CRANK FORE-AFT POSITION AFFECTS ECONOMY AND TECHNIQUE IN TRAINED RECUMBENT HANDCYCLISTS

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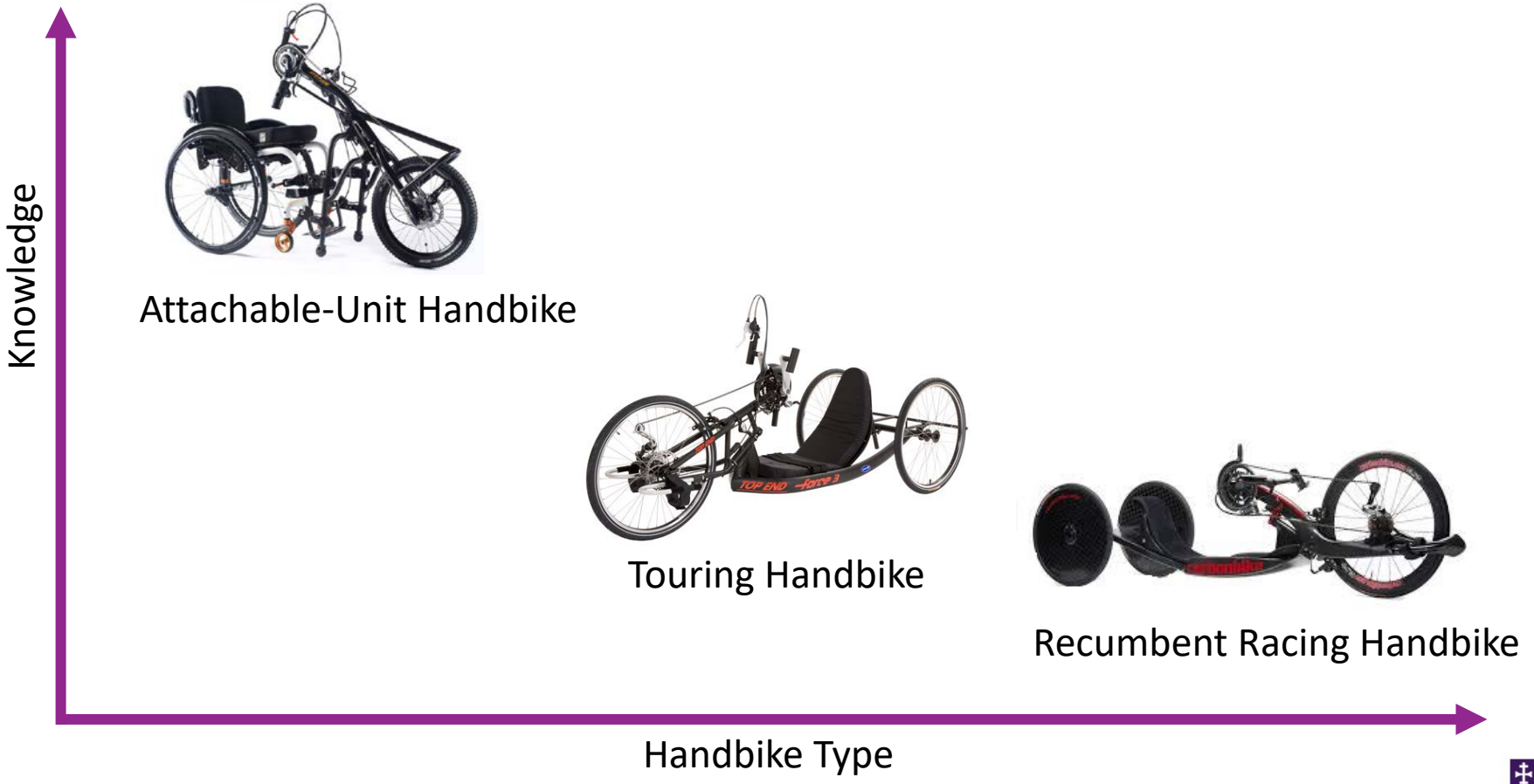
WHAT DO WE KNOW ABOUT CRANK FORE-AFT POSITION?



Arnet et al., 2014; Faupin and Gorce 2008; Litzenberger et al., 2016; Miller et al., 2004; van Drongelen et al., 2009

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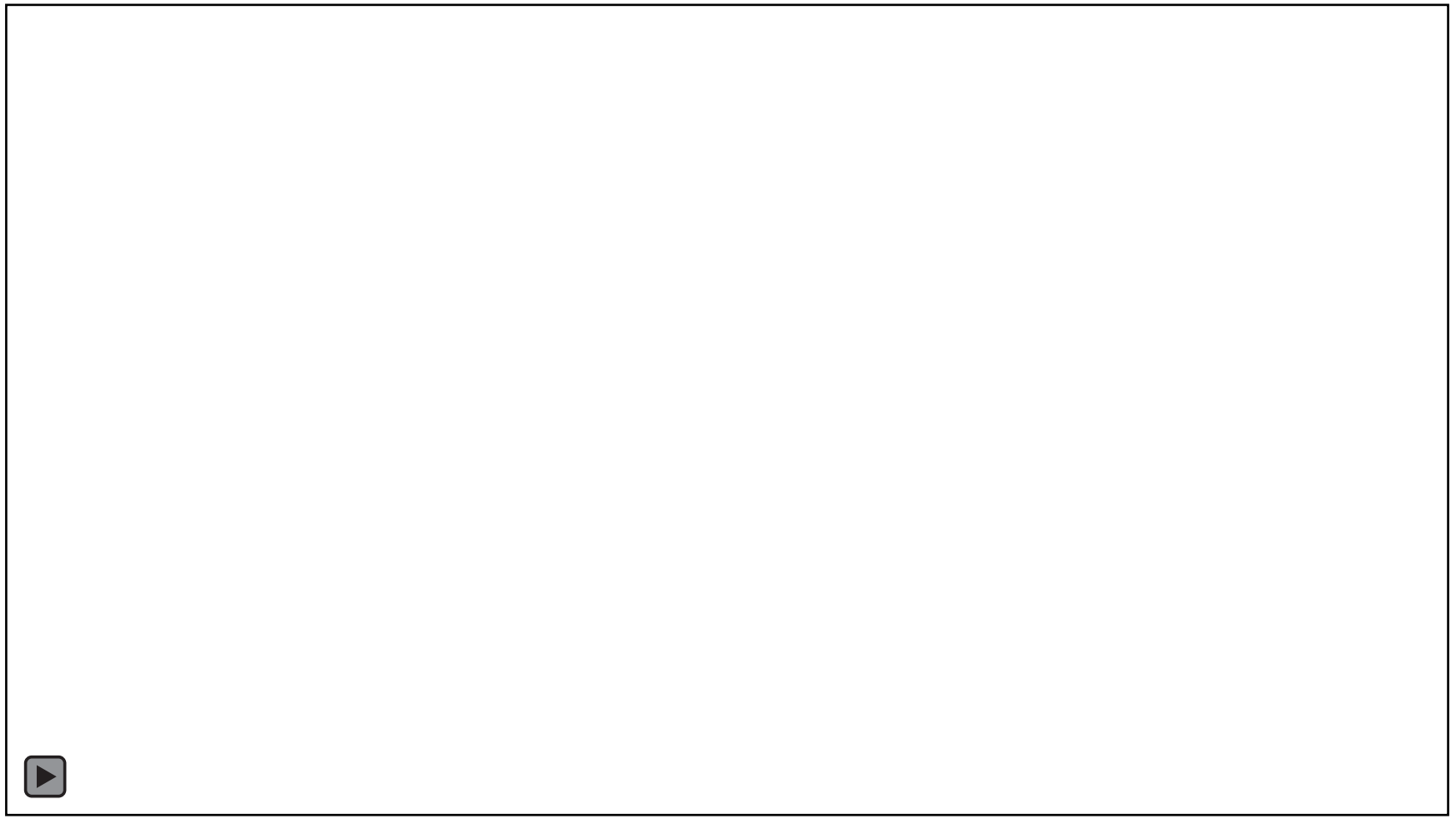
WHAT IS RECUMBENT HANDCYCLING?



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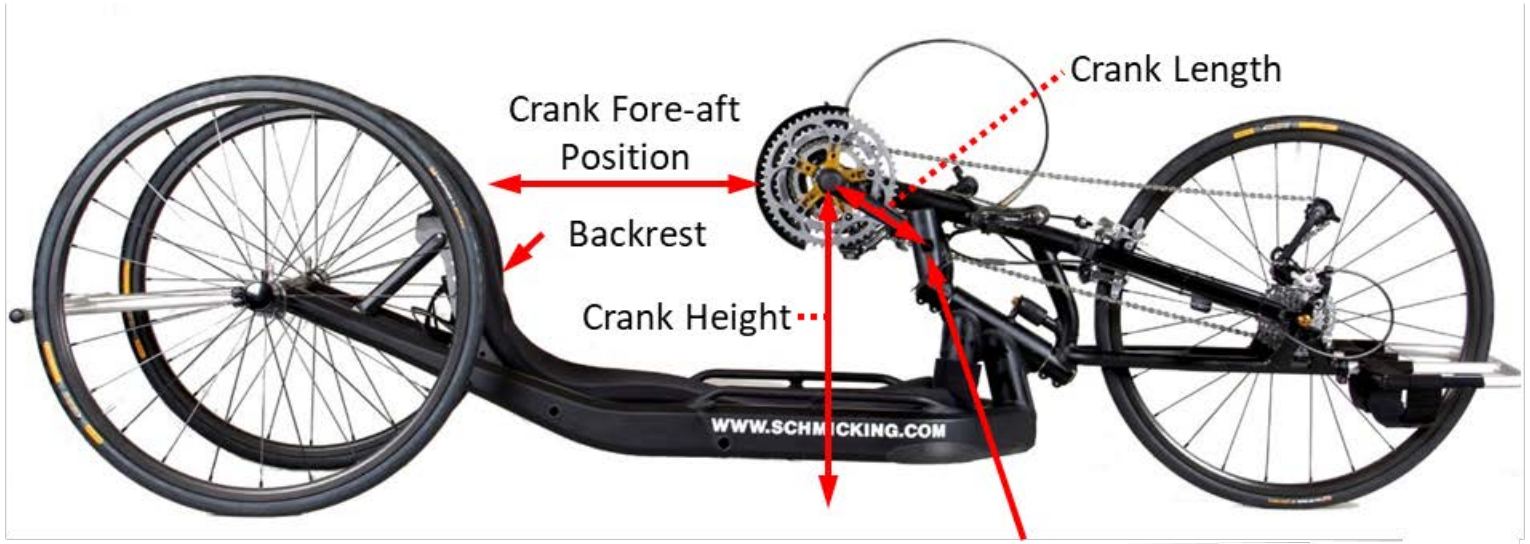
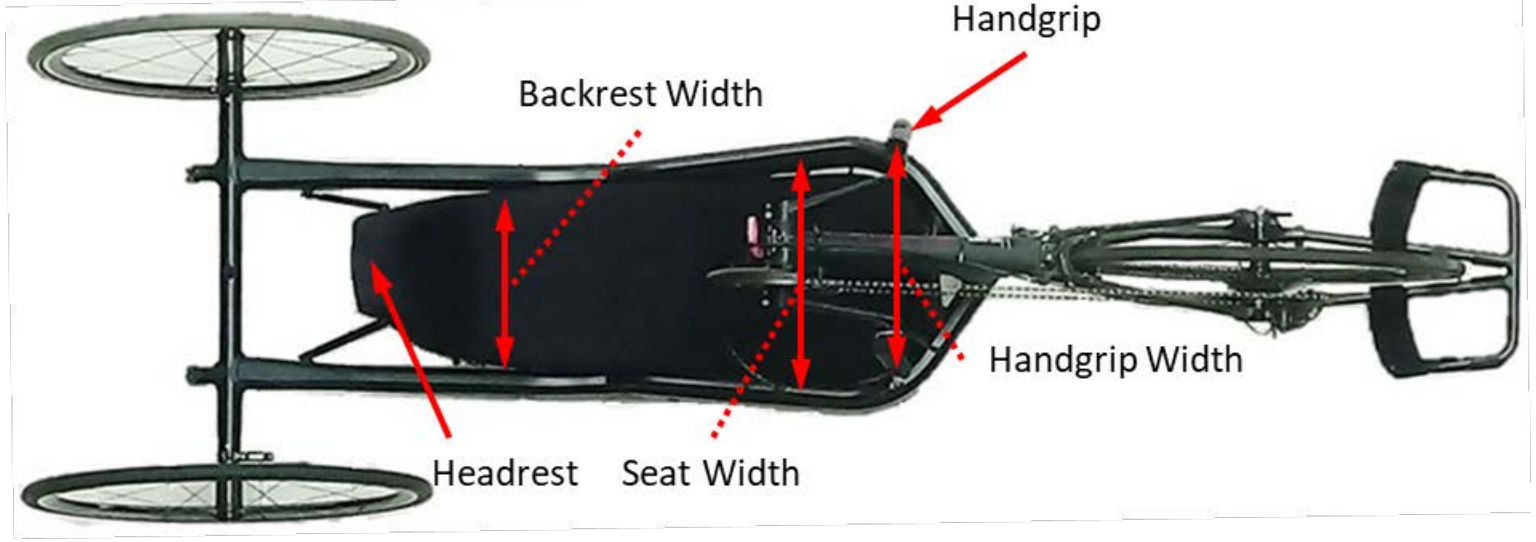
HOW IS A RECUMBENT HANDBIKE SET-UP?





Crank fore-aft Position:

1. 10 cm range
2. 15 % range relative to arm length

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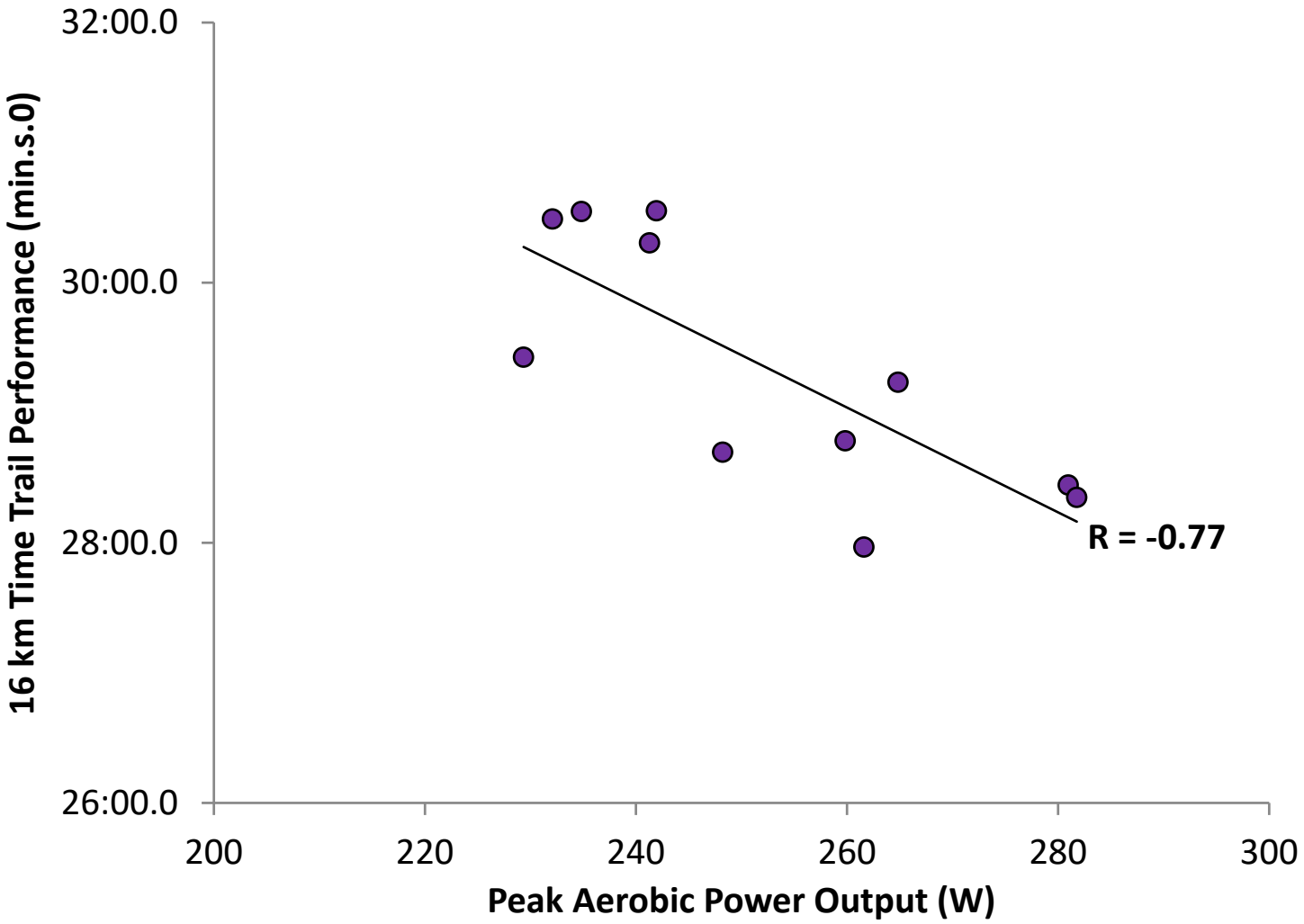
WHAT DOES HANDCYCLING LOOK LIKE IN A SIMULATED TIME TRIAL?



- Cadence 94 ± 6 rpm
- Intensity 70% Peak Aerobic Power Output

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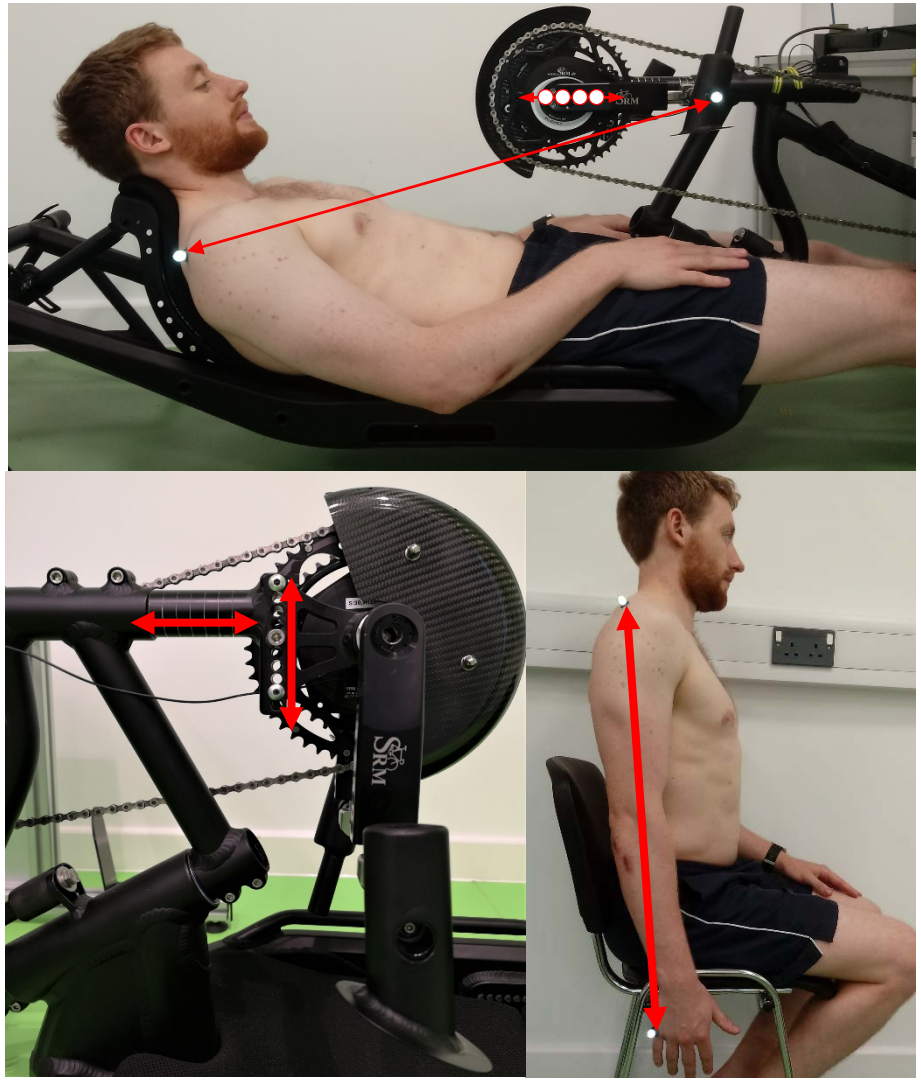
EXPERIMENTAL DESIGN



- Participants:
  - 15 trained recumbent handcyclists
  - 6 H3 and 9 H4
    - 10 SCI complete (T5 – L1)
    - 3 lower limb amputees
    - 2 cerebral palsy

- Manipulating crank fore-aft position by arm-length:
  1. 94%
  2. 97%
  3. 100%
  4. 103%

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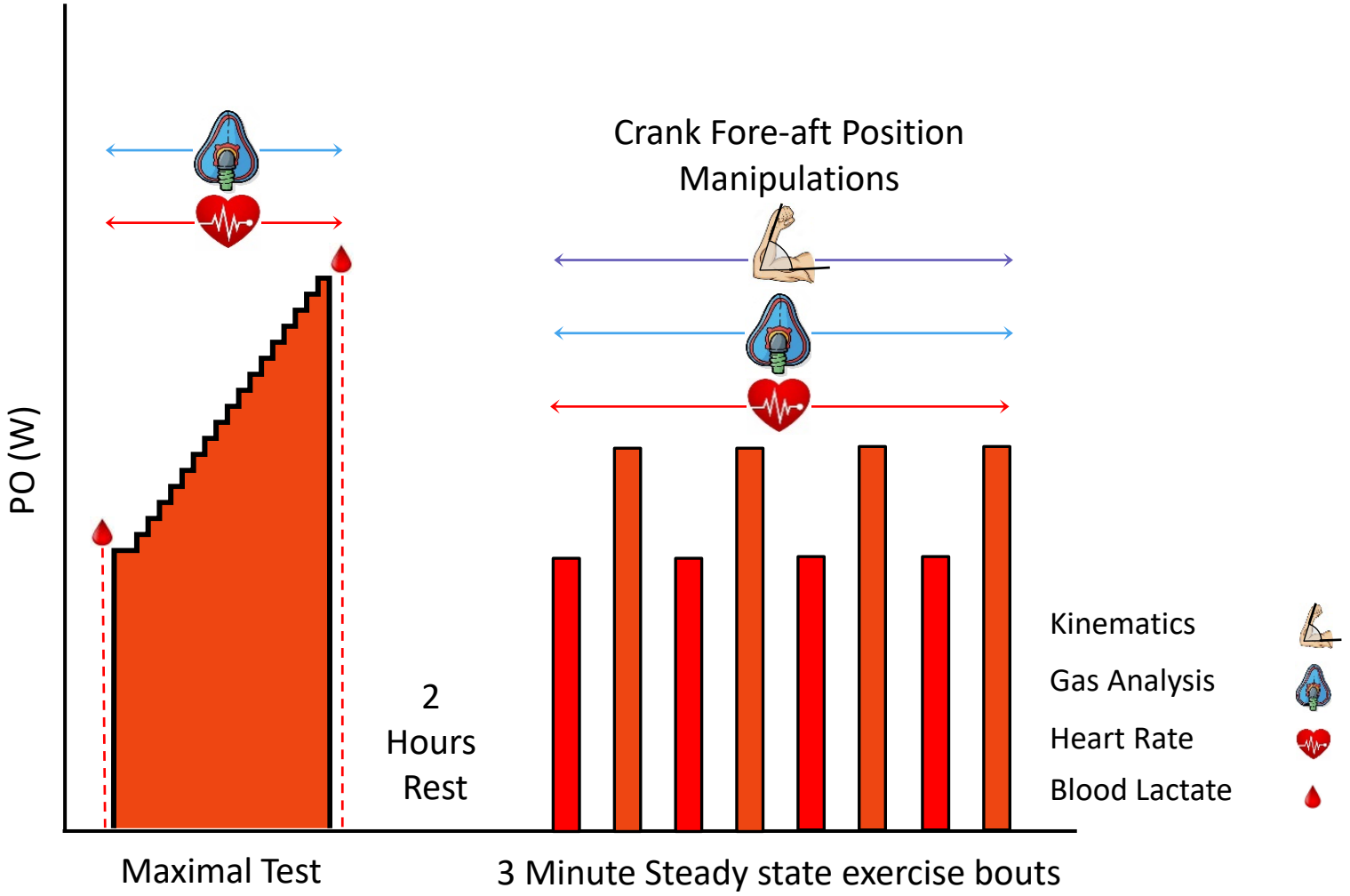
EXPERIMENTAL PROTOCOL



- Exercise Intensity
  - 50% and 70% PO_{Peak}
  - 90 ± 10 rpm
- Variables:
  - Handcycling Economy
  - Upper Limb Kinematics
  - Heart Rate

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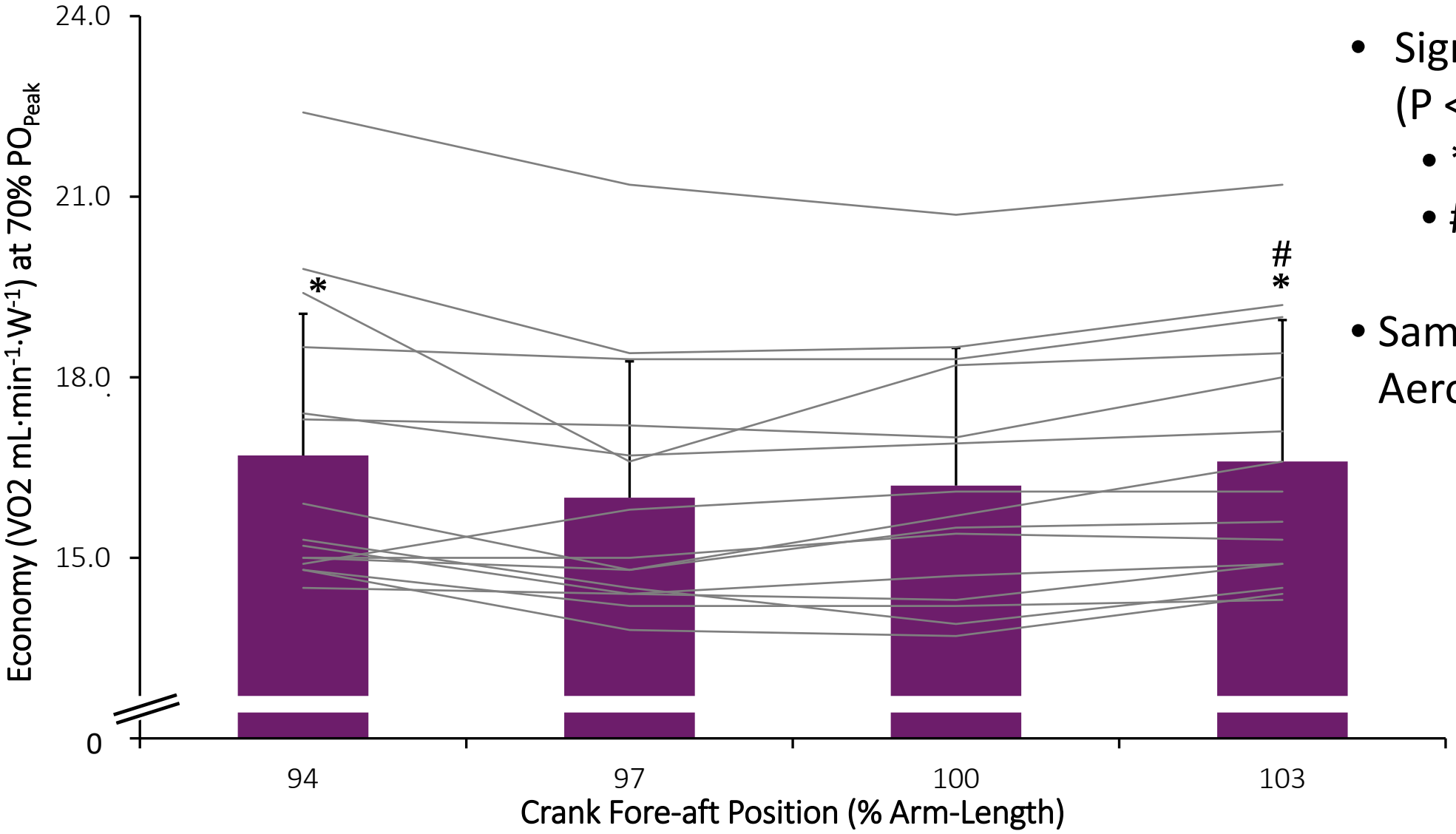
CRANK FORE-AFT POSITION AFFECTS HANDCYCLING ECONOMY



- Significant difference ($P < 0.05$) relative to:
  - * 97 %
  - # 100 %
- Same trend at 50% Peak Aerobic Power Output

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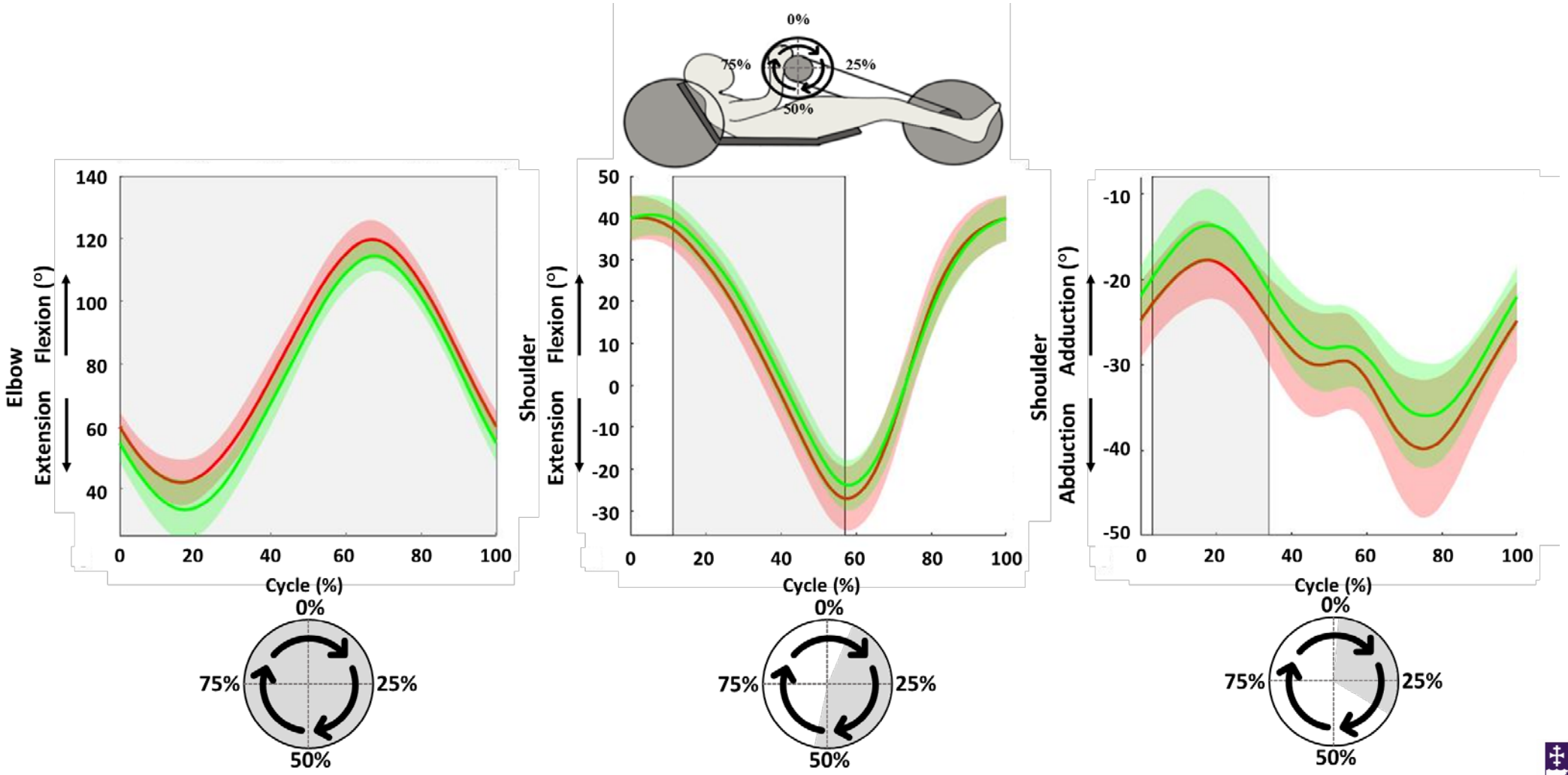
CRANK FORE-AFT POSITION AFFECTS HANDCYCLING TECHNIQUE



97%

103%

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CONCLUSION

- Crank fore-aft position influences economy and technique
- A crank fore-aft position equivalent to 97% - 100% of arm-length maximises economy
- Direct link between handbike configuration and handcycling technique.

THANK YOU FOR LISTENING

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HSBC UK
BRITISH CYCLING

ENGLISH INSTITUTE OF SPORT

RECUMBENT HANDBIKE CONFIGURATION

Parameter	Mean ± SD	Min	Max
Handbike Configuration			
Crank Height (m)	0.51 ± 0.02	0.48	0.54
Crank Horizontal Position (m)	0.58 ± 0.04	0.53	0.64
Backrest Height (m)	0.41 ± 0.04	0.36	0.46
Crank Length (mm)	171 ± 2	170	175
Handgrip Width (m)	0.33 ± 0.02	0.31	0.36
Mass (kg)	14.3 ± 1.2	13.0	16.6
Handbike-User Interface			
Crank Fore-aft Position (m)	0.68 ± 0.03	0.63	0.72
Shoulder Height (m)	0.33 ± 0.03	0.30	0.38
Eye-line Height (m)	0.54 ± 0.04	0.45	0.59
Crank Height vs Shoulder Height (%)	158.7 ± 12.8	136.8	170.0
Crank Fore-aft Position vs Arm length (%)	100.0 ± 4.0	95.5	109.2
Crank Length vs Arm Length (%)	25.3 ± 1.0	24.1	26.5
Handgrip Width vs Shoulder Width (%)	77.7 ± 3.9	73.4	86.6

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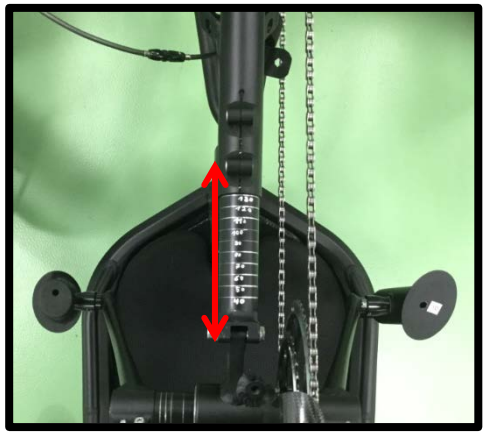
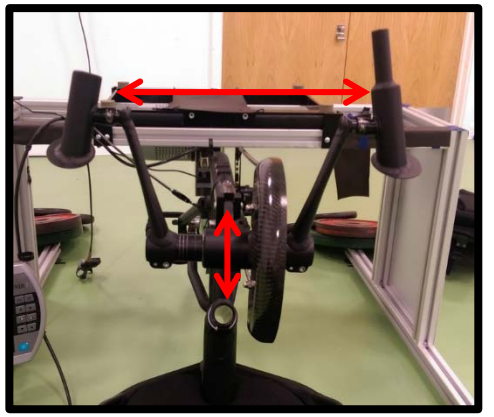
THE ADJUSTABLE RIG





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