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Toby Edwards
The University of Notre Dame Australia, toby.edwards@nd.edu.au

Jacob Joseph
The University of Notre Dame Australia, jacob.joseph1@nd.edu.au

Brendon Lewis

Ashley Cripps
The University of Notre Dame Australia, ashley.cripps@nd.edu.au

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Contact and Mailing Details
Ph. – 0755026911
Fax – 0756657358

www.strengthandconditioning.org
info@strengthandconditioning.org

PO Box 3586
Helensvale Town Centre, QLD,
Australia 4212

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RELIABILITY OF MECHANICAL SPRINT PROFILES IN STATE U16 FEMALE BASKETBALL ATHLETES

Toby Edwards[1], Jacob Joseph[1], Brendon Lewis[1], & Ashley Cripps[1]

[1]University of Notre Dame Australia, Fremantle, Australia.

BLUF
Mechanical sprint characteristics produce acceptable trial to trial reliability in state U16 female basketball athletes.

INTRODUCTION
Sprint acceleration is a key component of basketball performance that occurs frequently during competition that is commonly measured over various distances using timing gates. Sprint profiling is a topical area of research that provides practitioners an insight into the underlying mechanical characteristics that contributed to the performance. These include theoretical maximal force, theoretical maximal velocity, maximum power, slope of the force velocity relationship, maximum ratio of force, decrease in ratio of force and max speed. This study aimed to investigate the reliability of mechanical sprint characteristics in state U16 female basketball athletes.

METHODS
39 junior female basketball athletes (age 14.6 ± 0.6, height 172.1 ± 6.7cm, weight 64.4 ± 8.0 kg) performed 2 maximal 20 metre sprints on a hardwood indoor court. Timing gates were set at distances of 5, 10 and 20 metres with the initiation of sprint time occurring when the athlete's front foot left a laser. The athletes split times were entered into an excel spreadsheet that derived mechanical sprint characteristics through inverse dynamics. Coefficient of variation (CV%), and intraclass correlation (ICC) with 95% confidence intervals (CI) were analysed for each variable to determine trial to trial reliability. The average reliability for each measure was interpreted as acceptable if the ICC > 0.75 and a CV of <10%, moderate when ICC <0.75 or CV >10%, and unacceptable when ICC <0.75 and CV >10%.

RESULTS
All sprint mechanical characteristics displayed acceptable average trial to trial reliability except Sfv and Drf which displayed moderate reliability.

DISCUSSION
Practitioners are interested in identifying the underlying individual mechanical sprint characteristics that produce sprint performance. This study established the trial to trial reliability of mechanical sprint characteristics in state U/16 female basketball athletes. Trial to trial CV's ranged from 2.11 – 10.32% whilst ICC's ranged from 0.66 – 0.95. Sfv expressed the lowest reliability (CV 10.32 [8.40–13.2 CI]; ICC 0.66 [0.44-0.81]) which may be attributed to the derivation of mechanical sprint characteristics from split times and the complex multi-joint force velocity relationship. Drf also expressed low reliability (CV 9.71 [8.02-12.67]; ICC 0.68 [0.47-0.82 CI]) relative to other mechanical sprint variables which may account for the lack of sprint acceleration training.

PRACTICAL APPLICATION
The results suggest that mechanical sprint characteristics remain stable across multiple trials on a single day and that practitioners can be confident that data collected across two trials is highly reliable. Future research should investigate the interday and intraday reliability of mechanical sprint variables across different sports, levels of competition, and gender.

Table 1 - Trial to trial reliability of mechanical sprint characteristics.

	Mean	TE (95% CI)	CV (95% CI)	ICC (95% CI)	Interpretation
F0 (N/kg)	7.10	0.24 (0.20–0.31)	3.41 (2.80–4.43)	0.75 (0.57–0.86)	Acceptable
V0 (m/s)	7.32	0.19 (0.15–0.24)	2.71 (2.11–3.43)	0.90 (0.82–0.95)	Acceptable
Pmax (W/kg)	12.93	0.32 (0.26–0.42)	4.51 (3.66–5.91)	0.95 (0.92–0.98)	Acceptable
Sfv (N/m/s/kg)	-0.90	0.73 (0.60–0.94)	10.32 (8.40–13.2)	0.66 (0.44–0.81)	Unacceptable
RF max (%)	40.0	0.24 (0.20–0.31)	3.38 (2.81–4.36)	0.95 (0.90–0.97)	Acceptable
Drf (%)	9.32	0.69 (0.57–0.90)	9.71 (8.02–12.67)	0.68 (0.47–0.82)	Moderate
Max Speed (m/s)	7.02	0.15 (0.12–0.19)	2.11 (1.69–2.67)	0.91 (0.84–0.95)	Acceptable