GIH THE SWEDISH SCHOOL OF SPORT AND HEALTH SCIENCES

UCI UNION CYCLISTE INTERNATIONALE

The relationship between isometric and dynamic leg strength in elite para-cyclists and its use in para-cycling classification

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Para-cycling

- In need of an evidence-based classification system
  Tweedy, S.M., & Vanlandewijck, Y.C. (2009)
- Current system
- Ratio-scaled, reliable and training-resistant
- Isometric muscle strength tests
  Beckman, E.M., Connick, M.J., Tweedy, S.M. (2017)



C-class

- Classes C1-C5, where C1 consists of the athletes with the greatest impairments
- Mixed impairments within classes

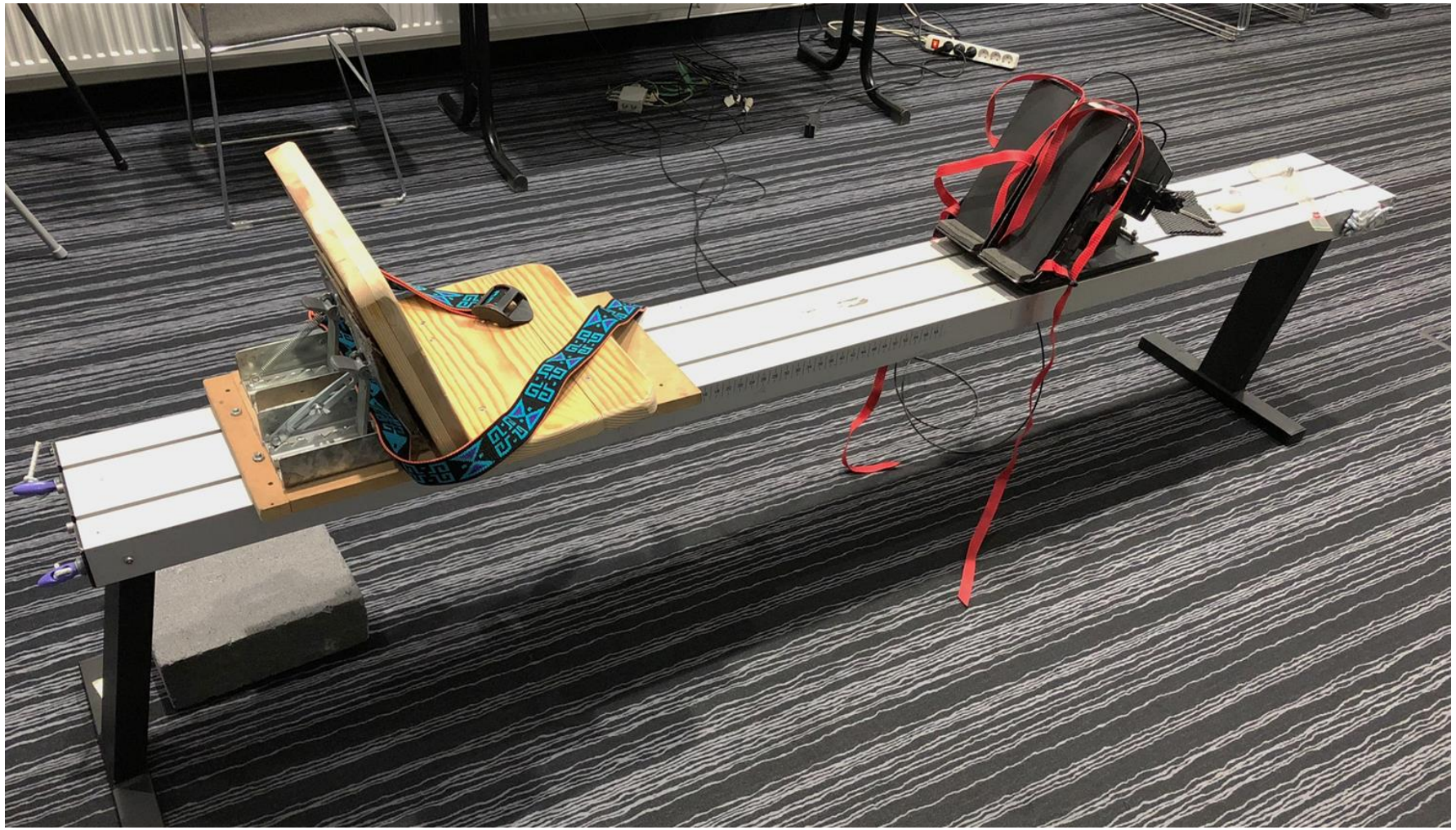
Research question

- Assess the relationship between isometric and dynamic leg strength tests
- Is the dynamic test a potential test for classification?

Data collection

- Para-cycling Road World Cup in Emmen, July 2018
- Para-cycling Road World Championship in Maniago, August 2018

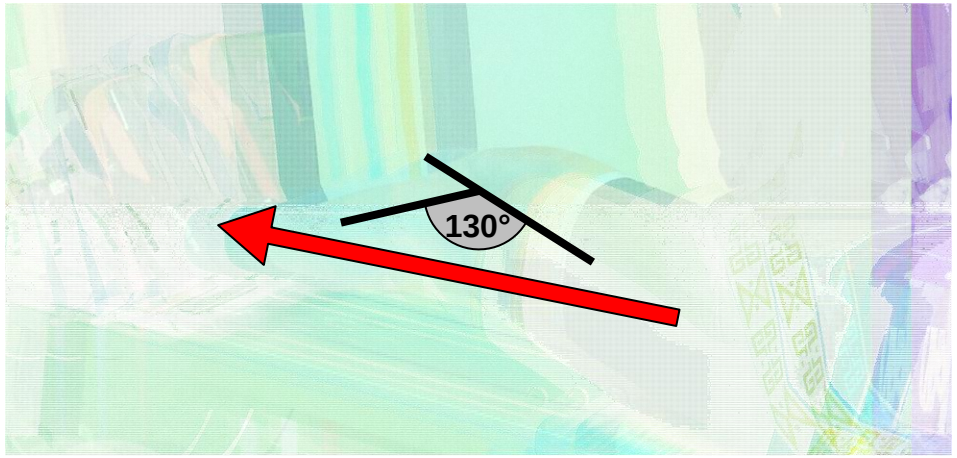
	n	Muscle strength and/or ROM impairment	Limb deficiency	Average training hours/week	Years competing internationally
Male	29	19	10	16	3
Female	8	7	1	15	2



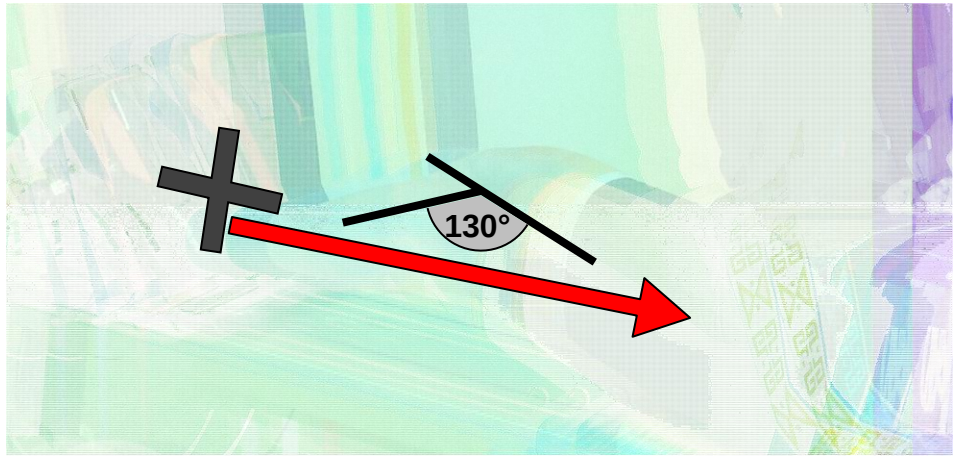
Customized isometric force measurement system

Bjerkefors et al (2019)

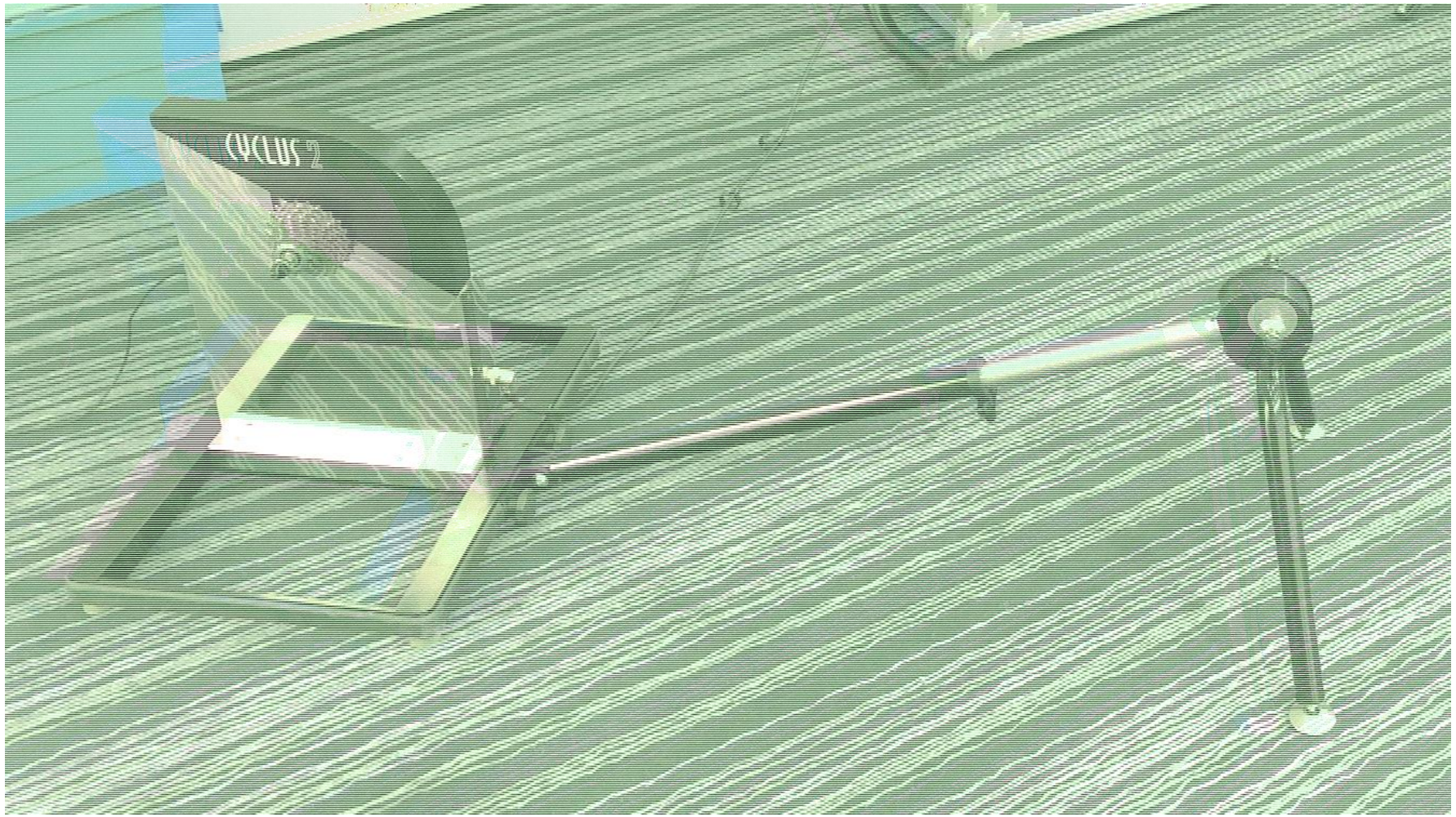
Isometric pushing



Isometric pulling



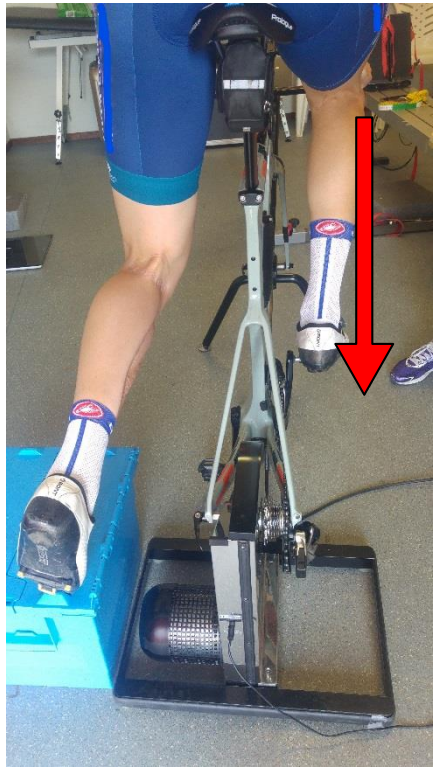
- 3 seconds maximal effort
- 2 trials each leg ⟶ best try for each leg added together
- Newton, not corrected for weight



Cyclus2, RBM Electronics, Germany

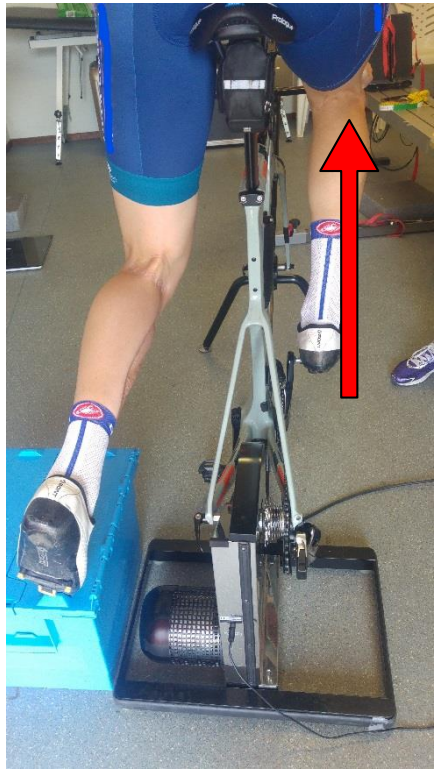
Dynamic pushing

0°



180°

Dynamic pulling

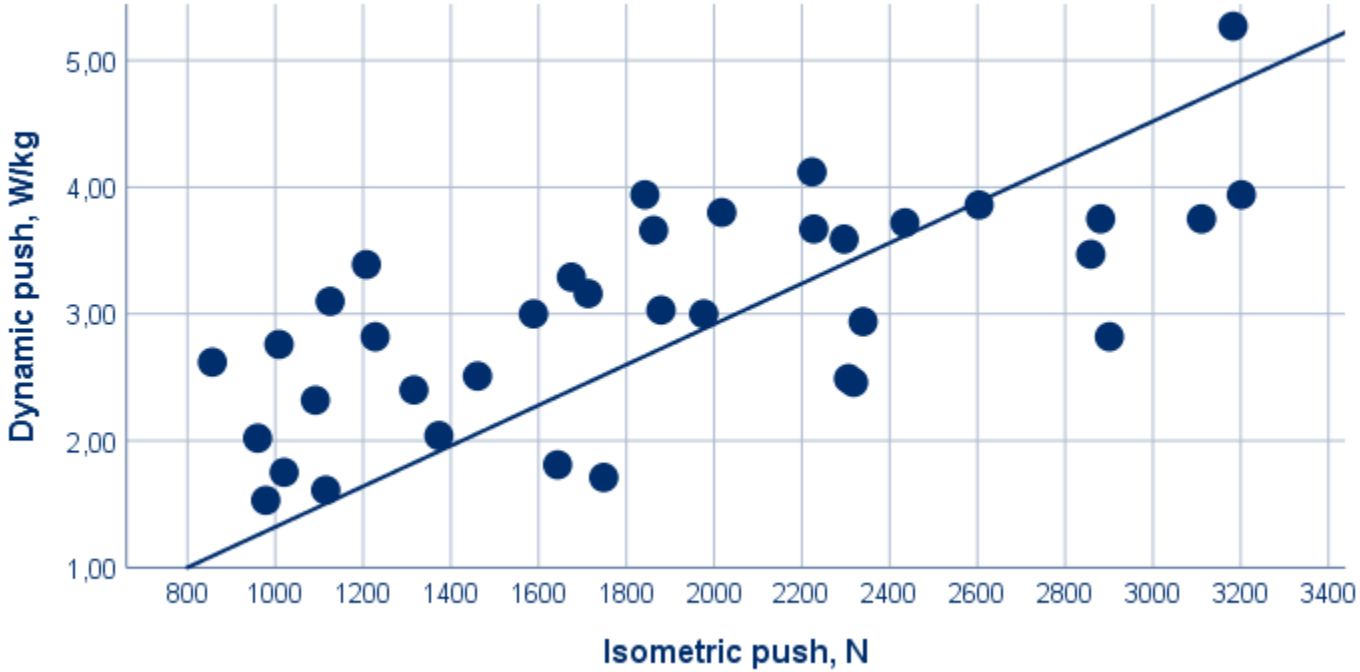


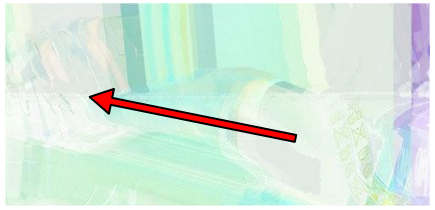
360°

180°

- Starting resistance 100 N
- 2-5 trials each leg ⟶ best try for each leg added together
- Watt/kg, corrected for weight

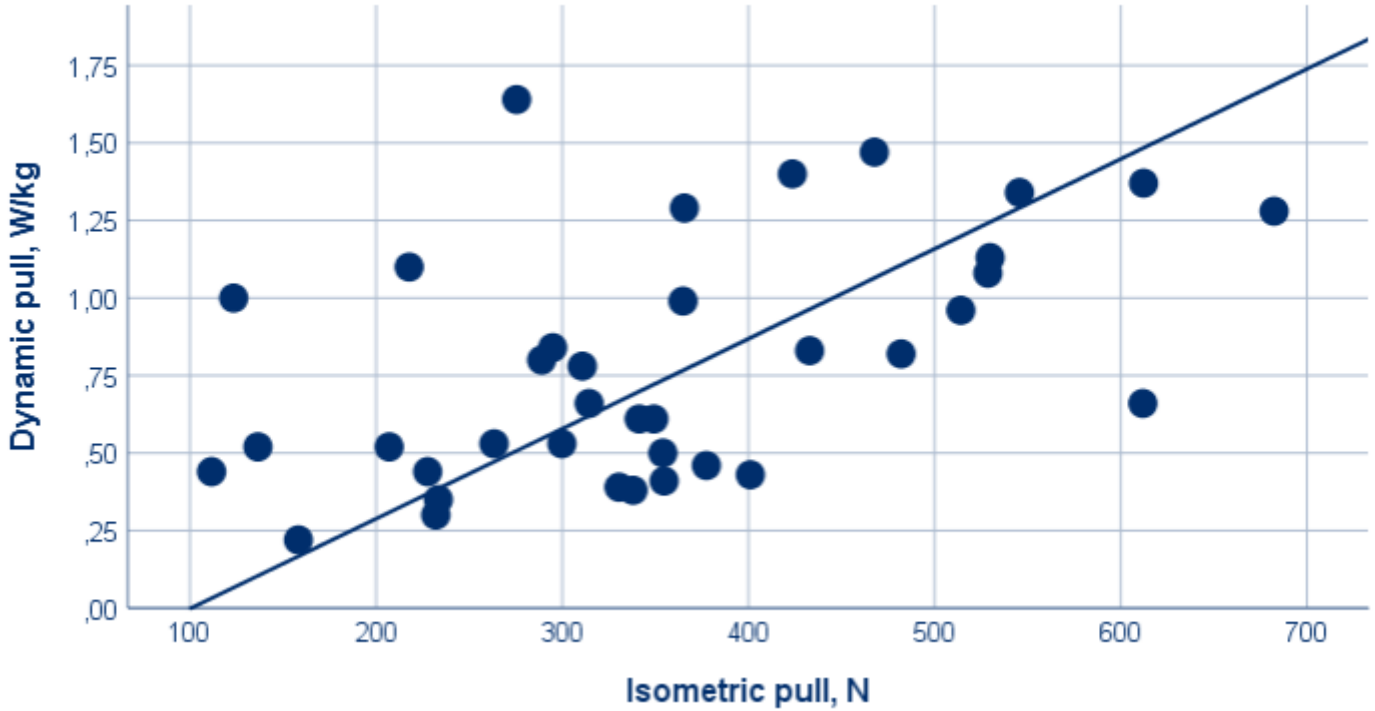
Results – isometric vs dynamic push

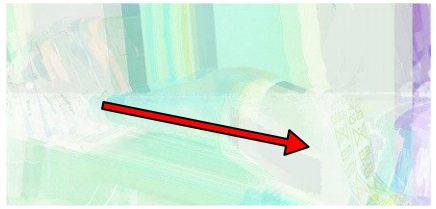




$\rho = .67$ ($p < .001$)

Results – isometric vs dynamic pull





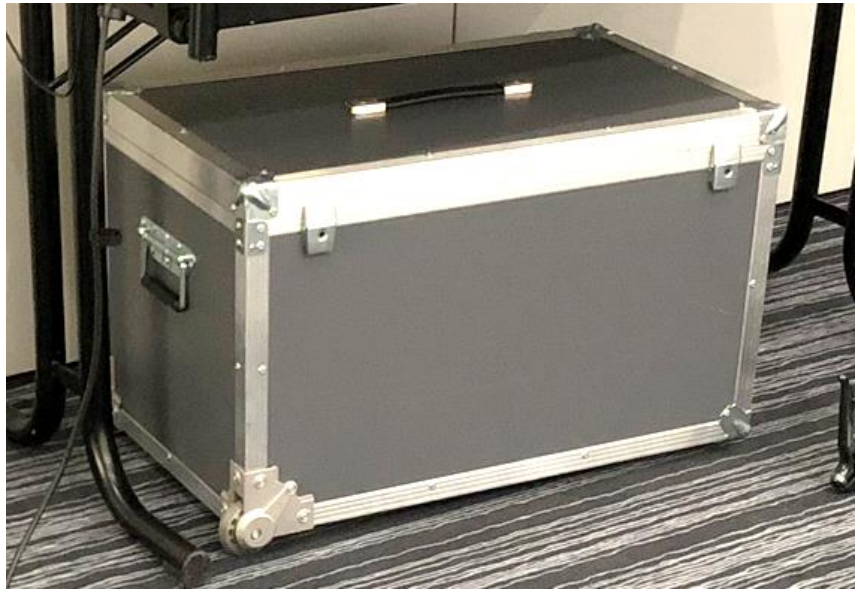
$\rho = .50$ ($p < .01$)

Discussion

- Different results between pushing and pulling
  - Ankle dorsiflexion
- Athlete's weight correction

The dynamic test in classification

- Pros
  - Easy
  - Less equipment
  - Instant results
  - Sport-specific
  - Training-resistant
  - Ratio-scaled
  - Correlates to the isometric test
- Cons
  - Logistics
  - Upper body



Thank you for your attention!

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