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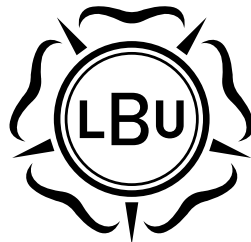
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# A COMPARISON OF THE MAXIMUM LOCOMOTOR INTENSITIES IN AGE-GRADE INTERNATIONAL AND ACADEMY RUGBY UNION



Dale Read<sup>1,2</sup>, Kevin Till<sup>1,2</sup>, Nicholas Dalton-Barron<sup>1,3</sup>, Grant Beasley<sup>4</sup> & Ben Jones<sup>1,2,5</sup>

<sup>1</sup>Leeds Beckett University, <sup>2</sup>Yorkshire Carnegie Rugby Union Football Club, <sup>3</sup>Catapult Sports, <sup>4</sup>The Rugby Football Union, <sup>5</sup>The Rugby Football League



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England  
Rugby

Amateur Club

School

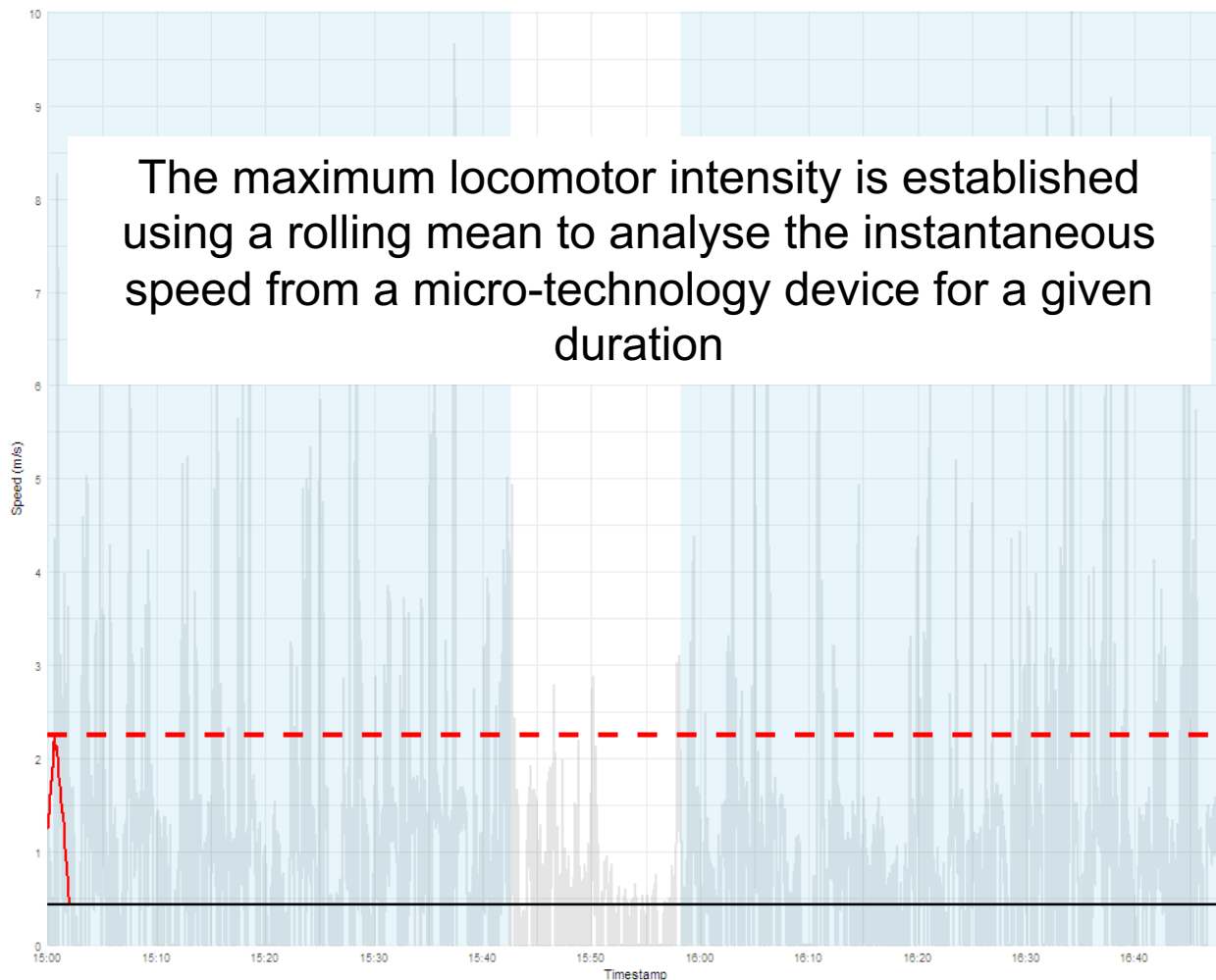
U18 Rugby  
Union in  
England

Academy

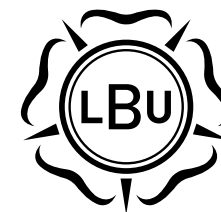
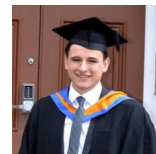
International

The  
'Performance Pathway'





@nickdalts



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1. To **quantify** the maximum locomotor intensities from U18 **international and academy** rugby union matches
2. To **compare** the maximum locomotor intensities between U18 **international and academy matches** using two variables (relative distance and high-speed relative distance)
3. To **compare** the maximum locomotor intensities between U18 international and academy **players that represented both playing levels**



$17.7 \pm 0.5$   
years

$17.6 \pm 0.6$   
years

1  
nation

142  
participants

10-Hz  
S5 Optimeye  
Catapult

$185.4 \pm 7.3$   
cm

$182.6 \pm 9.5$   
cm

232  
observations

7.17 Firmware  
5.17 Sprint  
software

7  
academies

$93.2 \pm 13.2$   
kg

$92.6 \pm 11.7$   
kg

16  
participants  
represented  
both playing  
levels

Front row  
2<sup>nd</sup> & Back  
Scrum halves  
Outside backs



## 1. Identify 'playing time' only

- Remove warm up, HT, bench, etc.
- 10-min minimum for inclusion

(Delaney et al., 2015, Read et al. 2018)

## 2. Export the instantaneous speed at 10-Hz

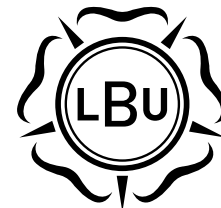
## 3. Use R to 'clean' the data

- $>10 \text{ m}\cdot\text{s}^{-1}$
- $<6$  satellites
- $>2.0$  Horizontal dilution of precision

(Weston et al., 2015)

## 4. Use R to analyse data

- Relative distance & high-speed relative distance ( $>5.5 \text{ m}\cdot\text{s}^{-1}$ )
- Rolling (0.1 s) mean
- 15 s, 30 s, 1, 2, 2.5, 3, 4, 5, 10-min (Read et al., 2018)



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## Linear mixed model

- Random: 'players code' and 'match code'
- Fixed: 'group' (international/academy and position)
- SWC established for each variable (0.2 between-subject standard deviation)
  - (RD = 3.8%; HS·min<sup>-1</sup> = 7.9%)
- Differences shown as Cohen's *d* effect size (ES) ±90% confidence intervals
- Magnitude-based inferences calculated
  - 'Unclear' when crossing the upper and lower bound of the SWC

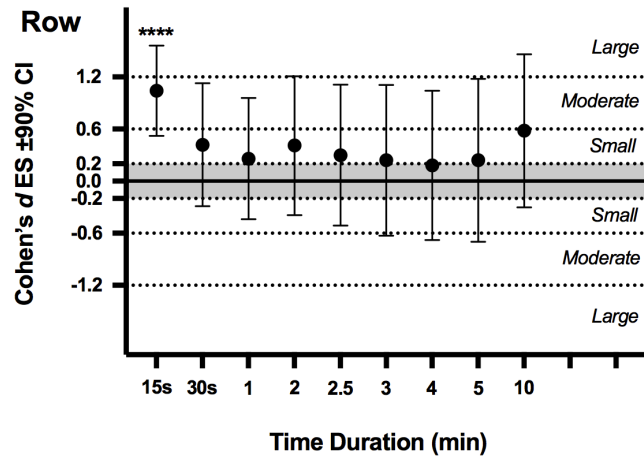
1. Maximal relative distance ( $\text{m} \cdot \text{min}^{-1}$ ) (A) and high speed ( $>5.5 \text{ m} \cdot \text{s}^{-1}$ ) relative distance ( $\text{m} \cdot \text{min}^{-1}$ ) (B) for international and academy rugby union players by position and time duration.

A	Front Row		Second & Back Row		Scrum Half		Outside Backs	
	International	Academy	International	Academy	International	Academy	International	Academy
15 s	$268 \pm 35$	$236 \pm 21$	$281 \pm 37$	$269 \pm 26$	$317 \pm 43$	$297 \pm 41$	$316 \pm 38$	$303 \pm 39$
30 s	$197 \pm 19$	$186 \pm 17$	$206 \pm 22$	$213 \pm 22$	$238 \pm 18$	$235 \pm 33$	$231 \pm 25$	$233 \pm 33$
1 min	$154 \pm 15$	$148 \pm 16$	$161 \pm 16$	$166 \pm 14$	$189 \pm 17$	$184 \pm 17$	$178 \pm 15$	$174 \pm 25$
2 min	$127 \pm 12$	$120 \pm 17$	$131 \pm 13$	$134 \pm 13$	$158 \pm 12$	$150 \pm 22$	$143 \pm 15$	$138 \pm 20$
2.5 min	$119 \pm 12$	$113 \pm 16$	$122 \pm 14$	$126 \pm 13$	$145 \pm 12$	$143 \pm 23$	$134 \pm 15$	$129 \pm 18$
3 min	$112 \pm 9$	$108 \pm 16$	$113 \pm 12$	$120 \pm 14$	$138 \pm 10$	$136 \pm 22$	$127 \pm 12$	$124 \pm 70$
4 min	$106 \pm 9$	$100 \pm 15$	$108 \pm 10$	$110 \pm 14$	$131 \pm 11$	$125 \pm 15$	$119 \pm 11$	$115 \pm 15$
5 min	$98 \pm 7$	$94 \pm 13$	$100 \pm 8$	$102 \pm 14$	$122 \pm 6$	$116 \pm 13$	$113 \pm 10$	$107 \pm 15$
10 min	$87 \pm 7$	$80 \pm 11$	$89 \pm 8$	$89 \pm 11$	$109 \pm 7$	$98 \pm 13$	$101 \pm 9$	$93 \pm 12$

B	Front Row		Second & Back Row		Scrum Half		Outside Backs	
	International	Academy	International	Academy	International	Academy	International	Academy
15 s	$156 \pm 64$	$96 \pm 41$	$180 \pm 61$	$153 \pm 46$	$242 \pm 70$	$203 \pm 78$	$230 \pm 60$	$212 \pm 57$
30 s	$79 \pm 31$	$49 \pm 21$	$94 \pm 32$	$79 \pm 24$	$134 \pm 40$	$111 \pm 36$	$123 \pm 29$	$119 \pm 40$
1 min	$40 \pm 16$	$26 \pm 11$	$49 \pm 16$	$44 \pm 15$	$71 \pm 24$	$62 \pm 23$	$65 \pm 15$	$65 \pm 22$
2 min	$21 \pm 8$	$14 \pm 6$	$28 \pm 10$	$25 \pm 11$	$46 \pm 12$	$34 \pm 11$	$40 \pm 10$	$38 \pm 12$
2.5 min	$18 \pm 7$	$11 \pm 5$	$24 \pm 9$	$21 \pm 10$	$42 \pm 13$	$30 \pm 10$	$35 \pm 8$	$34 \pm 11$
3 min	$17 \pm 6$	$10 \pm 5$	$22 \pm 9$	$19 \pm 8$	$38 \pm 11$	$27 \pm 9$	$33 \pm 7$	$30 \pm 10$
4 min	$13 \pm 5$	$8 \pm 3$	$19 \pm 7$	$17 \pm 8$	$33 \pm 10$	$21 \pm 6$	$27 \pm 6$	$25 \pm 8$
5 min	$11 \pm 4$	$7 \pm 3$	$16 \pm 6$	$14 \pm 7$	$28 \pm 9$	$18 \pm 5$	$24 \pm 6$	$21 \pm 7$
10 min	$7 \pm 3$	$5 \pm 2$	$10 \pm 4$	$9 \pm 5$	$19 \pm 6$	$13 \pm 4$	$17 \pm 4$	$15 \pm 5$

Data are presented as mean  $\pm$  standard deviation.

## Front Row



2.

## International vs. Academy

### Relative distance

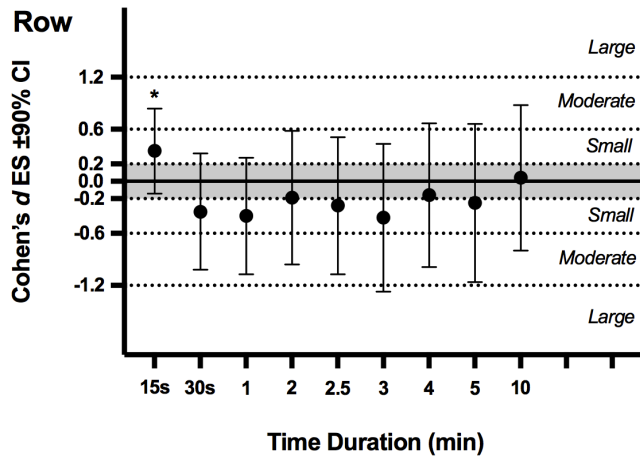
\* = Possibly

\*\* = Likely

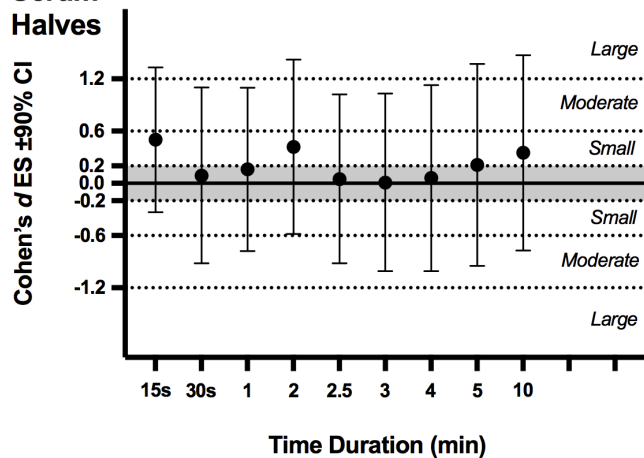
\*\*\* = Very Likely

\*\*\*\* = Almost Certainly

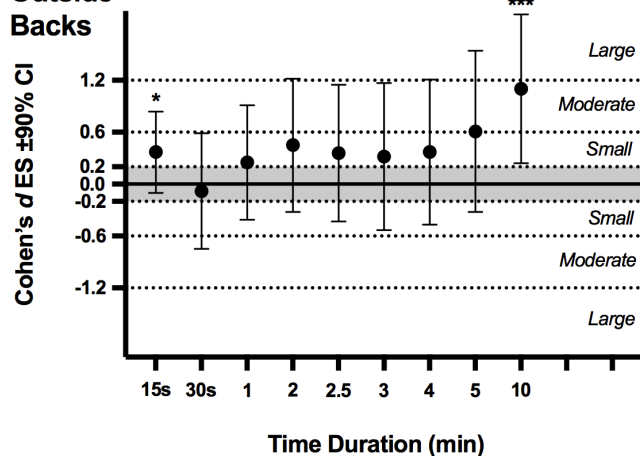
## Second & Back Row

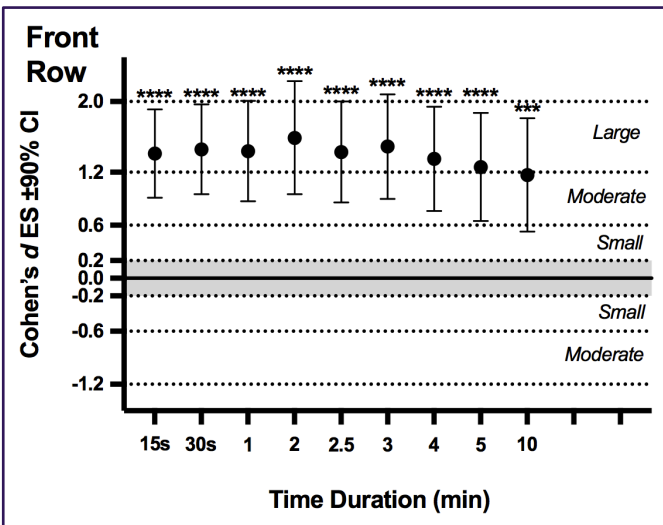


## Scrum Halves



## Outside Backs





2.

International vs.  
Academy

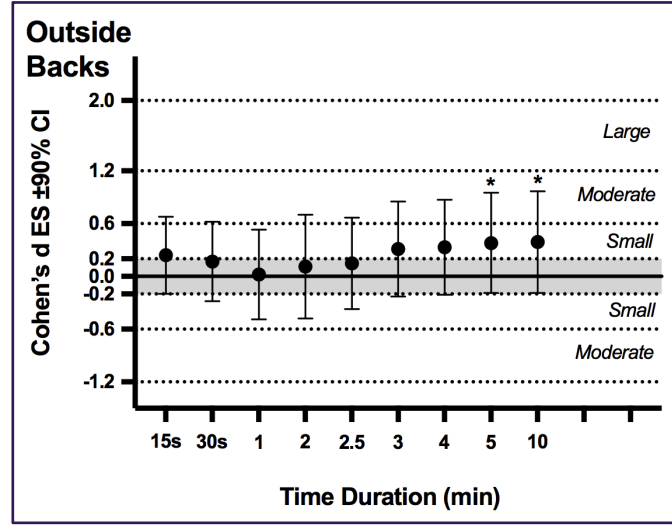
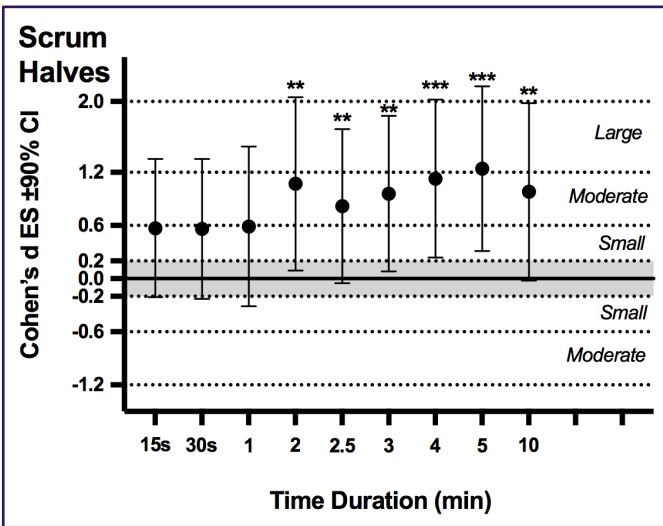
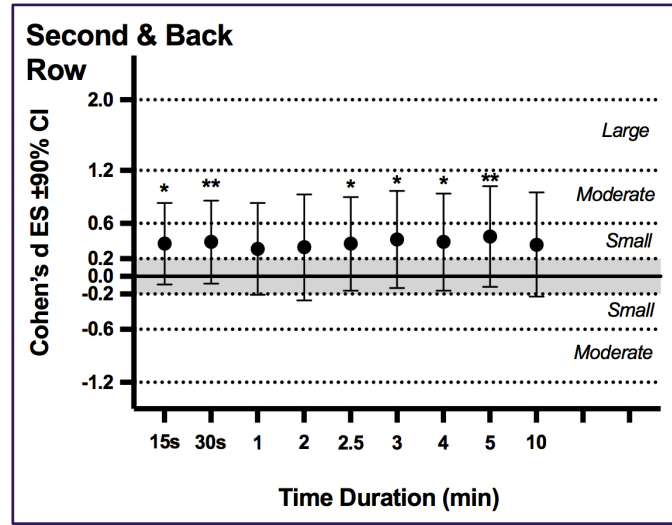
High-Speed  
Relative distance  
( $>5.5 \text{ m} \cdot \text{s}^{-1}$ )

\* = Possibly

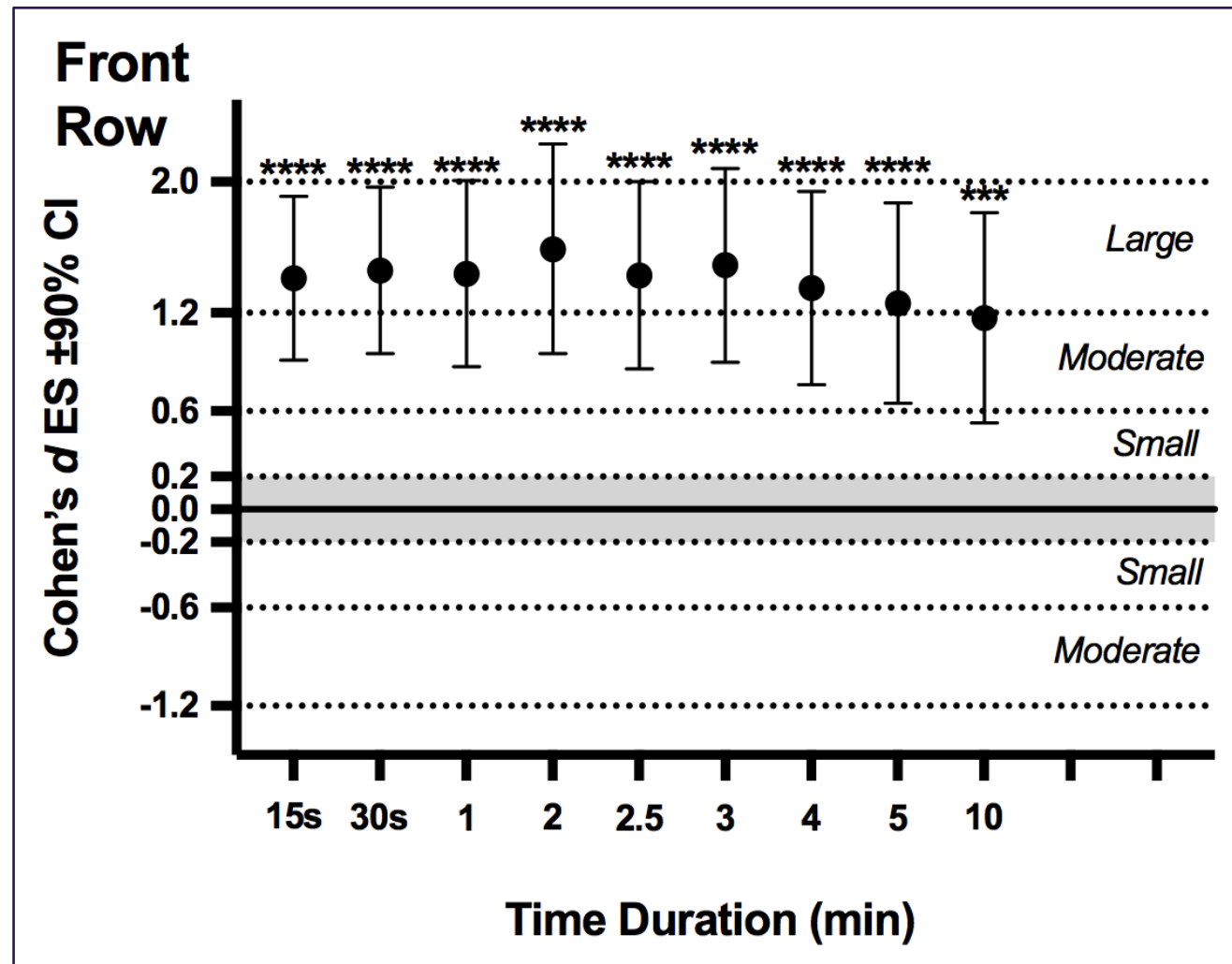
\*\* = Likely

\*\*\* = Very Likely

\*\*\*\* = Almost Certainly



2.



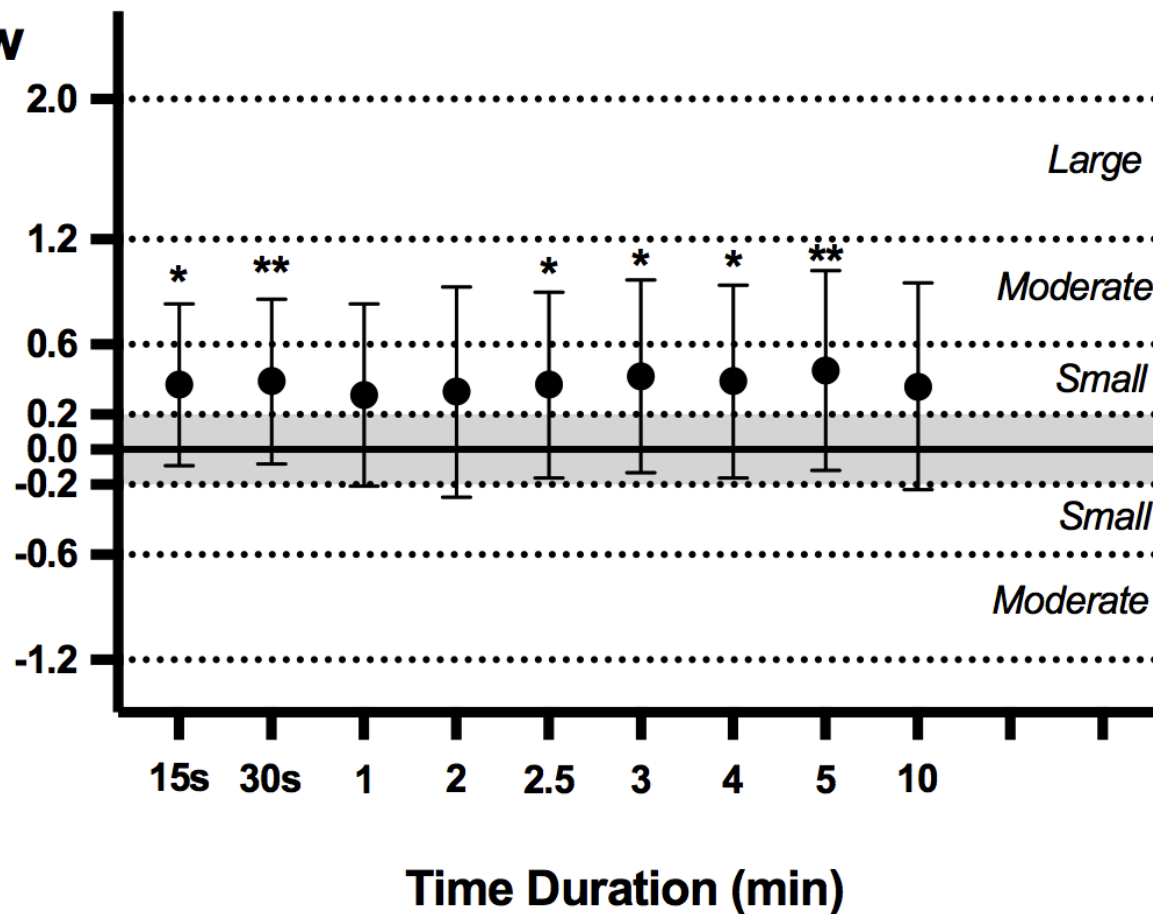


2.

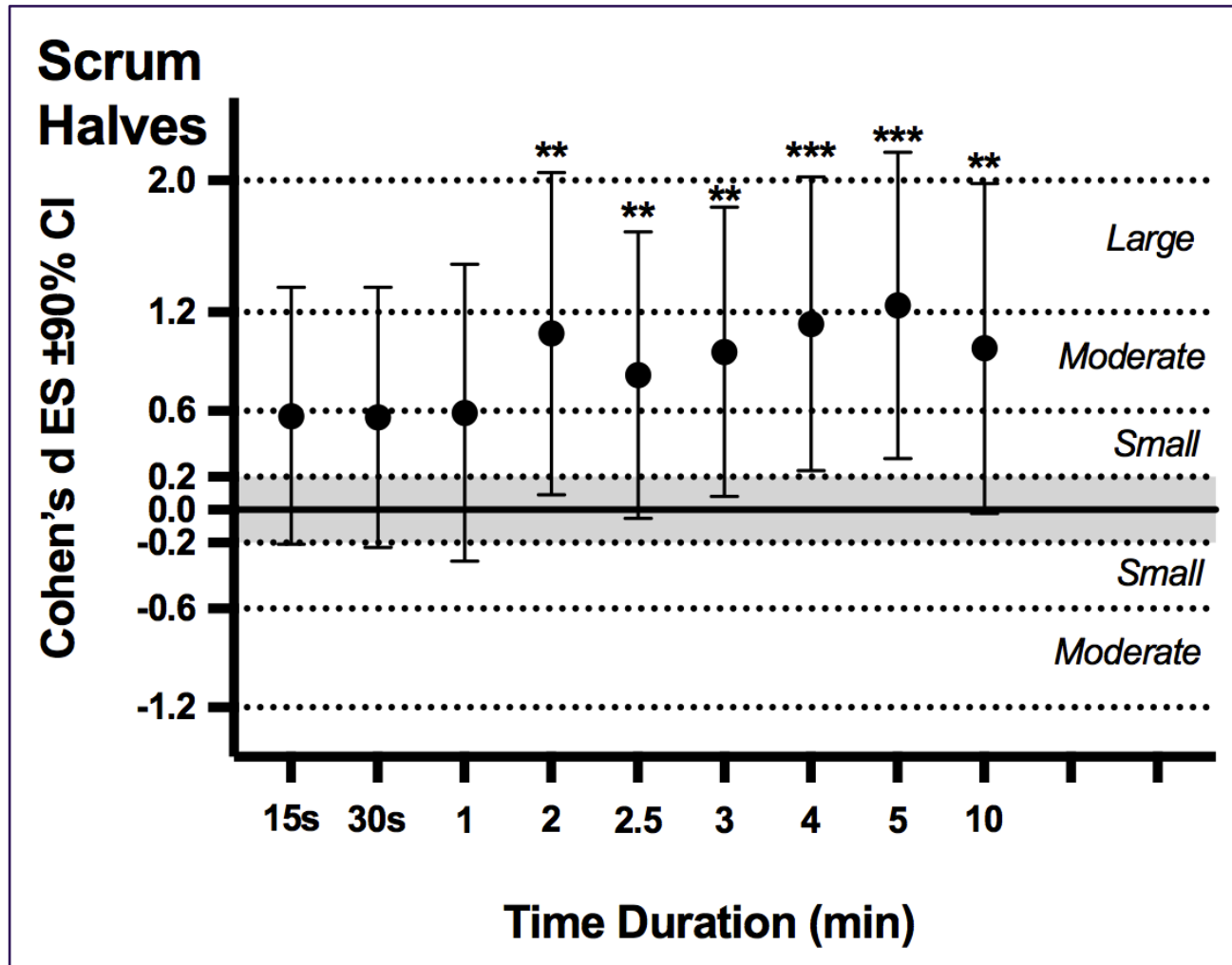
## Second & Back

Row

Cohen's d ES  $\pm$  90% CI



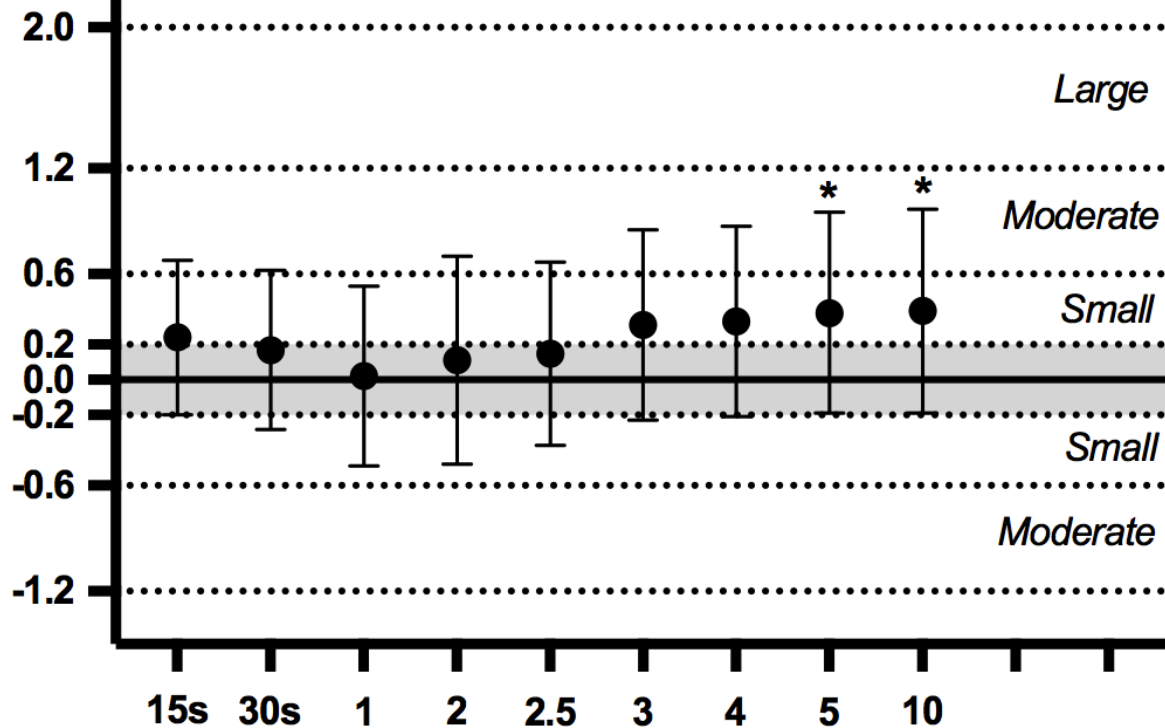
2.



2.

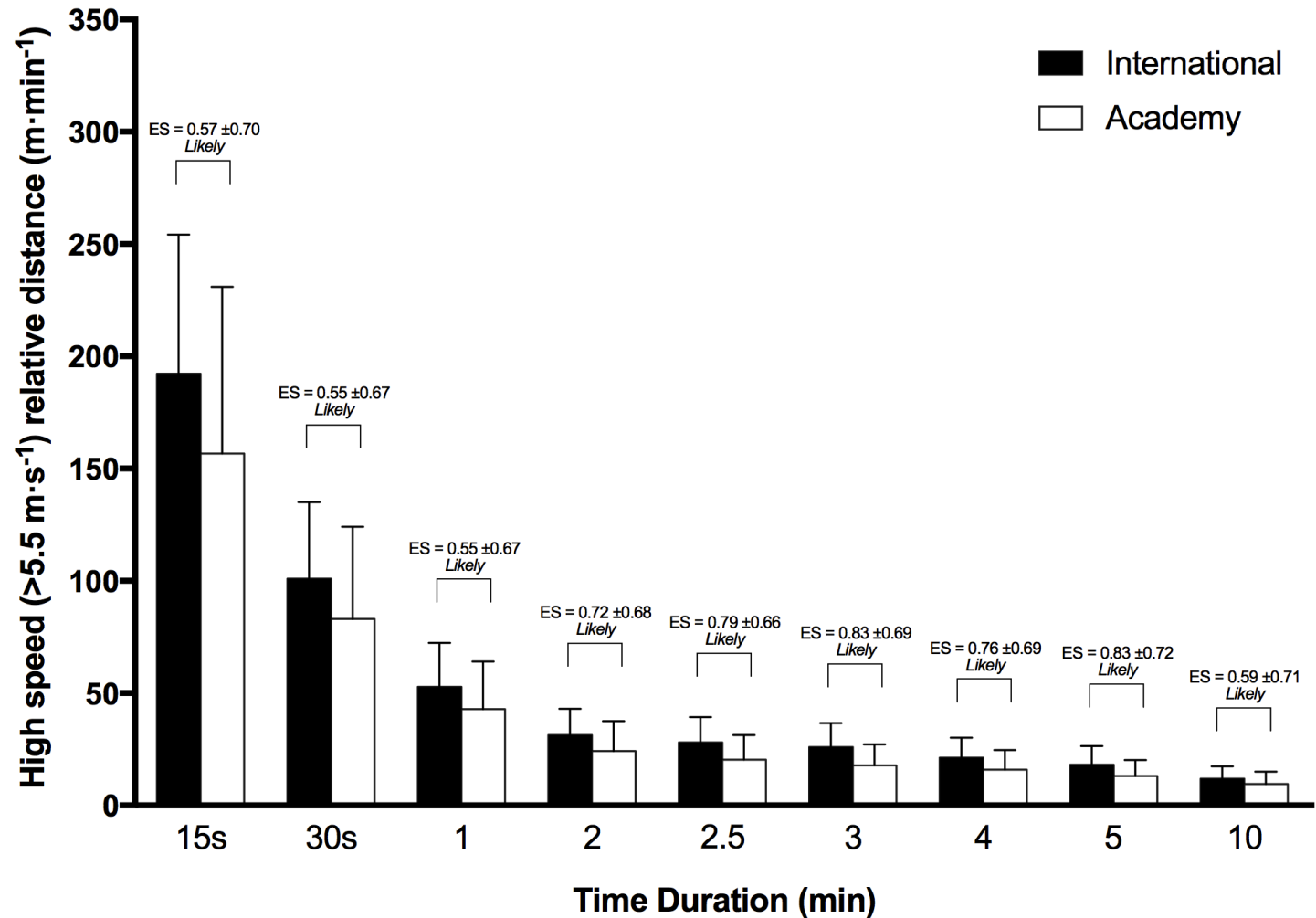
## Outside Backs

Cohen's d ES  $\pm$  90% CI



Time Duration (min)

3.



# Summary

2.

The maximum locomotor intensities (**relative distance**) largely showed *unclear* results **between international and academy** players.

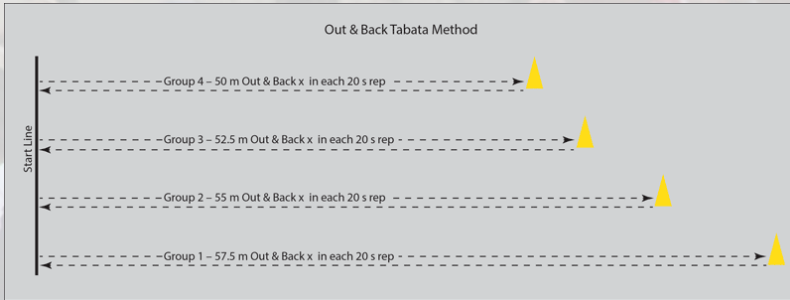
2.

The maximum locomotor intensities (**high-speed relative distance** ( $>5.5 \text{ m} \cdot \text{s}^{-1}$ )) were **greater for international front row** players (*moderate* and *large* effects), **greater in selected time durations for back and second row** (*small* effects), **scrum halves** (*moderate* and *large* effects) and **outside backs** (*small* effects).

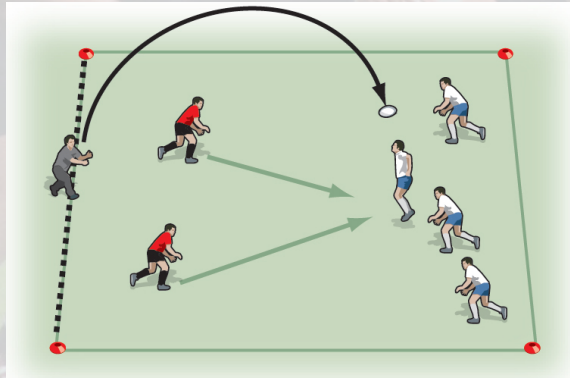
3.

The maximum locomotor intensities (**high-speed relative distance** ( $>5.5 \text{ m} \cdot \text{s}^{-1}$ )) were **greater for international players that represented both playing levels.**

# Practical Applications



Longest ball in play period = 2.5 min



	FR	SR & BR	SH	OB
Total Distance (m)	298	305	363	335
Relative Distance (m·min <sup>-1</sup> )	119	122	145	134
High-Speed Total Distance (m)	45	60	105	88
High-Speed Relative Distance (m·min <sup>-1</sup> )	18	24	42	35



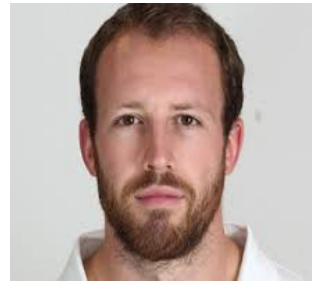
Professor Kevin Till



Nicholas Dalton-Barron

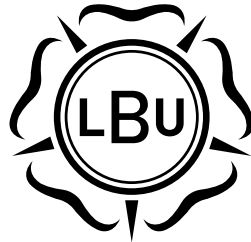


Professor Ben Jones



Grant Beasley

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Leeds Beckett University, UK



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# Questions (or any comments) welcome

Dale Read  
d.read@leedsbeckett.ac.uk

 @DaleRead4