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RELATIONSHIP BETWEEN TALENT IDENTIFICATION AND CHANGE OF DIRECTION IN YOUNG BASKETBALL PLAYERS

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Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Abstract

Study purpose. Regarding Talent identification (TID) programs, which are an integral part of the selection process for elite-level athletes, the authors detected a lack of evidence, as surprisingly little research has been conducted to elucidate the effects of Change of Direction (COD) test performance on TID in basketball. This study aimed to: i) analyze the anthropometrical measures, performance variables of COD and talents values of each basketball player, ii) conduct through a COD test, a talent identification procedure in basketball, and iii) run a correlation analysis to try to explain the relationship between COD test and basketball talent through either offensive and defensive skills.

Materials and methods. A cross-sectional study was conducted on nineteen youth basketball players (age = 15.68 ± 1.20 years; height = 188.84 ± 5.81 cm, and weight= of 75.74 ± 8.37 kg) with at least 3 years of experience. To assess the overall performance of the selected players, a questionnaire regarding either offense or defense variable was used. In addition, players were required to perform V-Cut, 5-0-5 and Illinois Dribbling tests. Single beam photocells (Chronojump Boscosystem) were used and 3D motion capture system with a video camera set at 210 Hz (CASIO EX-ZR800) recorded the entire action.

Results. Findings point out that the players' COD test result correlates positively [505 test (Contact time, r = 0.62, p = 0.004 and COD deficit, r = 0.55, p = 0.01) and Illinois Dribbling test [velocity (r = 0.45, p = 0.04)] with offensive skills whilst it correlates negatively [Illinois Dribbling test (r = -0.46, p = 0.04)] with defensive skills.

Conclusions. This study highlights the importance to perform a multidisciplinary approach considering either the coaches' assessment and players' COD performance to provide relevant information for TID.

Keywords: COD, basketball, talent identification, multidisciplinary approach.

Introduction

Basketball is one of the most popular team sports, being played world-wide. Several varieties of athletic skills can be valuable indicators of a talented player (Anshel & Lidor, 2012). In this sense, it must be mentioned that testing these skills might be useful as a Talent Identification (TID) screening process which might help trainers and scouts to make the best decisions during player selection of different competitive levels and field positions (Till et al., 2013). The talent detection process must have the ability to recognize athletes at younger ages, thus being able to generate more opportunities for success for people with more potential (Johnston et al., 2018). Many investigators have taken this matter into consideration, resulting in a rapid growth of the interest on the link about talents and sports in the last decade (Lidor et al., 2009). However, to the best of our knowledge, there are no previous studies available on talent in basketball. In fact, the detection of talent in basketball has been changing over time, several studies put the effort on relevant anthropometric aspects (Erčulj et al., 2009). Likewise, coordination and precision measures were found to successfully discriminate between skills levels, as well as physiological data, age, playing position and fitness (Gonaus & Müller, 2012; Till et al., 2016) however, these values must

be complemented by performing sprints and agility tests, such as Change of Direction (COD) tests (Pino-Ortega et al., 2021).

The ability to accelerate, stop quickly, turn or change of direction (COD), and accelerate again is an essential part of the motor skills of a basketball player (Paul et al., 2016). COD speed predominately characterizes the ability of the athletes during running to decelerate in the shortest possible time and to re-accelerate quickly in a new direction (Chaabene et al., 2018). On one hand, biomechanical aspects as the acceleration phase, the deceleration, the contact of the foot in the change and finally the acceleration towards the new destination are to be considered crucial phases to obtain the best performance (McBurnie, 2021). On the other hand, physiological aspects are crucial too; during COD tasks, two distinct forms of muscle actions are required to quickly decelerate (eccentric action) and accelerate (concentric action) the body during movement. More specifically, eccentric muscle strength may influence CoD speed performance to a high degree because it allows athletes to quickly decelerate the body during high movement velocities which is an important prerequisite for the subsequent acceleration phase of the body and the overall performance of COD tasks (Nimphius et al., 2016).

In this context, COD speed represents the physical quality of agility while perceptual and decision-making factors constitute the under-lying cognitive components of agility (Sheppard & Young, 2006). The muscle that helps improve COD is the hamstring at the time of deceleration. Authors as Gonzalo-Skok et al., (2015) explain that eccentric braking force is necessary to decrease braking time and improve COD. Besides, previous studies have examined whether COD speed is related to other physical fitness components such as speed, muscle strength, and muscle power (Brughelli et al., 2008; Sheppard & Young, 2006).

Unfortunately, there is a lack of practical, ecologic tools to assess TID in basketball (Johnston et al., 2018). Hence, new methods designed to identify young athletes with the potential for success in both U18 and U21 elite sport are needed such as test that give valid, sensible and reliable information. Following Quílez-Maimón et al. (2021), tests can be classified into field or laboratory tests; field test contribute to add an ecological approachment which is more likely to be transferred to real game situations. Consequently, field tests must be sensitive enough to detect very small changes (Pardos-Mainer et al., 2019). Accordingly, Pino-Ortega et al. (2021), mention that agility tests are necessary to identify young talents, as well as Suarez-Arrones et al. (2020) explain, COD is the result of agility and, therefore, performing COD tests will allow the evaluation of the concept of agility, which is a key point in talent identification in basketball.

However, very few studies have tested the relationships between basketball TID and performance among young basketball players. Nevertheless, it is pertinent to consider, following Dežman et al. (2001), either offensive and defensive variables to assess talent factors and correlate results with COD test. Following the above literature mentioned, the present study aims to: i) analyze the anthropometrical measures, performance variables of COD (505 test, VCut test and Illinois Dribling test) and talents values of each basketball players, ii) to conduct through a COD test, a talent identification procedure in basketball and iii) run a correlation analysis to try to explain the relationship between COD Test and basketball talent of attack and defense. The hypothesis of the study is that COD test are directly correlated to talent identification screening process. Authors expect that the results obtained in this study will set the definition of talent identification methods for trainers and scouts in the future.

Materials and methods

Study design

This study followed a cross-sectional design. A convenience sampling was performed. The study was approved by scientific council of Pontifical University of Comillas (code: 2021/64), and the Research Ethics Committee of the Pontifical University of Comillas (2021/90) and followed the Declaration of Helsinki ethical standards for the study in humans. The team staff was informed about the objectives of the study, and the research team ensured that parents or guardians signed their informed consents after having received details of the possible benefits and risks of the study.

Setting and context

The study occurred on 3 May 2022, corresponding to end season. The data collection was preceded by 48 hours of rest. In the day of data collection, the players' coaches answered to a questionnaire centered in the offensive and defensive behaviors of each player aiming to classify players in terms of offensive and defensive talent. After that, the COD assessments were executed on the players itself, and with the following sequences: (i) V Cut test; (ii) 5-0-5 test; and (iii) Illinois test. Players performed 2 trials for each test and rested 3 minutes between tests. The tests were preceded by a standardized warm-up protocol of 12 minutes consisting in standardized range-of-motion warm-up plus ballistic stretching. The data collection was performed in an indoor court, between 10:30h and 12 hours of the day with an average temperature of 21ºC and relative humidity of 60%.

Participants

Concerning the sample size, the next equation was used: Sample Size = $Z2 \times (p) \times (1 - p)/C2$, where Z = confidence level (95%); p = 0.05 and C = margin of error 0.05. Nineteen U21 basketball players voluntarily participated in this study (age= 15.68 ± 1.20 years; stature = 188.84 ± 5.81 cm, and body mass= of 75.74 ± 8.37 kg; 7.64 ± 2.02 years of experience) from the region of Baleares, Spain, were recruited from the Centre for Sport Technification of the Balearic Islands (CTEIB).

The eligibility criteria were: i) to be a member of CTEIB program during the whole academic year, ii) to be a member of male basketball U21 team, and iii) not have suffered any serious injury within the last 3 months previous to the data collection. These players had at least 3 years' experience in basketball practice and took part in high level competitions. In addition, these players trained three days a week (90 min per session) and played one match a week. The training sessions were based on technical and tactical content development (70% of training time), technical

skill improvements (10% of training time), and general improvements in physical condition (20% of training time). Generally, training sessions comprised a warm-up, main part, and cooldown.

Talent identification process

To assess the actual quality or overall performance of basketball players the variables – criteria established by Dèzman were used. Table 1 shows the variables (criteria) to evaluate actual quality of basketball players either on defense and offense:

Table 1. Items of the young talent questionnaire. The defensive and offensive items of the assessment questionnaires are presented. Adapted from Dèzman et al. (2001).

Offensive variables (criteria)	Defensive variables (criteria)
Ball control (BC)	Level of defensive pressure (LDP)
Passing skills (PS)	Defensive help (DH)
Dribble Penetration (DP)	Blocking shots (BS)
Three-point shots (TS)	Ball possession gained (BPG)
Two-point shots (TPS)	Defensive rebounding efficiency (DRE)
Free throws (FT)	Transition defense efficiency (TDE)
Two-and-one plays (TOP)	Playing multiple positions on defense (PMPD)
Efficiency of screening (ES)	-
Offense without the ball (OWB)	-
Offensive rebounding efficiency (ORE)	-
Transition offense efficiency (TOE)	-
Playing multiple positions on offense (PMPO)	-

Secondly, the questionnaire proposed by Dèzman et al. (2001), with the game items about the basketball player's game has been completed by the CTEIB sports responsible, who had specific knowledge for every player and marked out of 5 points either offensive and defensive criteria (see Table 1) for every player. On the other hand, an experimental part has been carried out, composed by three change-of-direction tests, the V-Cut test, the 505 test and the Illinois dribbling test.

Change-of-direction assessment

Players were required to perform three tests, described below, in the day of data collection. Data collect was carried out by the authors. Single beam photocells (Chronojump Boscosystem) were positioned at 80 cm from the floor in the start and end line. The players started with the same preferred foot at 5 cm from the starting point, while using split position. 3D motion capture system with a video camera set at 210 Hz (CASIO EX-ZR800) recorded the entire action.

V Cut Test

V-Cut test is a validated CoD test for basketball players by Gonzalo-Skok et al., (2015), it has a distance of 25 meters, with 4 changes of direction of 45 degrees every 5 meters of distance. Participants must go from the start point to the end point passing through each turn, where there will be a line separated by two cones and the distance between them is 0.7m. For each cone pass to be valid, they must step with at least one foot beyond the line. Two attempts were each player within a 2-minute rest. The best score obtained in the test was used for further data treatment. The coefficient of variation within-subject was 0.43%.

505 Test

The methodology for the 505-COD involved a 10-m linear sprint from a static start, a 180º turn on a predetermined turn leg (right/left) ensuring contact with a designated line, and a 5-m return sprint through an identified finish line. The time taken to complete the final 5 m of the 10-m linear sprint, turn, and 5 m return sprint was recorded (Nimphius et al., 2016). The COD (turn at 180ºC) was performed with preferred leg. For time evaluation, 2 attempts were performed with a recovery time of 2 min between repetitions and the best score of the two repetitions was used for subsequent analysis. Times were measured in sec. The coefficient of variation within-subject was 2.01%.

Illinois dribbling test

It is a test that has a distance of 20 meters at maximum speed, changes of direction and is carried out by driving the ball by hand and bouncing (Matulaitis et al., 2019). As explained by Nimphius et al., (2016), the test has 11 changes of direction, the duration of the test is between 13-19 seconds and the total travel distance is 60 meters and the types of changes of direction found in the test are 90 and 180 degrees. Each participant had 2 attempts, although if the participant lost control of the ball, it must be repeated until a valid one is achieved, two attempts were performed with a recovery time of 2 min between repetitions and the best score of the two repetitions was used for subsequent analysis. The coefficient of variation within-subject was 2.14%.

Statistical analysis

All analysis were conducted using statistical software Statistica (version 13.1; Statsoft, Inc., Tulsa, OK, USA) and the significance level was set at $p<0.05$. Descriptive statistics were calculated for each variable. Normal distribution and homogeneity tests (Kolmogorov–Smirnov and Levene's, respectively) were conducted on all metrics. Subsequently, Pearson's correlation coefficient r was used to examine the relationship between the COD values (505 test, VCut test and Illinois Dribling test) and the talent values (attack mean, deffense mean and overall values) We adopted the following criteria to interpret the magnitude of these correlations: $r \leq 0.1$, trivial; $0.1 < r \leq 0.3$, small; $0.3 < r \leq 0.5$, moderate;

0.5 < r ≤ 0.7, large; 0.7 < r ≤ 0.9, very large; and r > 0.9, almost perfect.

Results

Descriptive statistics were calculated for each variable (Table 2, 3 and 4).

First, a correlation analysis as performed between anthropometric values [i) weight, ii) height and iii) Body Mass Index] and talent values [i) attack mean, ii) defense mean and iii) overall], not revealed any significant correlation. See table 5 for more information.

Posteriorly, A correlation analysis was realized between 505 values [i) time, ii) velocity, iii) contact time, iv) 10m and v) COD_D] and talent values [i) attack mean, ii) defense mean and iii) overall]. A large positive correlation was found between defense skills and Contact time and COD Deficit (r =.62, p= .004 and r =.55, p= .01). (See table 6 and figure 1 for more information.

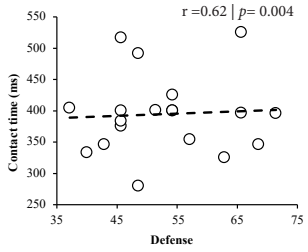

Fig. 1.1

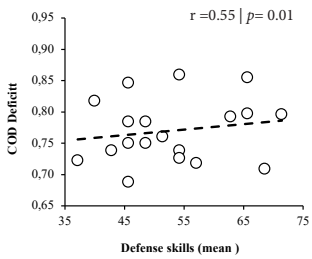

Fig. 1.2

Fig. 1. Representation of significative correlations 505 values (COD deficit) and talent values (Defense mean). Figure 1.1. Correlations analysis between Contact time and defense skills and Figure 1.2. Correlations analysis COD deficit and defense skills

Another correlation analysis was performed between V cut values [i)time, ii) velocity] and talent values [i) attack mean, ii) defense mean and iii) overall]. Crucially, any

Table 2. Antropometrical measures and ofensive and defensive performance variables related to talent questionnary of each basketball players (mean ± SD)

BP (n = 19)																						
	Antropometric measures					Variables on defense							Variables on offense									
	A	H	BM	BMI	LDP	DH	BS	BPG	DRE	TDE	PMPD	BC	PS	DP	TS	TPS	FT	TOP	ES	OWB	ORE	TOE
BP1	15	194.00	80.00	21.30	1.00	2.00	3.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00
BP2	15	189.00	73.00	20.40	2.00	2.00	3.00	3.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	2.00	1.00	4.00	4.00	2.00
BP3	14	184.00	70.00	20.70	3.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	2.00	1.00	2.00	2.00	2.00
BP4	14	183.00	80.00	23.90	3.00	2.00	4.00	3.00	4.00	4.00	3.00	2.00	2.00	2.00	2.00	3.00	3.00	2.00	2.00	3.00	3.00	2.00
BP5	14	184.00	72.00	21.30	4.00	2.00	4.00	2.00	4.00	3.00	4.00	4.00	4.00	4.00	3.00	2.00	4.00	3.00	2.00	3.00	2.00	4.00
BP6	15	177.00	62.00	19.80	4.00	1.00	2.00	3.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	2.00	3.00
BP7	15	188.00	68.00	19.20	2.00	2.00	2.00	2.00	3.00	2.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00	3.00	1.00	2.00	2.00	4.00
BP8	15	193.00	71.00	19.10	2.00	2.00	3.00	2.00	3.00	2.00	2.00	3.00	3.00	3.00	4.00	3.00	4.00	3.00	1.00	4.00	2.00	3.00
BP9	15	188.00	75.00	21.20	2.00	2.00	3.00	2.00	3.00	2.00	2.00	3.00	3.00	2.00	3.00	3.00	3.00	2.00	1.00	2.00	2.00	2.00
BP10	15	198.00	100.00	25.50	3.00	4.00	4.00	4.00	2.00	2.00	3.00	2.00	1.00	3.00	1.00	3.00	1.00	3.00	2.00	3.00	4.00	3.00
BP11	18	194.00	85.00	22.60	3.00	3.00	4.00	2.00	1.00	2.00	3.00	2.00	3.00	3.00	2.00	4.00	3.00	3.00	2.00	3.00	4.00	3.00
BP12	17	198.00	76.00	19.40	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	3.00
BP13	17	198.00	81.00	20.70	1.00	1.00	2.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	4.00	3.00	2.00	2.00	2.00	3.00	3.00
BP14	16	190.00	70.00	19.40	4.00	2.00	3.00	4.00	3.00	4.00	4.00	3.00	3.00	3.00	3.00	2.00	3.00	3.00	3.00	3.00	4.00	3.00
BP15	16	189.00	81.00	25.50	4.00	2.00	4.00	4.00	3.00	4.00	3.00	3.00	3.00	3.00	3.00	4.00	3.00	3.00	3.00	4.00	4.00	4.00
BP16	17	185.00	80.00	23.40	2.00	3.00	3.00	2.00	2.00	3.00	3.00	4.00	4.00	4.00	4.00	3.00	4.00	3.00	3.00	3.00	4.00	3.00
BP17	17	188.00	75.00	21.20	2.00	1.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00	3.00	3.00	2.00	3.00	2.00	3.00	2.00	3.00	2.00
BP18	16	184.00	75.00	22.20	3.00	2.00	4.00	3.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	4.00	2.00	4.00	3.00
BP19	17	184.00	65.00	19.20	3.00	1.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00	3.00	3.00	4.00	3.00	3.00
Mean	15.68	188.84	75.74	21.37	2.63	2.00	3.00	2.58	2.58	2.58	2.74	2.58	2.53	2.79	2.63	2.84	2.95	2.53	2.00	2.74	2.95	2.84
SD	1.20	5.81	8.37	2.02	0.96	0.75	0.82	0.84	0.96	0.90	0.73	0.77	0.84	0.79	0.76	0.69	0.71	0.51	0.94	0.81	0.91	0.69
UCI	17.41	186.23	71.98	20.46	2.20	1.66	2.63	2.20	2.15	2.17	2.41	2.23	2.15	2.44	2.29	2.53	2.63	2.30	1.58	2.37	2.54	2.53
LCI	14.58	191.46	79.50	22.48	3.06	2.34	3.37	2.96	3.01	2.98	3.07	2.92	2.90	3.14	2.97	3.15	3.26	2.76	2.42	3.10	3.36	3.15

Note: BP: Basketball Players; A: Age; H: height; BM: body mass; BMI: Body Mass Index; LDP: Level of defensive pressure; DH: Defensive help; BS: Blocking shots; BPG: Ball possesion gained; DRE: Defensive rebounding eficiency; TDE: Transition defense efficiency; PMPD: Playing multiple positions on defense; BC: Ball control; PS: Passing skills; DP: Dribble Penetration; TS: Three-point shots; TPS: Two-point shots; FT: Free throw; TOP: Two-and-one plays; ES: Efficiency of screening; OWB: Offense without the ball; ORE: Offensive rebounding efficiency; TOE: Transititon offense efficiency; SD: Standard Deivation; UCI: Upper confident interval and LCI: Lower confident interval

Table 3. Anthropometrical measures and mean performance variables of talent questionnaire (attack, deffense and overall) of each basketball players (mean ± SD).

BP (n = 19)							
	Antropometric Measures				Mean Performance Variables		
	A	H	BM	BMI	Attack Mean	Defense Mean	Overall
BP1	15	194.00	80.00	21.30	37.14	40.00	38.57
BP2	15	189.00	73.00	20.40	42.86	50.00	46.43
BP3	14	184.00	70.00	20.70	51.43	41.67	46.55
BP4	14	183.00	80.00	23.90	65.71	46.67	56.19
BP5	14	184.00	72.00	21.30	65.71	63.33	64.52
BP6	15	177.00	62.00	19.80	48.57	40.00	44.29
BP7	15	188.00	68.00	19.20	45.71	53.33	49.52
BP8	15	193.00	71.00	19.10	45.71	61.67	53.69
BP9	15	188.00	75.00	21.20	45.71	46.67	46.19
BP10	15	198.00	100.00	25.50	62.86	48.33	55.60
BP11	18	194.00	85.00	22.60	51.43	58.33	54.88
BP12	17	198.00	76.00	19.40	40.00	46.67	43.33
BP13	17	198.00	81.00	20.70	28.57	48.33	38.45
BP14	16	190.00	70.00	19.40	68.57	60.00	64.29
BP15	16	189.00	81.00	25.50	68.57	66.67	67.62
BP16	17	185.00	80.00	23.40	51.43	70.00	60.71
BP17	17	188.00	75.00	21.20	40.00	48.33	44.17
BP18	16	184.00	75.00	22.20	60.00	58.33	59.17
BP19	17	184.00	65.00	19.20	62.86	66.67	64.76
Mean	15.68	188.84	75.74	21.37	51.73	53.42	52..58
SD	1.20	5.81	8.37	2.02	11.78	9.45	9.24
UCI	17.41	186.23	71.98	20.46	46.43	49.17	48.42
LCI	14.58	191.46	79.50	22.48	57.02	57.67	56.73

Note: BP: Basketball Players; A: Age; H: height (cm); BM: body mass (kg); BMI: Body Mass Index; SD: Standard Deivation; UCI: Upper confident interval and LCI: Lower confident interval

Table 4. COD values (505 test, VCut test and Illinois Dribling test) of each basketball players (mean ± SD)

BP (n = 19)											
	505					V-CUT				IDT	
	T(s)	V (km/h)	CT (ms)	10m (s)	COD	T(s)	V (km/h)	CT (ms)	10m (s)	T(s)	V (km/h)
BP1	2.50	8.40	404.58	1.78	0.72	6.60	13.62	421.25	1.714	15.55	3.63
BP2	2.41	9.05	525.41	1.56	0.85	6.50	13.82	404.583	1.78	15.95	3.76
BP3	2.35	9.16	516.66	1.57	0.78	6.57	13.68	525.417	1.56	17.09	3.51
BP4	2.39	8.86	354.16	1.67	0.71	6.07	14.81	516.667	1.572	16.62	3.60
BP5	2.27	9.43	346.25	1.53	0.73	6.24	14.42	-	-	17.02	3.52
BP6	2.25	9.54	425.41	1.51	0.73	6.27	14.34	346.25	1.539	15.52	3.86
BP7	2.60	8.28	400.00	1.74	0.85	6.87	13.09	395.833	1.597	16.80	3.57
BP8	2.39	9.02	395.83	1.59	0.79	6.57	13.68	425.417	1.518	16.28	3.68
BP9	2.38	9.05	491.66	1.59	0.78	6.34	14.19	400	1.743	15.81	3.79
BP10	2.48	8.74	375.41	1.63	0.84	6.44	13.97	491.667	1.597	17.53	3.42
BP11	2.51	8.53	333.33	1.70	0.81	6.80	13.22	375.417	1.635	16.91	3.54
BP12	2.41	8.94	396.25	1.61	0.79	6.50	13.82	333.333	1.701	16.33	3.67
BP13	2.47	8.66	325.41	1.68	0.79	6.64	13.55	396.25	1.614	16.94	3.54
BP14	2.23	9.18	279.58	1.68	0.55	6.64	13.55	325.417	1.68	16.28	3.68
BP15	2.50	8.44	400.00	1.75	0.75	6.64	13.55	279.583	1.685	17.21	3.48
BP16	2.34	9.16	400.41	1.58	0.76	6.30	14.26	400	1.755	16.44	3.65
BP17	2.23	9.59	400.00	1.51	0.72	5.77	15.58	400.417	1.584	15.88	3.77
BP18	2.38	9.16	346.25	1.61	0.70	6.44	13.97	-	-	15.96	3.75
BP19	2.45	8.54	383.75	1.76	0.68	6.64	13.55	346.25	1.61	17.14	3.49
Mean	2.40	8.94	394.76	1.64	0.76	6.47	13.93	357.04	1.47	3.53	16.54
SD	0.10	0.39	62.88	0.08	0.07	0.26	0.58	140.38	0.52	1.03	0.56
UCI	2.35	8.76	366.48	1.60	0.73	6.35	13.67	293.92	1.23	3.07	16.29
LCI	2.44	9.11	423.03	1.68	0.79	6.59	14.20	420.16	1.70	4.00	16.79

Note: BP: Basketball Players; T: Time (s); V: Velocity; CT= Contact Time; COD_D: Change of Direction deficit; IDT: Illinois Dribling Test.

Table 5. Correlation between anthropometric values [i) weight, ii) height and iii) Body Mass Index] and and talent values (attack mean, defense mean and overall)

	BP (n=19)		
	Height (cm)	Weight (kg)	BMI (%)
AM	r=-.18	r=-.20	r=-.23
	p=.46	p=.39	p=.33
DM	r=-.11	r=.07	r=-.01
	p=.63	p=.76	p=.96
O	r=-.12	r=-.31	r=-.28
	p=.60	p=.18	p=.24

Note: AM: Attack Mean; DM: Defense Mean; O: Overall. * Denotes significance at p<0.05, and ** denotes significance at p<0.01.

Table 6. Correlation between 505 values (time, velocity, contact time, 10m and COD_D) and talent values (attack mean, defense mean and overall)

	BP (n=19)				
	T(s)	V (km/h)	CT (ms)	10m (s)	COD_D
AM	r=-.16	r=.25	r=.05	r=-.35	r=.19
	p=.51	p=.29	p=.81	p=.13	p=.43
DM	r=.07	r=.13	r=.62	r=-.37	r=.55
	p=.76	p=.57	p=.004**	p=.11	p=.01*
O	r=-.071	r=.24	r=.36	r=-.44	r=.41
	p=.77	p=.31	p=.12	p=.06	p=.07

Note: AM: Attack Mean; DM: Defense Mean; O: Overall; T: Time (s); V: Velocity; CT = Contact Time; COD_D: Change of Direction deficit. * Denotes significance at p<0.05, and ** denotes significance at p<0.01.

Table 7. Correlation between V Cut values (time, velocity, contact time, 10m and COD_D) and talent values (attack mean, deffense mean and overall)

	BP (n=19)				
	T(s)	V (km/h)	CT (ms)	10m (s)	COD_D
AM	r=01	r=.10	r=-.08	r=-.11	r=.08
	p=.62	p=.66	p=.72	p=.64	p=.72
DM	r=.01	r=.00	r=.01	r=-.13	r=.13
	p=.97	p=.10	p=.99	p=.59	p=.58
O	r=-.07	r=.07	r=-.05	r=-.14	r=.12
	p=.76	p=.76	p=.81	p=.55	p=.59

Note: AM: Attack Mean; DM: Deffense Mean; O:Overall; T: Time (s); V: Velocity; CT= Contact Time; COD_D: Change of Direction deficit. * Denotes significance at p<0.05, and ** denotes significance at p<0.01.

correlation was found between variables. See table 7 for more information.

Last, a new correlation analysis was performed between Illinois Dribbling test values [i)time, ii) velocity, iii) contact time, iv) 10m and v) COD_D] and talent values [i) attack mean, ii) defense mean and iii) overall]. A negative correlation was found between AM and Time (r =-.46, p= .04) and another positive moderate correlation was found between AM and velocity (r =.45, p= .04). See table 8 and figure 2 for more information.

At this point a correlation analysis was performed between significative values of each test performed, in this case 505 in defense (contact time and COD_D) and Illinois dribbling test in attack (Time and Velocity) and anthropometrical measures (weight, BMI and height). In this respect, dataset revealed a moderate positive correlation between weight and Time (r =.47, p= .04) and other moderate negative correlation between weight and V (r =-.46, p= .04). See table 9 and figure 3 for more information.

Table 8. Correlation between Illinois Dribling test values (time and velocity) and talent values (attack mean, deffense mean and overall)

	Male (n=19)	
	T(s)	V (km/h)
AM	r=-.46	r=.45
	p=.04*	p=.04*
DM	r=-.18	r=.18
	p=.46	p=.43
O	r=-.41	r=.41
	p=.08	p=.07

Note: AM: Attack Mean; DM: Deffense Mean; O:Overall; T: Time (s); V: Velocity * Denotes significance at p<0.05, and ** denotes significance at p<0.01.

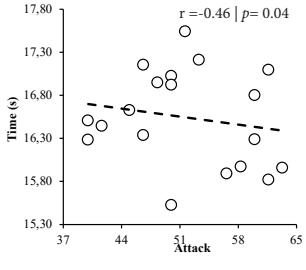

Fig. 2.1

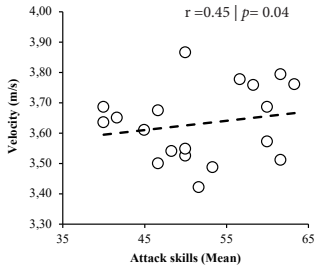

Fig. 2.2

Fig. 2. Representation of significative correlations between Illinois test values (Time and velocity) and talent values (Attack skills mean). Figure 2.1. Correlation analysis between Time and Attack skills and Figure 2.2. Correlation analysis between velocity and attack skills.

Table 9. Correlation between significative values of each test performed, in this case 505 in defense (contact time and COD_D) and Illinois dribbling test in attack (Time and Velocity) and talent values (attack mean, deffense mean and overall)

	Male (*n*=19)			
	Defense		Attack	
	CT (ms)	COD_D	T(s)	V (km/h)
Weight (cm)	r=-.22	r=.32	r=.47	-.46
	p=.36	p=.17	p=.04*	p=.04*
BMI (%)	r=-.41	r=.13	r=.40	r=-.39
	p=.08	p=.58	p=.08	p=.09
Height (cm)	r=-.18	r=.32	r=32	r=-.33
	p=.46	p=.16	p=.17	p=.16

Note: AM: Attack Mean; DM: Deffense Mean; O:Overall; CT = Contact Time; COD_D: Change of Direction deficit; T: Time (s); V: Velocity * Denotes significance at p<0.05, and ** denotes significance at p<0.01.

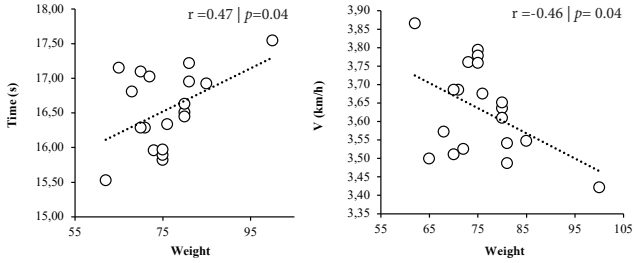

Fig. 3.1 Fig. 3.2

Fig. 3. Representation of significative correlations between significative values (CT and COD of 505 test and Time and velocity of Illinois Dribling test and anthropometrical measures reflected on weight. Figure 3.1. Correlation analysis between Time and weight and Figure 3.2. Correlation analysis between velocity and weight

Discussion

The aim of this study was to identify the possible relationship between the COD and a qualitative test for talent identification in basketball. Physicality-wise, a recent review reported that TID tests in basketball are related to 10-30 m sprinting and agility such as the COD. Thus, accelerations and decelerations become a success factor in basketball performance since they are implicit in the game because they are limited spaces (Pino-Ortega et al., 2021). Therefore, this study focused on the performance of COD tests for TID (505, V-CUT and Illinois). In this sense, COD is considered to be one of the important physical factors for talent identification as mentioned above. Recently, the importance of measuring COD deficit has also been highlighted. Measuring dribble times and dribble deficit during evaluations can allow basketball professionals to accurately determine the effects of training approaches on physical and technical attributes separately. This fact is relevant since the properties of short-duration acceleration and velocity properties are essential for the overall speed of the dribbling motion (Ramirez-Campillo et al., 2021). Thus, the dribbling deficit provides a more isolated measure of dribbling speed than tests using total performance times (Scanlan et al., 2018)

However, it has been mentioned how important it is to involve the coach in TID too. In this regard, (Junior, Vianna, Lauria, Coelho, & Werneck, 2019) reported that coach evaluation is essential and should be part of the TID process. Coaches' performance during years of training can influence TID due to the time spent and the environment involving the player (Roberts et al., 2021). Therefore, a qualitative assessment by the coach has been carried out on the one hand through. This basketball-specific test provides orientation to the player's position and role in the game. Thus, several studies have recently been reported highlighting that a multidimensional approach based on the different physical performance indicators together with the coaches' opinion is necessary for TID (Barraclough et al., 2022; Joseph et al., 2021; Ribeiro Junior et al., 2021). (Gál-Pottyondy et al., 2021) highlight that the relationship of qualitative tools with physical performance factors such as COD is not clear. In this line, this study aims to elucidate their possible relationship.

Considering the above, the results show a strong positive correlation between the defensive skills established by the coaches, the contact time and the COD deficit in the 505 test (see table 3). Thus, players with predominantly defensive skills tend to obtain worse COD skills. However, those players in whom coaches selected with higher attacking average obtained a negative correlation with time and a positive correlation with speed in the Illinos test. Thus, the more exhaustive relationship between position and COD determines a deeper TI (Dežman et al., 2001). This fact leads to an efficiency search due to the model of the club's game. Hence, the correlation between the Dezman questionnaire and the COD obtained could support a further efficient talent identification, providing information towards the player's position (Nasiri et al., 2019) and at the right place on the court according to the game model. In addition, The COD indicates the possible deficits of the players, and, from there, design a plyometric and explosive strength strategy for the improvement of the COD and decrease the incidence of injuries (Stojanovic & Ostojic, 2012). The results of the correlations appear consistent due to the fact that the attacking skills require a greater potential in the COD given the limited spaces per player, being related to a high number of accelerations/decelerations and more displacements of high intensity (Halouani et al., 2014; Hoffmann et al., 2014). In the COD, the stretching-shortening cycle of the muscle is produced. To greater speed in this cycle, the faster the COD will be. Therefore, the performance will be enhanced. It should be noted that this cycle occurs more optimally when there is a higher content of IIx fibers. In addition, the higher content of type IIx fibers will lead to greater performance in specific physical tests of basketball such as short sprints and jumps (Arede et al., 2019). Thus, Cui et al. (2019), reported that leg power is a determining factor for being recruited as a shooting guard, an offensive position where a large number of CODs are produced.

Elsewhere, defensive skills also require COD. However, there are other predominant characteristics. In defense, a greater corpulence is required to reduce the spaces of the attacking player, both for penetration and shooting. This reason could be the reason why defense-related characteristics obtained a positive correlation with a higher contact time and a deficit in COD. Thus, after observing the results, we proceeded to observe the possible correlations between anthropometric characteristics (height, weight and BMI) and the skills evaluated by the coaches. (Karalejic, Jakovljevic, & Macura, 2011) reported that the correlation between certain field tests and some anthropometric parameters indicates that some anthropometric measures could have a moderately negative influence on the results of technical skills tests in 14-year-old players. In this sense, traditionally, the tallest and heaviest players have been placed in positions close to the basket while smaller players belonged to positions farther away (Trninić & Dizdar, 2000; Trninić, Dizdar, & Jaklinović-Fressl, 1999), and the anthropometry of the players may influence their position (Bale, 1991; Ostojic et al., 2006; Young & Pryor, 2007). Thus, for players closer to the basket, a greater body mass is necessary to compete for positions under the basket. Conversely, the less corpulent players are in responsible for bringing the ball up quickly. Therefore, speed and agility are performance factors for these players (Drinkwater et al., 2008). However, in this study no correlation was found between anthropometry and either defensive or offensive skills. This fact could be due to the fact that they are players still in the formative stage, being able to be blamed on the individual physical maturity of each of the players

(Gryko et al., 2018). In this sense, these authors mentioned that maturity in some players could be late, and it could be detrimental to specialize players in a position according to their anthropometric characteristics (Gryko et al., 2019).

Conclusions

Finally, this study provides a multidisciplinary approach to TID, evaluating the COD from different specific tests and taking into account the evaluation of coaches. Further studies correlating defensive and offensive skills are needed to be able to compare the results, as well as studies conducting a multidisciplinary approach to TID. Several limitations exist in this manuscript. The limited number of participants found in this study, the absence of anthropometric parameters such as folds and other performance parameters such as vertical jump. The wide variety of studys found but with by diferents i) designs, ii) talent ranges, iii) variables assessed and iv) durations of the studies (more longitudinal studies is necessary) evidenced that more research is needed. Another limitation might be that other approaches such as psychological were not evaluated. Future research should consider all possible variables to be able to perform a multidisciplinary evaluation for TID. Nevertheless, it should be noted that findings are relevant partly due to the sample of semiprofessional basketball players and their concrete difficulty to access.

The COD is postulated as an essential tool for TID. However, it is important to perform a multidisciplinary approach considering the coaches' assessment. Elsewhere, COD correlates positively with offensive skills whilst correlates negatively with defensive skills. This novel multidisciplinary approach provides relevant information for TID.

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Conflict of interest

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ЗВ'ЯЗОК МІЖ ВИЗНАЧЕННЯМ ТАЛАНТУ ТА ЗМІНОЮ НАПРЯМКУ РУХУ В МОЛОДИХ БАСКЕТБОЛІСТІВ

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

Реферат. Стаття: 10 с., 9 табл., 3 рис., 42 джерела.

Мета дослідження. Стосовно програм визначення талантів (TID), які є невід'ємною частиною процесу відбору для спортсменів висококласного рівня, автори виявили брак доказів: на диво мало досліджень було проведено для з'ясування впливу результатів тесту на зміну напрямку руху (COD) на TID у баскетболі. Метою цього дослідження було: i) проаналізувати антропометричні показники, змінні показників виконання тесту COD і значення талантів кожного баскетболіста, ii) провести тест COD, процедуру визначення талантів у баскетболі та iii) провести кореляційний аналіз, щоб спробувати пояснити зв'язок між тестом COD і баскетбольним талантом через навички нападу або захисту.

Матеріали та методи. Дев'ятнадцять юних баскетболістів (вік = 15,68 ± 1,20 року; зріст = 188,84 ± 5,81 см, вага = 75,74 ± 8,37 кг) із принаймні 3 роками досвіду взяли участь у перехресному дослідженні. Щоб оцінити загальну результативність відібраних гравців, використовували опитувальник щодо змінної нападу або захисту. Крім того, гравці повинні були виконати тест V-Cut (біг ламаною лінією зі зміною напрямку руху в її кутах у формі літери V), тест 5-0-5 (тест на спритність, що передбачає спринт зі змінами напрямку руху на 90 градусів та одним розворотом на 180 градусів) та Іллінойський тест на ведення м'яча. Використовували однопроменеві фотоелементи (Chronojump Boscosystem), а система тривимірного захоплення руху з відеокамерою, налаштованою на 210 Гц (CASIO EX-ZR800), записувала всю дію.

Результати. Результати вказують на те, що показник гравців у тесті COD позитивно корелює [тест 5-0-5 (час контакту, r = 0,62, p = 0,004 та значення змінної «COD дефіцит», яку обчислюють шляхом віднімання часу, витраченого на прямолінійний біг, від загального часу виконання тесту COD, тобто чистий час маневрування, r = 0,55, p = 0,01) та Іллінойський тест на ведення м'яча [швидкість (r = 0,45, p = 0,04)] з навичками нападу, тоді як він негативно корелює [Іллінойський тест на ведення м'яча (r = -0,46, p = 0,04)] з навичками захисту.

Висновки. У цьому дослідженні висвітлюється важливість застосування мультидисциплінарного підходу, враховуючи оцінку тренерів і показники гравців у виконанні тесту COD, щоб надати відповідну інформацію для TID.

Ключові слова: тест на зміну напрямку руху (COD), баскетбол, визначення талантів, мультидисциплінарний підхід.

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