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Factors differentiating change of direction performance in NCAA Power 4 male basketball athletes

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Abstract

The aim of this study was to investigate COD performance in an elite basketball cohort to determine which phase specific qualities are most strongly associated with COD performance. One hundred and twenty-four male basketball athletes (age = 20.9 ± 1.23 years, height = 195 ± 14.3 cm, body mass = 89.9 ± 10.2 kg) from 10 different *NCAA* Power 4 basketball programs participated in this study. COD performance was assessed using a modified 505 (m505) COD test with phase specific and overall COD performance times measured via a portable motorized resistance device. Multiple linear regression was used to explore how total time to complete the m505 was influenced by the different phase-specific outcome measurements and differences between bigs (n = 54) and guards (n = 70) calculated using independent t-tests and Cohen's effect size. Four phase specific COD metrics significantly associated with m505 COD time to completion, including: time phase 1a (r = 0.90, p < 0.001), time phase 1b (r = 0.77, p < 0.001), maximal acceleration 1a (r = -0.73, p < 0.001) and maximal deceleration (r = -0.42, p < 0.001). These findings highlight the importance of phase specific outcome measures when assessing COD performance in elite basketball athletes.

Introduction

Basketball is a court-based team sport that requires a high demand of acceleration, deceleration, and change of direction (COD) [1-5]. Official basketball competitions are performed on courts with small perimeters (i.e., 94 ft x 50 ft), therefore, it is imperative for both health and performance that basketball athletes can efficiently accelerate, decelerate and change direction [6-10]. During training and competition, athletes are typically exposed to a higher volume of high-intensity decelerations (< 3.5 $m{\cdot}s^{-2}$) compared to accelerations (>3.5 $m{\cdot}s^{-2}$) [6,11]. Furthermore, high-intensity decelerations have been reported to have a very strong correlation with session rate of perceived exertion in elite basketball. These findings suggest that high-intensity decelerations contribute to the athlete's perception of more demanding movement activities in basketball [12]. Given the importance of deceleration for basketball players there is a need to evaluate player deceleration qualities alongside the more commonly measured sprint acceleration and COD performance times.

Recent sports science literature has examined athletes' ability to accelerate, decelerate and change direction simultaneously by assessing phase-specific (i.e., acceleration, deceleration and re-acceleration sub-phases) COD performance [13-19]. Phase specific COD analysis generates more detailed insights of COD performance than traditional approaches that use total time to completion as the outcome measure [17]. Whilst time to completion is a global measure of an athlete's ability to change direction, it does not provide insights into the different COD subphases that might underpin better COD performance and identify the COD qualities that may differentiate athletic groups and performance levels. For the purposes of phase specific COD analyses the 505 COD test is commonly used due to it involving a 180° COD that requires significant deceleration prior to turning (i.e., requires athletes to reduce momentum to zero). It is also easily modified to manipulate the approach velocity and deceleration demands encountered in different sports [20]. As such, in basketball, a sport that demands decelerations and turns predominantly from shorter sprint distances [21-23], the modified 505 (m505) COD test with a 5m approach distance prior to turning may be a more suitable test to understand and quantify COD performance capabilities [18-21]. However, to the authors knowledge, no study has investigated the use of the m505 COD test or phase specific COD information in elite basketball athletes.

Motorized resistance devices (MRD) permit continuous measurement of time, displacement, and pulling force during 505 COD tests allowing calculation of derived outcome measurements such as velocity, acceleration, deceleration, force and power [23,24]. An MRD (i.e., 1080 Sprint) provides valid measures of velocity during an m505 COD test, based on comparison of center of mass calculations from three-dimensional motion capture [23], and reliable phase-specific information during both the left and right foot turns within the test [24]. Furthermore, the MRD isolates specific phase components of the m505 test in deceleration, turning, and reacceleration rather than just using time to completion.

Therefore, the purpose of this study was to investigate performance in the m505 COD test using a MRD in an elite basketball population to determine which phase specific COD qualities best explain overall COD performance times and differentiate performance in guards (i.e., point guards and shooting guards) and bigs (i.e., small forwards, power forwards and centers). If an athlete was a hybrid of these two groups based on positional role within the team, it was then up to the coach to determine what positional group the athlete fell into based on tactical responsibilities of the athlete. This information could provide valuable information to practitioners working in an applied environment to advance the understanding of COD performance in elite basketball athletes, or other athletes competing in multi-directional speed sports. Based on the positional demands of the sport, it was hypothesized that guards would outperform bigs in phase specific variables and total COD times.

Methods

Study Design

A cross-sectional observational research design was used to investigate phase specific qualities of elite basketball athletes using the m505 test. All testing was conducted in a familiar environment (practice or game court) on a hardwood surface. The athletes were instructed to wear the same basketball footwear used in competition and training. Prior to testing all athletes performed a standardized warm-up that included dynamic stretching, skipping patterns, acceleration, and deceleration patterns. All data was collected within the same 2-week period of the preseason within NCAA Collegiate Basketball.

Participants

One hundred and twenty-four male basketball players (age = 20.9 ± 1.23 years, height = 195 ± 14.3 cm, body mass = 89.9 ± 10.2 kg) from 10 different NCAA Power 4 basketball programs participated in this study. The cohort was separated into two groups based on position comprising 54 bigs (age = 20.5 ± 1.4 years, height = 204.4 ± 7.6 cm, body mass = 102.1 ± 7.9 kg) and 70 guards (age = 21.2 ± 1.19 years, height = 190.5 ± 5.1 cm, body mass = 86.2 ± 4.5 kg). Each team's performance staff that participated within this study was sent descriptions and videos of each test within the protocol for familiarity 4-weeks prior to on-site data collection allowing for multiple exposures and familiarization of the tests for the athletes within the study. Athletes that were unable to participate in court-based team training due to previous are current injuries during the time of data collection were excluded from this study. Written informed consent was obtained from each athlete prior to participation. This study received institutional review approval via Mississippi State University (IRB-24-390).

Procedures

Following the warm-up the m505 tests were used to assess COD ability. The use of the m505 test with an MRD has been described in detail elsewhere [24] but summarized here for clarity. Specifically, the m505 test consists of two 5m sprints with a 180-degree turn where the athlete starts and finishes the test at the same mark. Both start/finish (0 m) and turning line (5 m) was marked with cones (approximately 15 cm diameter) about 1 m apart. The turning line was additionally marked with blue painters' tape (15 cm wide). Start condition was standstill with a self-selected staggered stance position. The athletes were instructed to sprint as fast as possible to the turning line with the final foot contact touching the turning line, before sprinting back past the start/finish line. Each athlete performed two m505 tests, one with the left and right foot being the final foot contact.

During the m505 test the line from a portable MRD (1080 Sprint; 1080 Motion, Lidingö, Sweden) was attached to the athlete on a pelvic belt. The load on the MRD was set to 3 kg for both the assisted (i.e., moving toward the MRD) and resisted (i.e., moving away from the MRD) phase of the COD test. The effects of the 3 kg load is expected to be minimal, and it was the same load used in both validation [23] and reliability analysis [24] of the same COD tests. The MRD was positioned on the baseline of each court area 8 and 3 m away from the staring and turning line, respectively. Each m505 was performed with the athlete initiating the movement toward the MRD (assisted start). Data was recorded at 333 Hz with a 1.3 Hz fourth order Butterworth lowpass filter applied prior to extraction of all outcome measurements. Filtered speed data (y-axis) over time (x-axis) is shown in Figure 1, with a description of all outcome variables in Table 1.

*****Insert Figure 1 Near Here*****

*****Insert Table 1 Near Here*****

Statistical Analysis

Descriptive data were calculated using Microsoft Excel (Microsoft Corp., Redmond, WA, USA) with statistical analysis performed using Jamovi (version 2.3.6) and Python (version 3.13.0). Normality of outcome measurements based on position were assessed and confirmed using the Shapiro-Wilk test and Q-Q plots. Multiple linear regression was performed to explore how total time to complete the m505 (i.e., dependent variable) was affected by the different phase-specific outcome measurements (i.e., exploratory variables) obtained by the MRD. The variance between positional groups (guards vs bigs) in m505 left and right foot turns were determined using independent sample *t*-tests with the magnitude of differences calculated using Cohen's d effect sizes (ES), which were interpreted as trivial ($d = < 0.19$), small ($d = 0.2$-0.49), moderate ($d = 0.50$-0.79), or large ($d > 0.80$) [25]. Correlations (r values) were interpreted using the scale from Hopkins (2002) [26] as: trivial (0.00–0.09), small (0.10–0.29), moderate (0.30–0.49), large (0.50–0.69), very large (0.7–0.89) and almost perfect (0.90–0.99). Statistical inferences were made by using an alpha level of $p \leq 0.05$.

Results

Determinants of m505 change of direction performance time

Table 2 displays statistical data from the multiple linear regression analysis. Of the 11 phase-specific COD variables analyzed only four significantly associated with m505 COD performance time. These included time phase 1a (Beta = 0.19, t(n) = 8.67, $p < 0.001$), time phase 1b (Beta = 0.47, t(n) = 11.14, $p < 0.001$), accel max 1a (Beta = -0.47, t(n) = -22.27, $p < 0.001$) and decel max (Beta = -0.20, t(n) = -5.98, $p < 0.001$).

*****Insert Table 2 Near Here*****

Scatter plots illustrating the relationship between phase specific change of direction metrics and total time to complete the m505 change of direction test can be seen in Figure 2.

*****Insert Figure 2 Near Here*****

Differences between guards and bigs

Descriptive statistics and differences between bigs and guards for all m505 outcome variables for left and right foot turns are illustrated in Table 2. Guards had significantly greater top speed 1a in both left foot (4.49 ± 0.25 vs. 4.25 ± 0.23; ES = 0.98) and right foot (4.48 ± 0.29 vs. 4.25 ± 0.22; ES = 0.82) turns, and decel max in both left foot: (8.10 ± 0.66 vs. 7.50 ± 0.82; ES = 0.82) and right foot (8.13 ± 0.61 vs. 7.68 ± 0.75; ES = 0.65) turns. Small effects were observed between positions based on the average of left and right foot turns, with guards having greater top speed 1b, shorter decel times and greater accel max 1b.

*****Insert Table 3 Near Here*****

Discussion

The aim of the current study was to examine performance in the m505 COD test using a MRD in an elite basketball population to determine which phase specific COD qualities best explain overall COD performance times and differentiate performance based on position. Total time to complete the m505 COD test was, as expected, significantly explained by both phase 1a and 1b times. However, it appears that performance during phase 1a is more important to overall COD performance times since both Accel max and Decel max during phase 1a were significantly correlated with performance, while top speed and accel max of phase 1b were not. Interestingly, total COD time did not significantly differentiate performance between guards and bigs, but phase specific information revealed guards assume significantly greater top speed and decel max during phase 1a than bigs in both left and right foot turns. These findings highlight the importance of phase-specific outcome measures to discriminate COD performance in elite basketball athletes.

Performance (i.e., total time) of m505 tests ranged from 3.18 to 3.27 s in the current study. This is both slower [24,27] and similar [23] to times observed in previous studies that measured COD performance with an MRD. Specifically, soccer, team handball and floorball athletes had shorter total times (range 3.01 to 3.04 s) in two studies [24,27], while in another study times were similar (range 3.26 to 3.52 s) to soccer, team handball, floorball and basketball athletes [23]. Similarly, phase times 1a and 1b follows the same pattern with longer [24,27] and similar times [23]. Thus, it appears that time measurements, overall and phase times, do not differentiate the elite basketball players tested in the current study to athletes at a lower level of performance. However, it appears that there might be other movement strategies used by the elite basketball players that are different than the populations studied previously [23,24,27]. For example, top speed observed for guards (4.48 to 4.49 $m \cdot s^{-1}$) are similar (4.48 to 4.49 $m \cdot s^{-1}$) to data presented previously [23,24], but decel max is greater (8.10 to 8.13 $m \cdot s^{-2}$) when compared to experienced soccer, handball, and floorball players (7.95 $m \cdot s^{-2}$) based on smallest worthwhile change (0.16 $m \cdot s^{-2}$) [27]. In contrast accel max in phase 1a is lower in both guards and bigs (5.10 to 5.44 $m \cdot s^{-2}$)· when compared to elite youth soccer players (6.28 $m \cdot s^{-2}$). In addition, accel max in phase 1b is greater in guards (6.20 to 6.31 $m \cdot s^{-2}$) as compared to youth elite soccer players (6.21 $m \cdot s^{-2}$), but not different based on smallest worthwhile change (0.13 $m \cdot s^{-2}$). In summary, it appears that compared to elite youth soccer players, elite basketball players, particularly guards, approach the m505 with a slower initial acceleration (i.e., accel max 1a), a similar top speed before a greater deceleration and a marginally greater re-acceleration (accel max 1b). Consequently, exploring phase specific information provides additional insights beyond total time when analyzing COD performance.

From the multiple regression some distinct characteristics of the different subphases significantly explained performance (i.e., total time) in the m505 test. The fact that both phase 1a and 1b times explain total time is not surprising considering they make up the total time. A more important aspect of our analysis was aimed at identifying which outcome variables within the different COD phases explain performance. Our findings highlight the role of accel max and decel max play obtaining faster COD performance times in elite basketball players. These findings are congruent with previous research from Dos'Santos et al. [28] that identified that greater deceleration, and braking forces were significantly associated with better overall COD performance times.

When examining differences between guards and bigs only phase specific variables top speed 1a and decel max significantly differentiated performance in both left and right foot turns. This finding is logical when examining the demands of the sport of basketball. Guards are typically on the perimeter with possession of the ball or defending the offensive player with the basketball. This would lend itself to more opportunities within the tactical context of the game to perform high-intensity accelerations and decelerations [29, 30]. For example, Garcia et al. [31] found that guards were exposed to shorter and more intermittent high-intensity shuffles and changes of directions than bigs when examining match-play demands in elite basketball. Nonetheless, these findings highlight the importance of developing horizontal deceleration ability in elite basketball players, which likely enables them to attain higher percentage of their maximum speed capabilities prior to changing direction due to having greater deceleration and therefore less time to stop.

Associations between deceleration performance and basketball performance has previously been investigated, but this involved "vertical COD" evaluated using the countermovement jump (CMJ) [32]. Specifically, amongst the CMJ variables examined, braking (or "deceleration phase") rate of force development revealed the greatest between group differences in minutes per game and competition performance in an elite basketball team [32]. However, this analysis reflects an association between CMJ braking force and the volume of decelerations performed rather than their intensity or maximum horizontal deceleration ability. Few studies have examined whether deceleration, and other neuromuscular qualities derived from vertical jumps transfer to greater deceleration performance in the horizontal direction [33]. Harper et al. [33] found that concentric variables from a CMJ best differentiated between high and low horizontal deceleration abilities in university team sport athletes, with eccentric peak force and eccentric-deceleration rate of force development having moderate effect size differences. Similarly, in another study, examining the influence of drop jump variables on horizontal deceleration performance in the same sample, concentric mean force had the largest effect size differences between low and high performers, but this variable had large to very large associations with eccentric mean force from the highest drop height (i.e., 40cm) [34]. In professional basketball players, Philipp et al. [35] also observed that players with higher horizontal deceleration performance had higher jump height, concentric velocities and concentric mean power, though these differences were non-significant, potentially due the small sample size (*n*=10). Therefore, further research is needed to investigate directional specific deceleration capabilities in basketball and if vertical deceleration qualities associate or transfer to better performance in horizontal deceleration tasks and vice-versa.

Limitations

Some limitations of the present study should be acknowledged. Factors such as seasonal variations, training load, match-play congestion, and daily rehabilitation may have impacted performance, even if all players were tested during two weeks in pre-season. Consequently, multiple measures taken throughout the training year would be able to account for such influences. Furthermore, tactical styles and physical preparation of the different teams included in the cohort could potentially impact the different COD qualities explored in this study. Understanding the schematics, particularly defensively, of how the coaches form each of these teams utilizes cut, dribble handoffs, screens, and the application of volume and intensity of the actions during training could provide insight on strategies and technique of the ability of the athlete to decelerate. Regardless, the methods and population studied are novel and the results may benefit practitioners working in basketball and other team sports.

Conclusion

The current study provides unique phase specific data of COD outcome measurements of time, speed, acceleration and deceleration measurements in an elite basketball population. Both accel max and decel max in phase 1a potentially could explain performance (i.e., total time) of the m505 COD test. Positional differences between guards and bigs were observed with guards being able to assume significantly greater top speeds and decel max in both left and right foot turns and with shorter decel times. These findings could impact how practitioners working in basketball evaluate COD performance.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author, [AJP]. The data are not publicly available due to privacy issues.

Ethics statement

This study was approved by the Institutional Review Board at Mississippi State University (IRB-24-390).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Figure 1: Illustration of the individual phases in m505 change of direction test

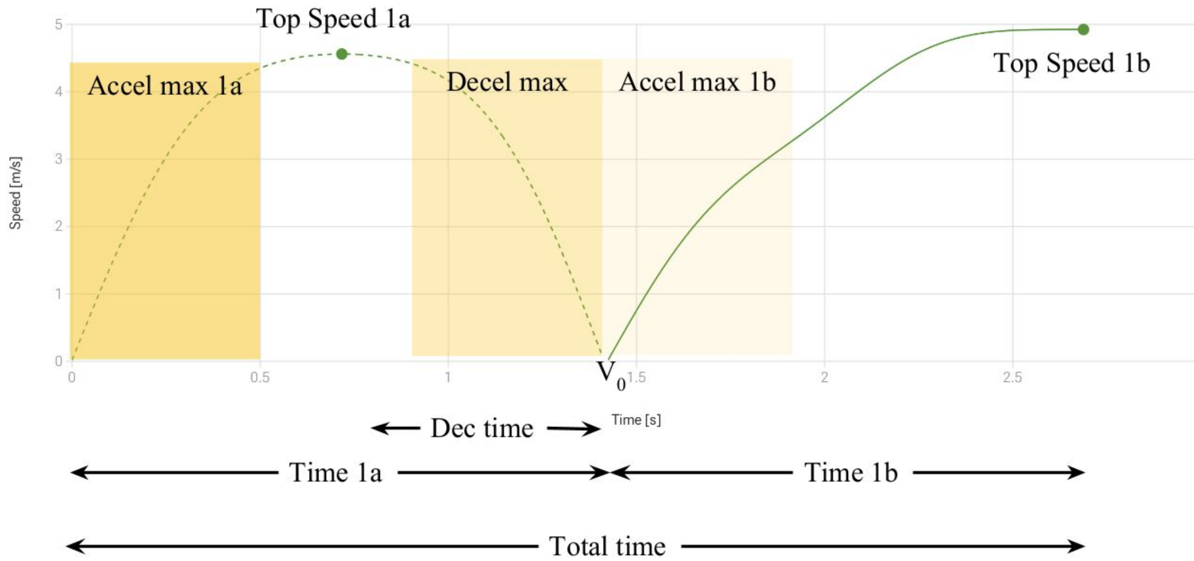

Table 1: Description and definitions of m505 change of direction outcome variables

Phase	**Variable**	**Abbreviation**	**Definitions or calculations**
Full			From the start of the measurement (0,2 m·s^{-1} trigger in MRD) back to the start/finish line. Note. phase 1a + phase 1b as defined below
1a			Phase 1a was defined as the phase from the start of the measurement (0,2 m·s^{-1} trigger in MRD) to when velocity changed direction (V_0).
1b			Phase 1b was defined as the phase from V_0 until the same distance as measured in phase 1a was covered.
Full	Total time (s)	Total time	Time to complete full test
	Total distance (m)	Total dist	Total distance covered in full test
1a	Time (s)	Time 1a	Time to complete phase 1a
	Distance (m)	Dist 1a	Distance covered during phase 1a
	Top speed (m·s^{-1})	Top Speed 1a	Maximum speed during phase 1a
	Maximum acceleration (m/s^2)	Accel Max 1a	The 0.5 second time-interval with the greatest average acceleration during phase 1a.
	Maximum deceleration (m/s^{-2})	Decel Max	The 0.5 second time-interval with the greatest average deceleration during phase 1a.
	Deceleration time (s)	Decel time	Time from Top Speed 1a to V_0
1b	Time (s)	Time 1b	Time to complete phase 1b
	Distance (m)	Dist 1b	Distance covered during phase 1b
	Top speed (m/s)	Top Speed 1b	Maximum speed during phase 1a
	Maximum acceleration (m/s^2)	Accel Max 1b	The 0.5 second time-interval with the greatest average maximum acceleration during phase 1b.

Table 2: Multiple linear regression with total time to complete the m505 change of direction test as dependent variable

	Unstandardized coefficient			Standardized coefficient					
Variable	B	SE	95% CI	Beta	95% CI	t	*r*	R^2	*p*
Constant	1.2429	0.21775	0.8139; 1.6719			5.708			< .001
Total Distance (m)	0.35	0.30	-0.23; 0.94	0.54	-0.35; 1.44	1.19	0.44	0.19	0.23
Phase 1a Dist (m)	-0.12	0.302	-0.72; 0.46	-0.09	-0.53; 0.34	-0.41	0.43	0.19	0.676
Phase 1a Time (s)	0.19	0.022	0.14; 0.23	0.19	0.14; 0.23	8.67	0.90	0.81	**< .001**
Top Speed 1a (m/s)	0.05	0.021	0.01; 0.09	0.05	0.01; 0.08	2.616	-0.28	0.08	0.09
Accel max 1a (m/s^2)	-0.07	0.03	-0.07; -0.06	-0.47	-0.51; -0.43	-22.27	-0.73	0.54	**< .001**
Decel max (m/s^{-2})	-0.08	0.01	-0.10; -0.05	-0.20	-0.26; -0.13	-5.98	-0.42	0.18	**< .001**
Decel Time (s)	-0.09	0.07	-0.24; 0.05	-0.03	-0.09; 0.02	-1.23	0.36	0.13	0.22
Phase 1b dist (m)	-0.40	0.30	-1.00; 0.19	-0.32	-0.81; 0.15	-1.33	0.43	0.19	0.18
Phase 1b time (s)	1.12	0.10	0.92; 1.32	0.47	0.39; 0.55	11.14	0.77	0.60	**< .001**
Top Speed 1b (m/s)	0.01	0.02	-0.03; 0.06	0.01	-0.04; 0.07	0.56	-0.47	0.22	0.57
Accel max 1b (m/s^2)	-0.01	0.01	-0.03; 0.01	-0.02	-0.06; 0.02	-0.89	-0.52	0.27	0.37

Definition and description of all outcome variables are presented in Table 1.
Abbreviations: B = unstandardized regression coefficients, SE = Standard Error, 95% CI = 95% confidence interval, Beta = standardized regression coefficient, t = t statistics, *r* = correlation coefficient, R^2 = coefficient of determination, p = p-value

Figure 2: Scatter Plot with correlations (R) and coefficients of determination (R^2) between phase 1a time, accel max 1a, decel max, and phase 1b time to total time

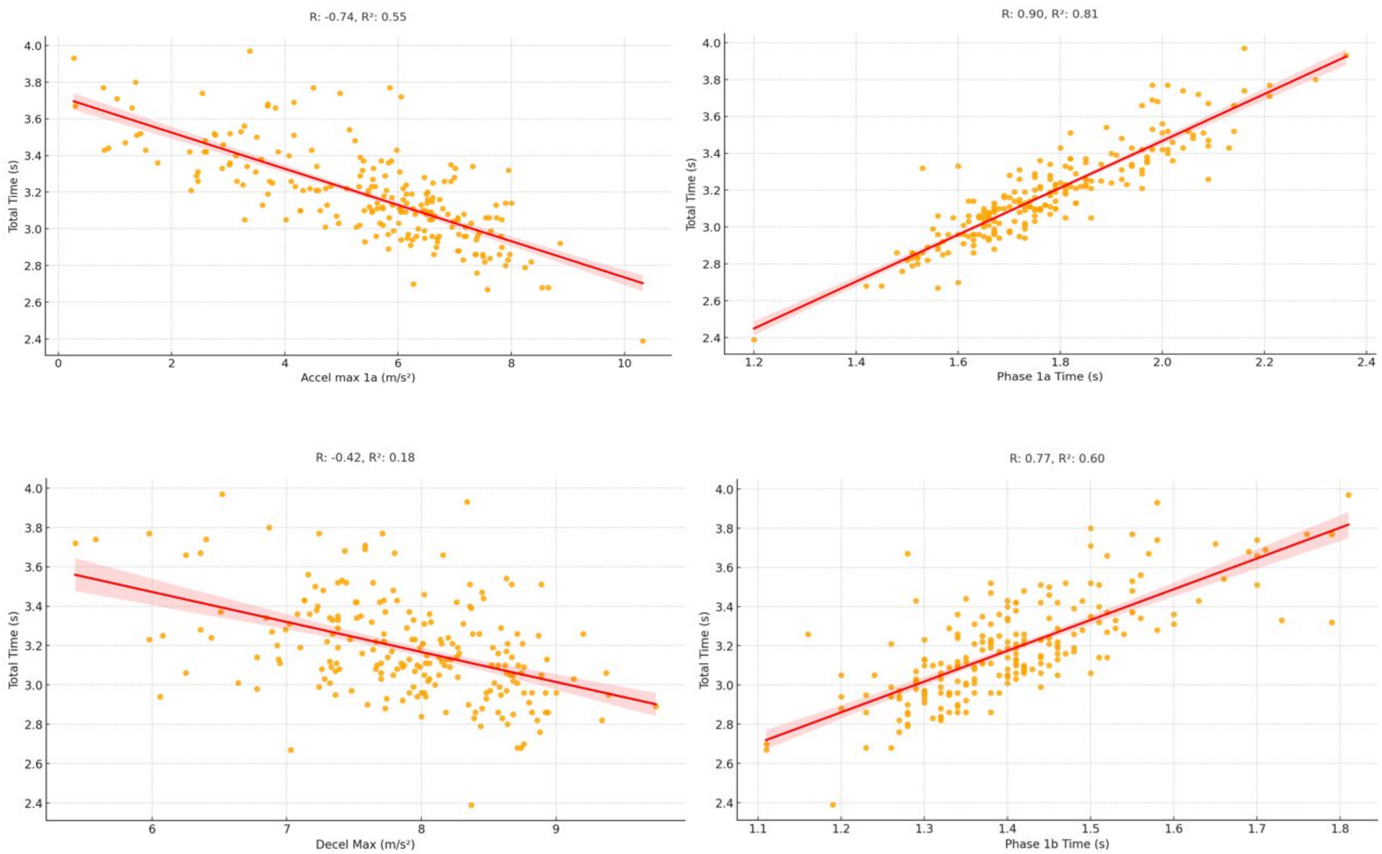

Table 3. Descriptive statistics (95% confidence intervals) and effect size (ES) differences between bigs (n = 54) and guards (n = 74) for all m505 outcome variables for left and right foot turns

	m505 Left Foot Turn				m505 Right Foot Turn			
Variables	**Bigs**	**Guards**	***p***	**ES**	**Bigs**	**Guards**	***p***	**ES**
Total Time (s)	3.27 ± 0.28	3.18 ± 0.30	0.07	0.32	3.23 ± 0.30	3.20 ± 0.32	0.61	0.09
	(3.19; 3.35)	(3.11; 3.26)		(S)	(3.14; 3.31)	(3.12; 3.27)		(T)
Total distance (m)	9.74 ± 0.45	9.86 ± 0.47	0.17	0.24	9.66 ± 0.34	9.82 ± 0.52	**0.04**	**0.36**
	(9.62; 9.87)	(9.74; 9.97)		(S)	(9.56; 9.75)	(9.70; 9.94)		**(S)**
Distance 1a (m)	4.90 ± 0.20	4.95 ± 0.23	0.22	0.22	4.84 ± 0.17	4.92 ± 0.26	**0.04**	**0.36**
	(4.84; 4.95)	(4.89; 5.00)		(S)	(4.80; 4.89)	(4.86; 4.99)		(M)
Time 1a (s)	1.84 ± 0.20	1.82 ± 0.44	0.80	0.04	1.82 ± 0.24	1.78 ± 0.22	0.47	0.12
	(1.78; 1.90)	(1.72; 1.93)		(T)	(1.75; 1.88)	(1.73; 1.84)		(S)
Top Speed 1a (m/s)	4.25 ± 0.23	4.49 ± 0.25	**0.01**	**0.98**	4.25 ± 0.22	4.48 ± 0.29	**0.01**	**0.82**
	(4.18; 4.31)	(4.43; 4.55)		(AP)	(4.19; 4.32)	(4.40; 4.55)		(VL)
Accel max 1a (m/s^2)	5.10 ± 1.84	5.44 ± 2.20	0.35	0.16	5.29 ± 1.89	5.34 ± 2.07	0.88	0.02
	(4.60; 5.60)	(4.92; 5.97)		(S)	(4.77; 5.80)	(4.85; 5.83)		(T)
Decel max (m/s^{-2})	7.50 ± 0.82	8.10 ± 0.66	**0.01**	**0.82**	7.68 ± 0.75	8.13 ± 0.61	**0.01**	**0.65**
	(7.27; 7.72)	(7.94; 8.26)		(L)	(7.48; 7.89)	(7.98; 8.28)		(L)
DEC time (s)	0.82 ± 0.13	0.75 ± 0.10	**0.04**	**0.53**	0.79 ± 0.11	0.75 ± 0.09	0.08	0.31
	(0.78; 0.85)	(0.73; 0.78)		(L)	(0.75; 082)	(0.73; 0.78)		(M)
Distance 1b (m)	4.85 ± 0.27	4.91 ± 0.25	0.19	0.24	4.28 ± 0.17	4.90 ± 0.26	0.05	0.35
	(4.78; 4.93)	(4.85; 4.92)		(S)	(4.77; 4.86)	(4.83; 4.96)		(M)
Time 1b (s)	1.42 ± 0.13	1.40 ± 0.12	0.29	0.18	1.41 ± 0.12	1.41 ± 0.13	0.94	0.01
	(1.39; 1.46)	(1.37; 1.43)		(S)	(1.38; 1.45)	(1.38; 1.45)		(T)
Top Speed 1b (m/s)	4.49 ± 0.35	4.59 ± 0.34	0.12	0.27	4.48 ± 0.35	4.58 ± 0.33	0.11	0.28
	(4.40; 4.59)	(4.51; 4.67)		(S)	(4.38; 4.58)	(4.50; 4.66)		(S)
Accel max 1b (m/s^2)	6.08 ± 0.61	6.31 ± 0.65	**0.04**	**0.37**	6.13 ± 0.66	6.20 ± 0.62	0.58	0.10
	(5.91; 6.25)	(6.16; 6.47)		(M)	(5.95; 6.31)	(6.05; 6.34)		(S)

T = trivial, S = small, M = moderate, L = Large, VL = Very Large, AP = Almost Perfect