THE RELATIONSHIP BETWEEN VARYING PERFORMANCE TESTS AMONG COLLEGIATE TRACK AND FIELD ATHLETES

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Introduction

The ability to rapidly produce force is related to success in varying track and field (T&F) events (3). In addition, sprinting is common to many T&F events and may contribute to performance. Previous work suggests that 30-meter sprint (30M) performance is correlated with performance in varying T&F events (2). Furthermore, jumping, power, and strength also share a relationship with sprint performance, indicating that they may be good indicators of sprint performance (1). These variables may also contribute to various performance in different T&F events, such as long jump, pole vault, hurdles, throws, etc (4). As sprinting is a component common to many T&F events, understanding how strength, power, and jumping measures relate to sprint performance may aid coaches in monitoring performance.

Purpose

The purpose of the study was to assess the relationship between 30M performance and other strength/power measures in collegiate T&F athletes.

Methods and Materials

- Participants: 35 Female NCAA Division 1 T&F athletes (divided into four event groups: sprints, jumps, hurdles, and multi-events. Demographic information can be observed on **Table 1**.
- Participants completed the following performance tests: static (30M) and flying (FLY) 30 meter sprints, standing long (LONG) and triple (TRIP) jumps, time to run 150 meters (150), distance in 50 seconds (50SEC), overhead back (OHB) and underhand front (UHF) throws with a 4 kg shot, a hop test for distance (DBL), and 1RMs for clean and squat. In addition, 1RMs relative to body mass were calculated.
- Pearson product-moment correlations (r) were calculated to assess the relationship between 30M and other performance variables. Correlations were also run for individual subgroups. All correlations were subject to the following cutoffs: small (0.1-0.3), moderate (0.3-0.5), strong (0.5-0.7), and very strong (>0.7). Statistical significance was accepted when p<0.05.

TABLE 1. Participant demographic data

	All	Sprints	Jumps	Hurdles	Multi-events
N	30	7	13	4	6
Height (cm)	168.3 ± 6.8	166.01 ± 6.91	170.47 ± 6.49	169.55 ± 6.68	165.31 ± 6.93
Mass (kg)	61.7 ± 7.2	63.44 ± 5.97	61.99 ± 8.59	63.07 ± 4.09	61.06 ± 7.85

Data are presented as mean ± SD.

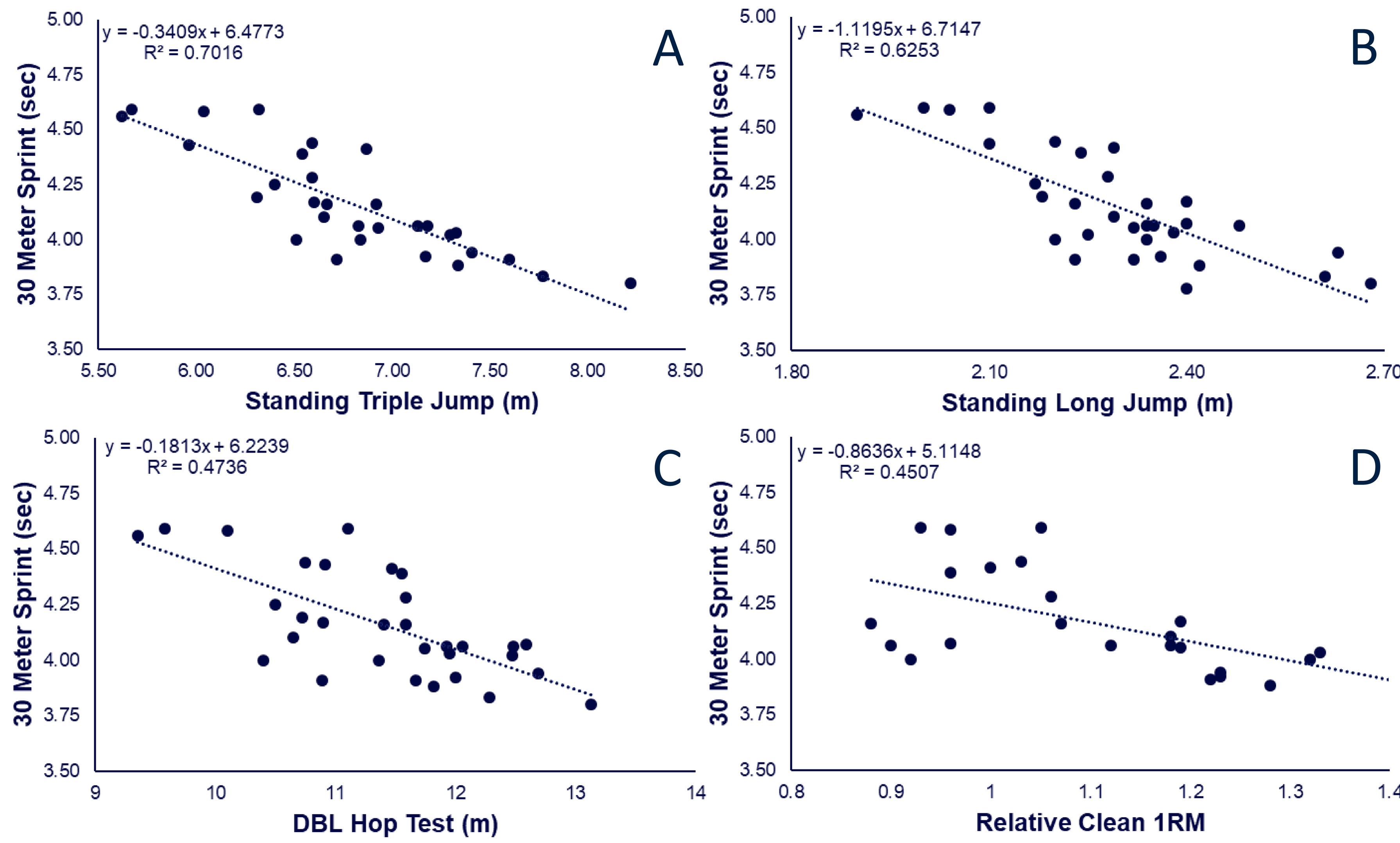

Figure 1. Scatterplots with linear lines of best fit, regression equations, and R^2, values to assess the relationship between 30 meter sprint performance and standing triple jump (A), standing long jump (B), double hop test (C), and relative clean 1RM (D) performances.

Table 2. Correlations between 30M and other variables for all athletes

	X ± SD	N	r	p
Height (cm)	168.28 ± 6.76	28	−0.10	0.60
Weight (kg)	61.68 ± 7.25	28	−0.21	0.28
LONG (m)	2.30 ± 0.17	32	−0.79	<0.001
TRIP (m)	6.80 ± 0.59	30	−0.84	<0.001
DBL (m)	11.43 ± 0.88	31	−0.69	<0.001
OHB (m)	11.16 ± 2.03	31	−0.58	0.001
UHF (m)	11.25 ± 1.52	31	−0.70	<0.001
30FLY (sec)	3.64 ± 0.24	30	0.88	<0.001
150 (sec)	19.69 ± 1.31	33	0.83	<0.001
50 (m)	324.81 ± 22.05	30	−0.75	<0.001
CLEAN (kg)	69.47 ± 13.38	30	−0.62	<0.001
$CLEAN_{rel}$	1.13 ± 0.19	25	−0.67	<0.001
SQUAT (kg)	100.29 ± 18.29	30	−0.50	0.01
$SQUAT_{rel}$	1.59 ± 0.25	25	−0.39	0.054

Data are presented as mean SD. r indicates Pearson product-moment correlation strength between that variable and 30M performance (p < 0.05). 30M, 30 meter sprint test; LONG, standing long jump; TRIP, standing triple jump; DBL, double-double hop test; OHB, overhead back throw; UHF, underhand front throw; 30FLY, flying 30 meter test; 150, time to sprint 150 meters; 50, distance sprinted in 50 seconds; CLEAN, clean 1-repetition maximum (1RM); CLEANrel, clean 1RM relative to body mass; SQUAT, squat 1RM; SQUATrel, squat 1RM relative to body mass.

Results

- **Mean 30M time for all athletes was 4.15 ± 0.24 seconds**.
- For all athletes, strong and very strong correlations were shared between 30M and the following variables:
  - DBL, 150, 50SEC, OHB, UHF, FLY, LONG, TRIP, CLEAN, SQUAT, and RELCLEAN, accounting for 25-78% of the variance in 30M performance.
  - Correlation coefficients and p-values can be seen on **Table 2**.
- For individual events, strong relationships between 30M and other performance tests were observed.
- Sprints and jumps displayed significant relationships between 30M and other running (**r = -0.81-0.94, p = <0.001-0.04**) jumping (**r = −0.92-−0.66, p = <0.001-0.02**), and strength/power tests (**r = −0.91-−0.67, p = 0.01-0.02**).
- Hurdles 30M performance shared strong relationships with 150 (**r = 0.92, p = 0.03**) and FLY (**r = 0.94, p = 0.02**).
- Multi-events found a significant relationship between 30M and Clean 1RM only (**r = −0.97, p = 0.03**).

Conclusion

For all athletes, 30M shared strong to very strong relationships with other sprint, jump, strength, and power tests. Sprinting is common to all events in this analysis. Track and field athletes rely on strength and power in their events, with these metrics also related to sprinting performance (4). Outside of the other sprinting tests, jumping tests shared some of the strongest relationships with 30M. This may be related to similar stretch-shortening and ground contact time characteristics between these activities, which may be related to sprinting and T&F performance (3). Improving these characteristics may influence sprinting performance, which may contribute to T&F performance (2).

Practical Application

Sprinting shared strong relationships with many other strength, power, and jumping measures. As sprinting is common to many T&F events, improvements to sprinting may be related to improved event performance. As strong relationships between sprinting and other strength/power measures were observed, monitoring strength, power, and jumping performance may provide insight into sprinting characteristics. This information may be relevant to coaches and may inform both assessment and program design considerations.

References

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