Validity of the Wahoo KICKR Power Trainer™ and Reliability of a 4 km Cycle Time Trial

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INTRODUCTION

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- Changes in performance as small as 1% can determine the difference between a finish on the podium or a finish within the peloton (Lamberts et al. 2009)
  - Accurate monitoring of training and competitive performance is significantly important

Greg Lemond, 1989: 8 secs (0.003%)

Alberto Contador; 2007: 23 secs (0.008%)

ERGOMETERS

- Invaluable pieces of laboratory equipment used to conduct:
  - Physiological fitness assessments, monitor training and performance responses and enable structured training programs
- Limitations include
  - Replication of bicycle setup (i.e. dimensions, gearing, joint angles) (Driller, 2014)
- ↑ reliability and ecological validity when own bicycles are used (Paton and Hopkins, 2006)

Ergometer	Coefficient of Variation (%)
Wattbike (Hopker, 2010)	2.5
Velotron (Abbiss, 2008)	0.8
Kingcycle (Palmer, 1996)	0.9
SRM (Balmer, 2009)	0.9

Wahoo KICKR Power Trainer™

Attachment of cyclists own bicycles

Wireless communication

VALIDITY???

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MEASURES OF PERFORMANCE

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REVIEW ARTICLE

Sports Med 2008; 38 (4): 297-316
0112-1642/08/0004-0297/$48.00/0

Validity, Reliability and Sensitivity of Measures of Sporting Performance

Kevin Currell and *Asker E. Jeukendrup*
School of Sport and Exercise Sciences, University of Birmingham, Edgbaston, Birmingham, UK

TT distance	CV (%)	Ergometer	Author
5 km	2.3	Electromagnetically braked	Jensen and Johansen (1998)
20 km	1.1	Kingcycle	Palmer et al. (1996)
40 km	0.9	Kingcycle	Palmer et al. (1996)
40 km	1.1	Own bike + SRM	Smith et al. (2001)
50 km	4.2	Stationary magnetic bike	Jensen and Johansen (1998)

- 4 km TT reliability???

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PURPOSE

1. Examine the **validity** of power output of the Wahoo KICKR Power Trainer
2. Assess the **reliability** of a 4 km cycle time trial, completed on the Wahoo KICKR Power Trainer

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METHODOLOGY

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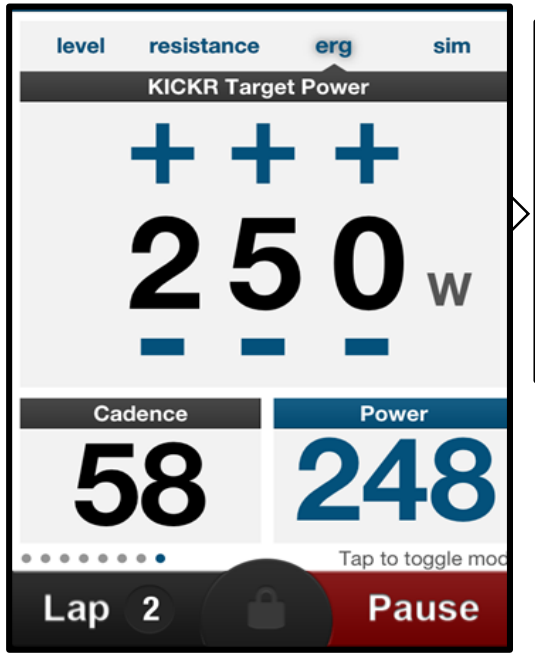
1. Validity



VS.

controlled cadence

100 – 600 W @ 80, 90 and 100 rpm

METHODOLOGY

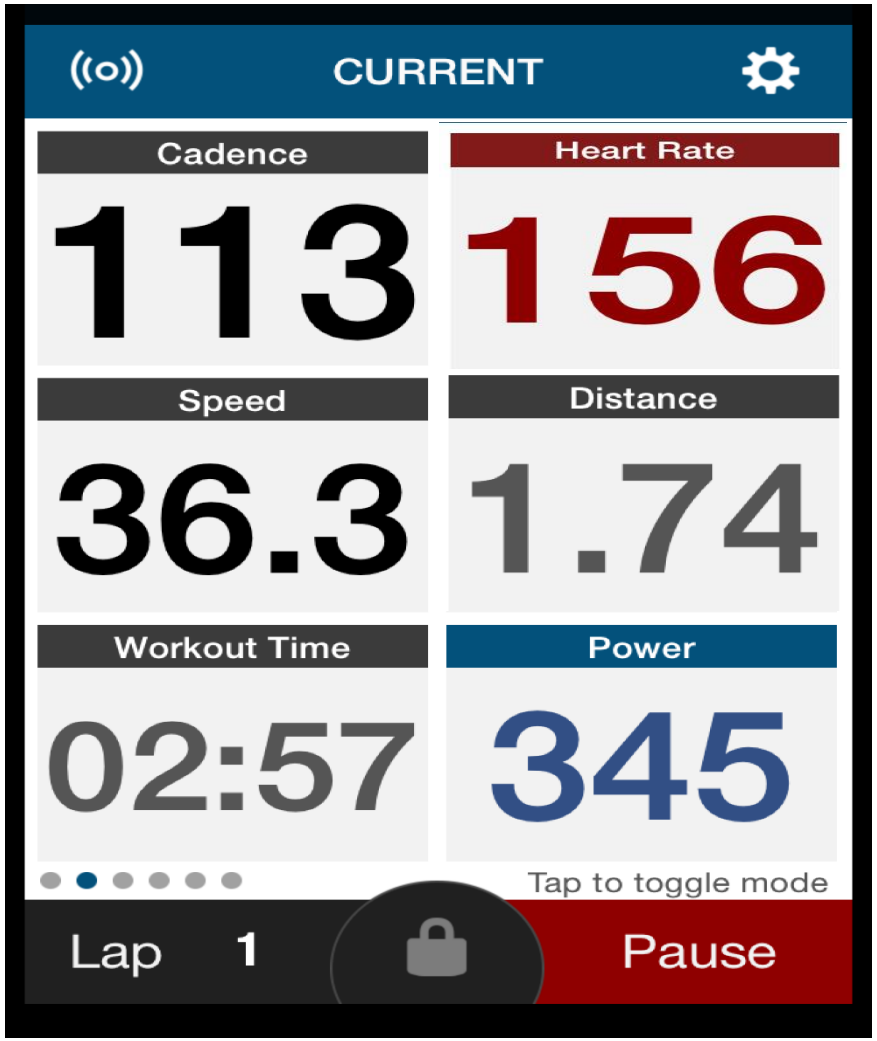
2. Reliability

Participants

- 12 males 18-40 years
- Minimum 10 h cycling per week
- Previous TT experience

Study Design

- 3 x 4 km TTs
  - 10 min warm up at self selected intensity
  - 10 s countdown
  - Power, speed, cadence, heart rate, total time and RPE (Borg, 1960)



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STATISTICAL ANALYSIS

Validity

- Bland- Altman plot (Bland & Altman, 1986)
  - 95% Limits of Agreement

Reliability

- Shapiro Wilks Normality Test
- Intraclass Correlation Coefficients (ICC) and Coefficient of Variations (CVs) (%) (Hopkins, 1997)
  - 95% Confidence intervals
  - Power, Cadence, Speed, Heart Rate and Total Time

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VALIDITY

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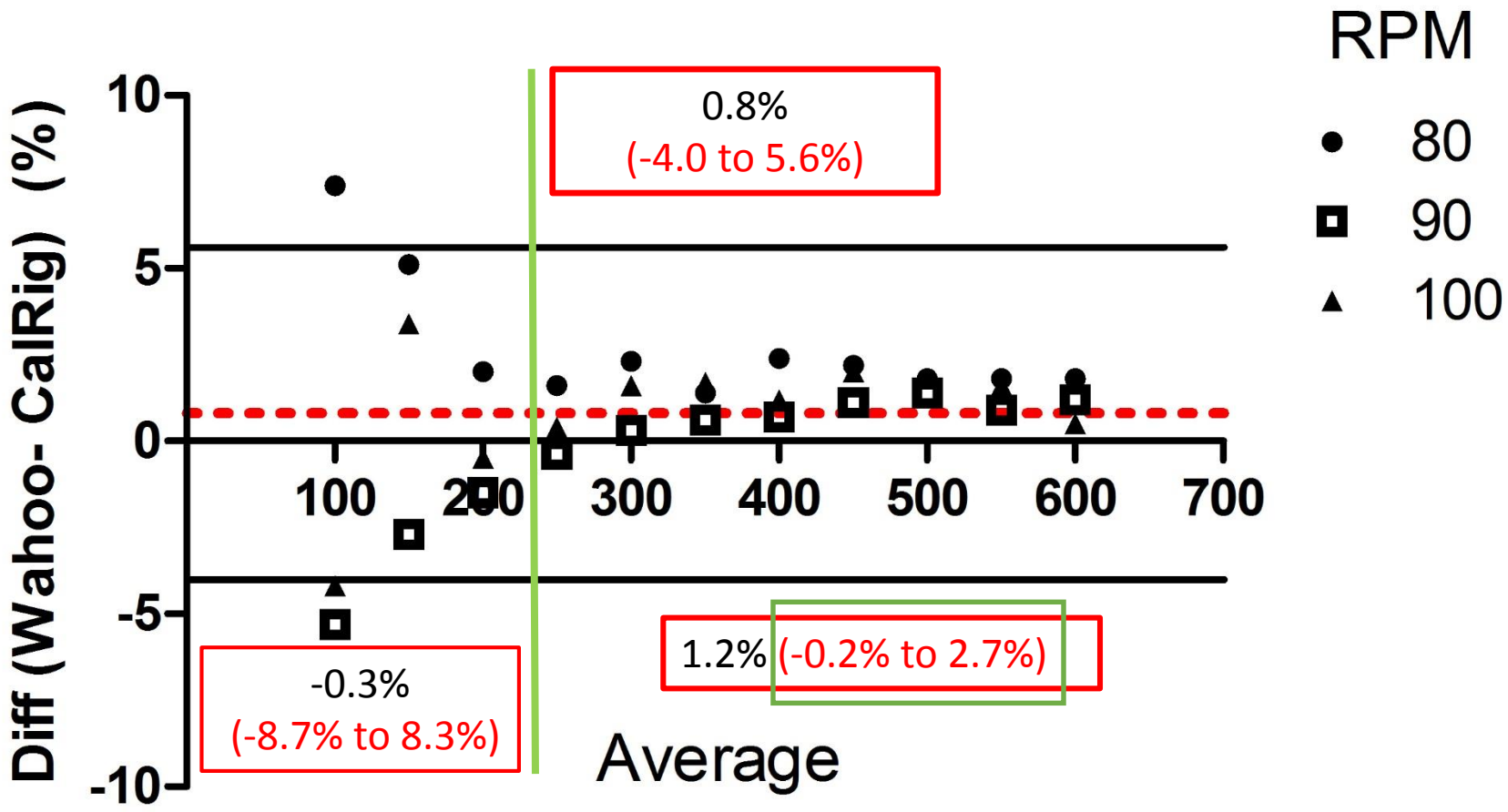

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RELIABILITY

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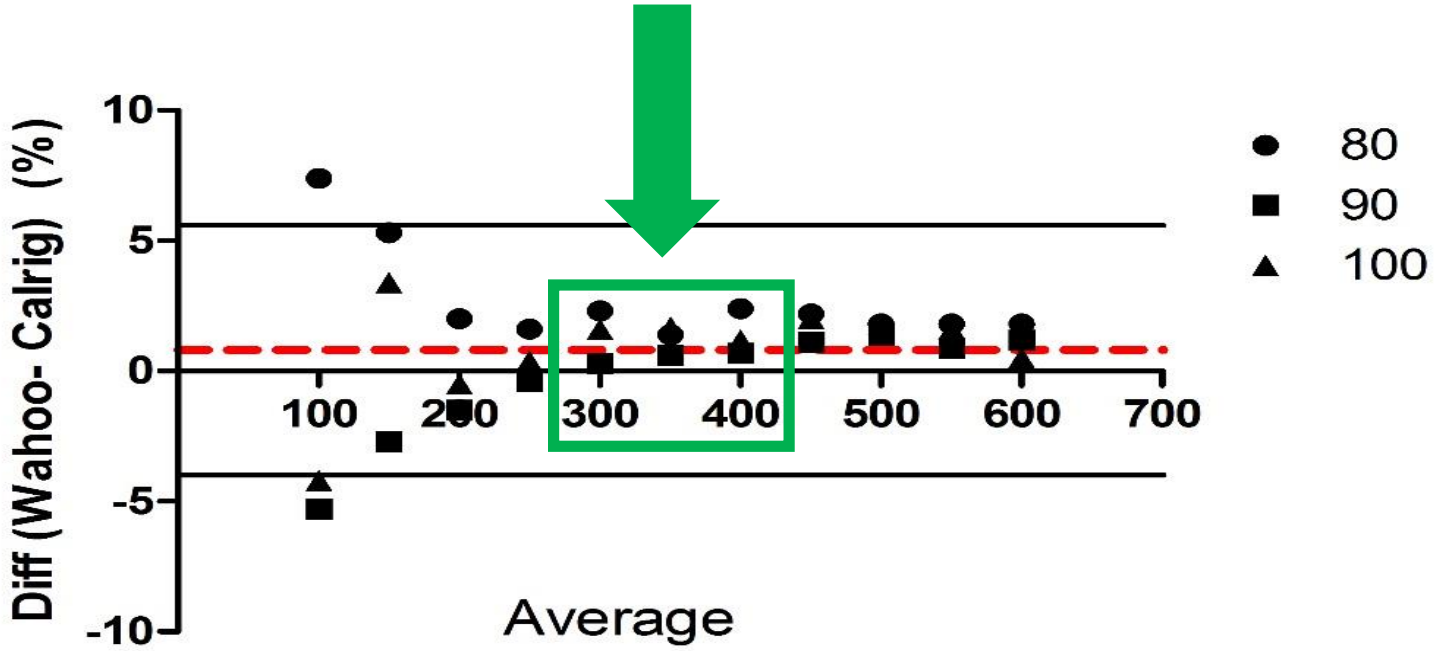
	TT 1	TT 2	TT 3	Average
Power (W)	342 ± 42	341 ± 45	349 ± 37	344 ± 41



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RELIABILITY CONT.

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	ICC	CV(%)
Power (W)	0.94 (0.85- 0.98)	3.4 (2.7- 4.7)

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DISCUSSION

- For the detection of changes in performance due to ergogenic/training interventions, ergometer errors of <1% are required (Paton and Hopkins, 2001)
  - Wahoo KICKR= 0.8%

- Caution < 250 W at 80, 90 and 100 rpm
  - Greater variation in validity of power due to wider LoA

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FUTURE DIRECTIONS

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- Assessment of validity of > 1 Wahoo KICKR Power Trainers
- Investigation of validity in power > 600 W
  - Sprint intervals

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CONCLUSIONS

1. Provides valid measures of power particularly when power is greater than 250 W

2. 4 km time trial is highly reliable when power is primary performance outcome

3. The Wahoo KICKR and the 4 km TT may detect performance changes (~1.7%)

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Thank you ☺

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Dr James Fell

Dr Cecilia Kitic (nee Shing)

Dr Stuart Smith

- Mr Stephen Stone
- Participants

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TWEET THIS!!

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VALID ✓

RELIABLE ✓

- Wahoo KICKR Power Output is valid over 100- 600 W
- 4 km TT using the KICKR is reliable in trained cyclists