Dribble Deficit quantifies dribbling speed independently of sprinting speed and differentiates between age categories in pre-adolescent basketball players

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ABSTRACT: The aims of this study were to a) quantify the relationships between sprinting and dribbling speed measured using dribble time and Dribble Deficit and b) assess the difference between age categories in sprinting and dribbling speed in pre-adolescent basketball players. Pre-adolescent, male basketball players (Total, N = 81; Under-10, n = 32, Under-9, n = 49) completed two trials of different tasks including 20-m linear sprints without dribbling, 20-m linear sprints dribbling with dominant and non-dominant hands, and change-of-direction (COD) sprints with and without dribbling. Sprinting time, dribbling time and Dribble Deficit were then calculated for each trial. Spearman rank correlations were used to assess the relationships between outcome measures for Under-9 and Under-10 players separately and combined. The Mann-Whitney U test with effect sizes (ES) was used to assess differences in outcome measures between Under-9 and Under-10 players. Moderate-to-very large significant relationships ($p < 0.05$) between linear and COD sprinting time and dribbling time using dominant and non-dominant hands were found in Under-9, Under-10 and all players combined. Trivial-to-moderate relationships were found between sprinting time and Dribble Deficit in all age categories across linear and COD paths. Quicker performance times ($p < 0.05$) were found for Under-10 compared to Under-9 players in all outcome measures (ES: small-to-moderate), except for COD sprinting time ($p > 0.05$; ES: small). Dribble Deficit measures dribbling speed independently of sprinting speed across linear and COD paths in pre-adolescent basketball players and differentiates between age categories.

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INTRODUCTION

Basketball is an intermittent, court-based team sport characterized by repeated execution of high-intensity actions and sport-specific skills such as dribbling, passing and shooting [1–4]. Previous research has shown that dribbling skills are constantly used during basketball games with elite players dribbling during ~10% of live time [1, 3] and in 39% of performed sprints [2]. As dribbling is a core skill for in-game success, it is extensively coached in youth basketball [5]. Specifically, the high-speed dribble is considered a fundamental skill in adult and youth basketball as it provides an advantage over the defender while driving to the basket or conducting a fast break [6]. Due to the importance of dribbling speed for offensive success, it is important to have effective test techniques to assess dribbling speed in basketball players.

Traditionally, high-speed dribbling has been assessed together with other skills by measuring total performance time during linear sprints or sprints including changes of direction (COD) while dribbling the ball over 10–20 m [7–10]. However, these widely utilized tests are flawed as dribbling skills and speed are not measured in isolation. Indeed, measuring dribbling performance in conjunction with sprinting speed is problematic as players able to sprint faster may perform better in dribbling tests where total performance time is used as the key outcome regardless of their dribbling ability or speed. Indeed, total dribbling time has been shown to possess large-to-very large relationships with sprinting time (R = 0.64–0.86; R^2 = 0.41–0.74) in semi-professional [11] and collegiate [12] male basketball players during 20-m linear sprints. Similar results were reported during COD sprints performed with and without dribbling in the same samples of players (R = 0.88–0.91; R^2 = 0.77–0.82) [11, 12]. Therefore, testing protocols that can assess high-speed dribbling skill in isolation from sprinting speed are practically important to determine the dribbling skill of a player.

The Dribble Deficit was developed to counter the limitations of using total performance time when assessing dribbling speed and is defined as the difference between the total performance times to complete sprint trials with and without dribbling across the same movement path [11]. Dribble Deficit has been reported to isolate dribbling speed independently of sprinting speed as trivial-to-moderate relationships have been documented between Dribble Deficit and total performance time during linear and COD sprints [11, 12]. Despite the potential utility of Dribble Deficit to assess dribbling speed at all levels of basketball players, currently Dribble Deficit has only been studied in semi-professional [11] and collegiate [12] basketball players, thus limiting the generalizability of the results to other basketball players such as those competing in youth competitions.

Pre-adolescent (~7–10 years of age) basketball players usually compete in groups based on chronological age. It has been shown that dribbling speed measured using total dribbling time improves with age in pre-adolescent basketball players [13, 14]. However, since dribbling speed using total performance time appears to be influenced by sprint capabilities [11, 12], examination of the Dribble Deficit might be useful to understand differences in dribbling skill according to age. Indeed, older pre-adolescent players might achieve quicker sprinting and dribbling speeds compared to younger players due to differences in growth rather than heightened dribbling skills. Therefore, Dribble Deficit might overcome this limitation in pre-adolescent basketball players. This insight will inform basketball coaches on age differences in dribbling skill in pre-adolescent basketball players, which may assist in developing specific training drills and assessment practices in youth basketball. Therefore, the aims of this study were to a) assess the relationships between sprinting and dribbling speed measured using total dribbling time and Dribble Deficit and b) assess differences in sprinting and dribbling speed between age categories in pre-adolescent basketball players.

MATERIALS AND METHODS

Participants

Pre-adolescent, male, Lithuanian basketball players belonging to the same basketball academy were recruited for this study. Within their academy, players were divided into two groups (Under-10 and Under-9) based on their birth year (2009 or 2010). A total of 81 players were investigated (Under-10: n = 32; Under-9: n = 49) (Table 1). For each outcome measure, we examined each group separately and combined. Our sample size encompassed all players in the basketball academy in those age categories and exceeded the minimum number of required participants (i.e. 10 players) based on recommendations in previous investigations assessing Dribble Deficit in basketball players (G*Power; version 3.1.9.2; University of Dusseldorf, Dusseldorf, Germany) (alpha = 0.05; beta = 0.80; coefficient of determination = 0.5) [11, 12]. Players were usually completing 3 x 90-min training sessions per week and participating in ~25 matches across the season including participation within academy tournaments and two international tournaments. All players and their legal guardians were notified about the aims of the study, research procedures, requirements, risks, and benefits of participation before they each provided written informed consent. All procedures received approval from the ethics committee at the Lithuanian Sports University and conformed to the Declaration of Helsinki.

Procedures

A cross-sectional, within-subject design was utilized in which all testing was conducted in one session. During the testing session, demographic and anthropometric characteristics were measured for each player. Chronological age was calculated to the nearest 0.1 year by subtracting date of birth from date of testing. Body mass was measured using electronic scales (Tanita Body Composition Analyzer TBF–300, Tanita Corporation, Japan) to the nearest 0.1 kg. Height and sitting height were measured using an anthropometer

TABLE 1. Player characteristics according to age category and across all players combined.

Measure	Under-10 group (n = 32)	Under-9 group (n = 49)	ES (interpretation) Under-9 vs. Under-10	Total (N = 81)
Age (y)	9.7±0.2 **	8.7±0.3	-0.84 (large)	9.1±0.6
Height (cm)	143.6±6.4 **	136.2±6.8	-0.52 (large)	139.1±7.5
Body mass (kg)	34.8±6.7 *	31.2±6.6	-0.32 (medium)	32.6±6.8
APHV (y)	12.9±0.4	12.8±0.3	-0.22 (small)	12.9±0.4
MO (y)	-3.2±0.5 **	-4.1±0.4	-0.75 (large)	-3.8±0.6

Note: ES – effect size; APHV – age at peak height velocity; MO – maturity offset; *p <0.05 and **p <0.01 indicate significantly different to Under-9 years group.

TABLE 2. Inter-trial reliability measured via intraclass correlation coefficient (ICC), technical error of measurement (TEM) and coefficient of variation (CV) with 95% confidence intervals for each outcome measured taken for Under-10 years players, Under-9 years players, and all players combined.

Age category	Outcome measure	ICC	TEM (s)	CV (%)
Under-10 (n = 32)	Linear sprint without dribbling	0.95 (0.89; 0.97)	0.25 (0.20; 0.33)	1.8 (1.4; 2.4)
	Linear sprint DH	0.96 (0.93; 0.98)	0.20 (0.16; 0.26)	2.5 (2.0; 3.3)
	Linear sprint NDH	0.97 (0.93; 0.98)	0.19 (0.16; 0.26)	3.0 (2.4; 4.0)
	COD without dribbling	0.96 (0.93; 0.98)	0.20 (0.16; 0.27)	2.0 (1.6; 2.6)
	COD dribbling	0.98 (0.97; 0.99)	0.14 (0.11; 0.18)	1.8 (1.4; 2.4)
Under-9 (n = 49)	Linear sprint without dribbling	0.88 (0.80; 0.93)	0.38 (0.31; 0.47)	2.8 (2.4; 3.6)
	Linear sprint DH	0.94 (0.90; 0.97)	0.25 (0.21; 0.32)	3.8 (3.1; 4.8)
	Linear sprint NDH	0.99 (0.98; 0.99)	0.12 (0.10; 0.14)	2.5 (2.1; 3.1)
	COD without dribbling	0.99 (0.97; 0.99)	0.12 (0.10; 0.15)	1.5 (1.3; 1.9)
	COD dribbling	0.98 (0.96; 0.99)	0.15 (0.13; 0.19)	2.8 (2.3; 3.5)
Total (N = 81)	Linear sprint without dribbling	0.91 (0.86; 0.94)	0.32 (0.28; 0.38)	2.5 (2.1; 2.9)
	Linear sprint DH	0.95 (0.93; 0.97)	0.22 (0.91; 0.27)	3.3 (2.9; 3.9)
	Linear sprint NDH	0.98 (0.97; 0.99)	0.13 (0.11; 0.15)	2.7 (2.3; 3.2)
	COD without dribbling	0.98 (0.97; 0.99)	0.15 (0.13; 0.18)	1.7 (1.5; 2.0)
	COD dribbling	0.98 (0.97; 0.99)	0.14 (0.12; 0.16)	2.4 (2.1; 2.9)

(Martin, GPM SiberHegner) to the nearest 0.1 cm. Specifically, sitting height was measured with players sitting on a 30-cm box, which showed acceptable validity and reliability [15]. Age at peak height velocity (APHV) and maturity offset (MO) were then calculated using established sex-specific equations incorporating chronological age, height, body mass, sitting height, and estimated leg length (height minus sitting height) [16].

Before completing speed testing, each player underwent a standardized 10-min warm-up consisting of moderate jogging and progressive speed runs with and without dribbling a ball. Afterwards, each player completed two trials in a randomized order for each of the following: a) 20-m linear sprints; b) 20-m linear dribble sprint with dominant hand (DH); c) 20-m linear dribble sprint with the non-dominant hand (NDH); d) COD sprint; and e) dribble sprint with COD involving the use of both hands. Briefly, the 20-m linear sprint involved players moving in a straight line while the COD sprint involved players moving around three markers placed at even distances (marker 1: 3 m to the right and 2.5 m forward from the start position; marker 2: 3 m to the left and 2.5 m forward from the first marker; marker 3: 3 m to the right and 2.5 m forward from the second marker) toward the finishing line positioned 3 m to the left and 2.5 m forward from the third marker for a total of 22 m (Figure 1) [11, 12]. During the COD sprint while dribbling, players performed a crossover dribble at each marker so that they always dribbled with their outside hand while moving forward. Players started from a standing position 30 cm before the first timing gate to safeguard against premature triggering of timing

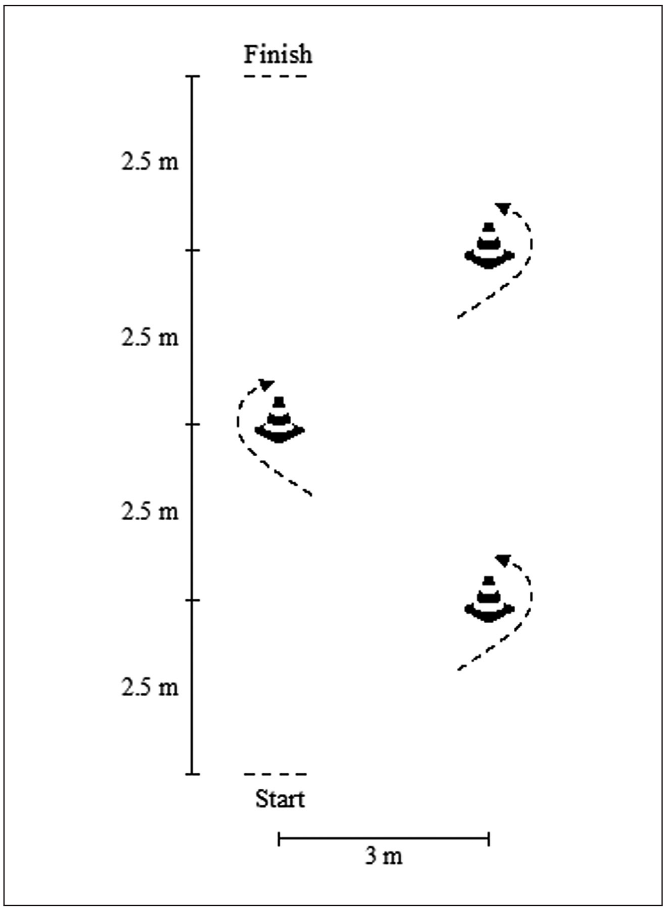

FIG. 1. Layout of the change of direction test performed with and without dribbling.

and were able to choose their preferred lead leg, which was consistent across all trials [11].

The inter-trial reliability for each performed test is shown in Table 2 and is considered acceptable according to previous recommendations [11, 12]. For all dribbling tasks the same standard size 5 basketball was used, which is the ball usually adopted in age-specific competitions relevant to the recruited players. The quickest total time of the two trials to complete each of the linear and COD sprints with and without dribbling was recorded and used to calculate the Dribble Deficit (i.e. differences between the best total time for the dribbling trial and the best total time for the corresponding non-dribbling trial for both linear sprint and COD sprints) [11, 12]. Dribble Deficit was calculated separately for the dominant and non-dominant hand as previously described [11] and replicated [12]. For all trials, electronic timing gates (Powertimer Testing System, NewTest, Oulu, Finland) were positioned on the start line and end-point. Each trial was separated by 3 min of passive (standing) rest. Players were familiar with these testing procedures since they were normally included in regular testing batteries. All tests were completed on the same indoor regular-sized basketball court and conducted on the same day in the afternoon.

Statistical analysis

Descriptive statistics were used to calculate means, medians, standard deviations, and standard errors for each outcome measure. Normal distribution was checked for all outcome measures using the Shapiro-Wilk test, with measures demonstrating a non-normal distribution. Therefore, after verifying the monotonicity for the studied relationships, Spearman rank correlations were used to assess the relationships between outcome measures for Under-9 and Under-10 age-category players separately and for all players combined. Specifically, the following relationships were assessed: a) linear sprint time and linear dribble time separately for dominant and non-dominant hands; b) linear sprint time and linear Dribble Deficit time separately for dominant and non-dominant hands; c) COD sprinting time and COD dribbling time; and d) COD sprinting time and COD Dribble Deficit. All Spearman's rho values were calculated with 95% confidence intervals, with magnitudes interpreted as: trivial (0–0.10); small (0.11–0.30); moderate (0.31–0.50); large (0.51–0.70); very large (0.71–0.90); and almost perfect (0.91–1.00) [17]. Additionally, the Mann-Whitney U test was used to assess differences in anthropometric characteristics, maturation status and testing outcomes between Under-9 and Under-10 players. An alpha level of

TABLE 3. Spearman's correlations with 95% confidence intervals (95% CI) between outcome measures recorded without dribbling [linear and change-of-direction (COD) sprinting time] and outcome measures derived using total dribbling time and Dribble Deficit across the same paths [linear sprint with dominant hand (DH) and non-dominant hand (NDH), and COD sprint], respectively in Under-10 players, Under-9 players and all players combined.

Age category	Outcome measures	Spearman's rho (95% CI)	Interpretation	p
Under-10 (n = 32)	Linear dribble time DH	0.820 (0.660; 0.909)	Very Large	<0.001
	Linear dribble time NDH	0.820 (0.660; 0.909)	Very Large	<0.001
	COD dribble time	0.816 (0.652; 0.907)	Very Large	<0.001
	Dribble Deficit time DH	0.232 (-0.127; 0.537)	Small	0.201
	Dribble Deficit time NDH	0.489 (0.169; 0.715)	Moderate	0.005
	COD Dribble Deficit time	0.229 (-0.130; 0.535)	Small	0.206
Under-9 (n = 49)	Linear dribble time DH	0.631 (0.425; 0.774)	Large	<0.001
	Linear dribble time NDH	0.657 (0.461; 0.792)	Large	<0.001
	COD dribble time	0.438 (0.233; 0.673)	Moderate	<0.001
	Dribble Deficit time DH	0.045 (-0.239; 0.322)	Trivial	0.759
	Dribble Deficit time NDH	0.386 (0.118; 0.602)	Moderate	0.006
	COD Dribble Deficit time	-0.214 (-0.467; 0.071)	Small	0.139
Total (N = 81)	Linear dribble time DH	0.722 (0.597; 0.812)	Very Large	<0.001
	Linear dribble time NDH	0.753 (0.641; 0.835)	Very Large	<0.001
	COD dribble time	0.614 (0.457; 0.734)	Large	<0.001
	Dribble Deficit time DH	0.218 (0.000; 0.417)	Small	0.050
	Dribble Deficit time NDH	0.501 (0.317; 0.648)	Moderate	<0.001
	COD Dribble Deficit time	0.058 (-0.162; 0.27)	Trivial	0.606

TABLE 4. Differences between Under-10 and Under-9 groups and data indicative of all players combined for each outcome measure.

Outcome measures	Under-10 (n = 32)		Under-9 (n = 49)		ES (interpretation) Under-9 vs. Under-10	Total (N = 81)	
	Mean±SD	*Median±SE*	*Mean±SD*	*Median±SE*		*Mean±SD*	*Median±SE*
Linear sprint without dribbling (s)	3.99±0.29	3.98±0.05 *	4.18±0.34	4.14±0.05	-0.27 (small)	4.11±0.33	4.07±0.04
Linear sprint DH (s)	4.54±0.62	4.35±0.11 ***	5.03±0.85	4.78±0.12	-0.40 (medium)	4.83±0.80	4.67±0.09
Linear sprint NDH (s)	4.78±0.83	4.48±0.15 ***	5.64±1.36	5.16±0.19	-0.37 (medium)	5.30±1.24	4.79±0.14
COD without dribbling (s)	6.30±0.65	6.15±0.12	6.56±0.90	6.40±0.13	-0.17 (small)	6.46±0.81	6.31±0.09
COD dribbling (s)	7.14±1.04	6.86±0.18 ***	8.38±1.76	7.92±0.25	-0.48 (medium)	7.89±1.63	7.60±0.18
Dribble Deficit linear sprint DH (s)	0.55±0.46	0.40±0.08 **	0.84±0.71	0.70±0.10	-0.31 (medium)	0.73±0.64	0.56±0.07
Dribble Deficit linear sprint NDH (s)	0.79±0.64	0.59±0.11 ***	1.45±1.19	1.02±0.17	-0.36 (medium)	1.19±1.06	0.90±0.12
Dribble Deficit COD (s)	0.84±0.52	0.75±0.09 ***	1.82±1.53	1.69±0.22	-0.44 (medium)	1.43±1.32	1.08±0.15

Note: ES – effect size; SD – standard deviation; SE – standard error; DH – dominant hand; NDH – non-dominant hand; COD – change of direction * p <0.05; ** p <0.01; *** p <0.001 compared to Under-9 years group.

$p < 0.05$ was set *a priori* for statistical significance. Effect sizes for pairwise comparison were calculated using the r-value [18] and were interpreted according to Cohen's benchmarks as: no effect (0–0.09); small (0.10–0.29); medium (0.30–0.49); large (≥0.5) [19]. All statistical analyses were performed using JASP team 2019 (v0.10.2) and Microsoft Excel (Version 15, Microsoft Corporation, Redmond, USA).

RESULTS

Comparisons between age categories showed statistically significant differences ($p < 0.05$) in anthropometric characteristics and maturity offset (Table 1). Additionally, the relationships between total sprinting times with total dribbling times and Dribble Deficit outcome measures are shown in Table 3. Large-to-very large significant ($p < 0.05$) relationships were found between total linear sprinting time and total dribbling time using dominant and non-dominant hands in Under-9 players, Under-10 players and all players combined. Similar relationships were found between total COD sprinting time and total COD dribbling time in Under-10 players and all players combined, while moderate significant relationships were found between these measures in Under-9 players. When considering relationships between total linear sprinting time and linear Dribble Deficit, trivial-to-moderate relationships were found for dominant and non-dominant hands in both age categories and all players combined. Additionally, trivial-to-small relationships were found for total COD sprint time and COD Dribble Deficit in both age categories and all players combined.

Significant age differences with small-to-medium effect sizes were found for all outcome measures except for total COD sprinting time (Table 4).

DISCUSSION

This study aimed to assess the relationships between sprinting and dribbling speed measured using total dribbling time and Dribble Deficit in pre-adolescent basketball players. Sprinting time had a large-to-very large influence on total dribbling time, while trivial-to-moderate relationships were evident between sprinting time and Dribble Deficit. Additionally, comparisons in sprinting and dribbling speed between Under-9 and Under-10 players were conducted, showing significant differences between age categories in all outcome measures except for COD sprinting time.

Dribbling speed is commonly measured in basketball since it represents one of the most fundamental basketball-specific skills [20]. However, dribbling speed measured as total performance time during traditional testing approaches is influenced by sprinting speed [11, 12]. Indeed, large-to-very large relationships have been observed between total sprinting time and total dribbling time in adult semi-professional [11] and collegiate [12] male basketball players during linear (R = 0.64–0.86) and COD (R = 0.88–0.91) sprints. These data overlap with the relationship magnitudes (large-to-very large) observed in the present study in pre-adolescent, male basketball players during the same linear sprint and COD tasks.

When considering the relationships between sprinting and total dribbling times during COD tasks in each age category, only a moderate relationship was found in Under-9 players. This finding indicates that COD dribbling speed measured with traditional tests might be partially influenced by physical qualities of players in this age category, while other components such as coordination and dribbling skills might play a more dominant role than in older children (Under-10 players) and adults. In this regard, previous research has shown moderate relationships between performance times during linear and COD sprint tests in basketball players aged 12–15 years [21, 22], indicating that factors other than sprint speed, such as coordination, may exert a strong influence on COD speed. Additionally, superior dribbling skills are required during COD tasks compared to linear tasks due to the execution of crossover dribbling manoeuvres when changing directions. Therefore, the Under-9 players we investigated may have possessed a lower ability to perform crossover dribbling compared to Under-10 players despite demonstrating similar COD sprinting speed. In support of this notion, our results revealed a statistically significant difference between age categories in total COD dribbling time, with no significant differences in total COD sprinting time. This result aligns with previous research showing stronger relationships (R = 0.54–0.90) between linear and COD sprint time and performance time during the Illinois Agility Test while dribbling a ball in basketball players aged >10 years compared to players aged 8–9 years (R = 0.36–0.51) [13]. A possible reason for differences in dribbling capabilities in youth basketball players of different ages might be that Under-9 players have less training experience, producing lower and more heterogeneous dribbling skill levels compared to Under-10 players. However, no information was available regarding the training experience of the recruited players, suggesting that future research is needed in this area. Overall, our results indicate that sprint speed makes a significant contribution to total dribbling time across linear and COD movement paths in pre-adolescent basketball players, suggesting that an alternative approach to measuring dribbling speed in isolation of sprinting capability is warranted.

In contrast to total dribbling time, the Dribble Deficit has been used as an effective measure of dribbling speed to negate the strong influence of sprinting speed on total performance time during dribbling tests [11, 12]. Indeed, previous investigations documented trivial-to-moderate associations between Dribble Deficit and sprinting time during linear and COD tasks in semi-professional and collegiate, adult, male basketball players [11, 12]. To the best of our knowledge, this is the first study investigating the use of Dribble Deficit in pre-adolescent basketball players, yielding similar results to those reported in previous investigations examining adult basketball players (trivial-to-moderate relationships). Therefore, Dribble Deficit may be effective in measuring the technical contribution to dribbling speed in isolation from the physical contribution (sprinting speed) in pre-adolescent basketball players.

Investigating physical capabilities and technical skills in pre-adolescent players from different age categories is fundamental to design age-based training drills to aid player development and optimize performance. Our results revealed that Under-10 players had a higher linear sprinting time compared to Under-9 players, confirming the results of a previous investigation [13]. Considering dribbling speed tested with traditional total performance times taken during linear and COD tasks, a recent investigation assessing pre-adolescent basketball players aged 7–10 years showed faster dribbling speeds in older players [14]. Specifically, large differences between 9–10 year-old players were noted in dribbling speed during 20-m linear sprint (effect size = 1.85) and Illinois Agility Dribble tests (effect size = 1.82) [14]. These results overlap with our investigation given that we observed significant differences in linear and COD dribbling speeds between Under-10 and Under-9 players. However, since we showed that total dribbling time is largely associated with total sprinting time in these age categories, it seems fundamental to isolate the technical contribution to dribbling speed when making comparisons between age categories. Our study is the first to investigate differences in Dribble Deficit between different age categories in pre-adolescent basketball players. Significantly, superior Dribble Deficit was apparent during linear (dominant and non-dominant hands) and COD tasks in Under-10 players compared to Under-9 players. This result may be expected given that pre-adolescent, male basketball players have been suggested to experience a "window of opportunity" for technical skills approximately at 7–10 years of age [14]. It is interesting to note that Dribble Deficit is able to discriminate between different age categories together with traditional timed dribbling speed. Consequently, using these two testing procedures in combination may provide useful information for basketball coaches with players fitting these age categories.

This study provides useful information for basketball coaches of youth players; however, some limitations should be addressed. Firstly, our results are indicative only of pre-adolescent basketball players. Accordingly, further studies should address the usefulness of Dribble Deficit also in adolescent basketball players according to chronological and biological age, since at this stage of puberty, players with a similar chronological age might possess a different biological age. Secondly, our results are indicative only of linear and COD paths, which are not representative of all dribbling manoeuvres during basketball games; therefore future studies examining other movement pathways are warranted. Finally, in the current study, the training experience of the players was not recorded, which might have influenced the results of the different dribbling skill levels found in the two studied age groups. Therefore, future studies are warranted to assess whether the differences in Dribble Deficit found between the groups were partially due to playing experience.

Practical Applications

Our findings suggest that Dribble Deficit may be implemented by basketball coaches to assess the technical contribution to dribbling speed in pre-adolescent, male basketball players. This result is important, as developing proper dribbling skills is fundamental in the investigated age categories [14]. In particular, the use of Dribble Deficit might be important to identify possible deficiencies in dribbling skill and monitoring the changes over time following targeted training plans. Basketball coaches should still measure dribbling speed using total performance times when conducting dribbling assessments, since it provides insight into combined physical and technical contributions to dribbling speed, which is indicative of game play.

CONCLUSIONS

This study indicates that Dribble Deficit measures dribbling speed independently from sprinting speed during linear and COD tasks in pre-adolescent basketball players. Additionally, Dribble Deficit differentiates the superior dribbling speed in Under-10 compared to Under-9 basketball players.

Disclosure statement

The authors declare that they have no conflict of interest.

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