning techniques, visual scanning speed and anticipation), only further studies will be able to clarify the real contribution of the observed training approach for these two areas.

The results of this study can also be discussed in terms of the risks of early specialization [16], which has been more promoted in SSG than in RTG. Therefore, it could be speculated that a training approach orientated to basic, general, and multilateral techniques of movement could more effectively promote prepubescent soccer players' sprint and agility abilities than specific training, even with a modestly long period characterized by only two weekly training sessions. In addition, it has to be underlined that the players' improvements that emerged for the tests performed in this study were associated with ball possession skills, which are strongly associated with soccer game performance. In particular, 20-mCoDB represents the most representative soccer condition among the proposed tests, because several game actions, such as acceleration, deceleration and CoD in evading an opponent, sprints with CoD to contact a ball or player, or initiation of whole-body movement in response to a stimulus [8,23], were fully simulated.

However, these tests have limitations to be considered as fully representative of agility in a soccer game. In fact, according to Sheppard and Young [9], a real agility task is defined by movements that not only involve changes in speed or direction, but also reactions to a stimulus not specifically planned and rehearsed. In addition, these results have to be evidently confined to prepubescent soccer players and no generalization to other ages can be made, especially because of heterogeneous trajectories in the CODs performed by young sub-

jects [24], which have not been analyzed in this study. Moreover, no absolute certainty can be assumed about the assessment of the state of maturation provided by the players' parents, although Tanner's guidelines have been exhaustively followed by the persons conducting the study. Also the non-random distribution of players into the two subgroups (because of practical issues) could represent an experimental limitation of this study, despite no baseline anthropometric influence having been registered. Finally, the reduced number of test sessions could make the players' evaluation not so accurate over an entire season or longer periods.

CONCLUSIONS

This study highlighted the effects of running technique and a soccer-specific training approach on prepubescent soccer players' sprint and agility performances. After the intervention, running technique training demonstrated a significant margin of improvement for 20-mLB and 20-mCoDB (which are particularly game-related), whereas no particular trends emerged for 20-mL and 20-mCoD sprint tests. By contrast, the soccer-specific approach showed no significant improvement in each test (even showing weak decreases in the tests with

CoDs). In addition, these results appeared even more robust because players who trained to improve the running technique already had better results than the other group before the intervention, thus representing a condition that could potentially limit the emergence of differences after the training period.

From a practical point of view, coaches should use these results to optimize their training sessions for prepubescent soccer players, avoiding focusing only on soccer-specific workouts as potential risk of early specialization, and promoting training sessions mostly orientated to basic, general, and multilateral techniques of movement to effectively improve sprint and agility abilities. Even though the use of ball drills, especially characterized by the provision of game situations (i.e., small-sided games and friendly matches), is surely more attractive for prepubescent players than running exercises, the findings of this study suggest that the latter can be more constructive for improving sprint capabilities.

Conflict of interests

The authors declared no conflict of interests regarding the publication of this manuscript.

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