Loughborough University

Female classification wheelchair rugby

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World Wheelchair Rugby

Loughborough University
Peter Harrison Centre for Disability Sport

#InspiringWinners since 1909

Wheelchair rugby

- Mixed sex sport

- Classification system (0.5-3.5)
  - Upper extremity (both)
  - Trunk
  - 4 players (8.0 points)
  - Additional 0.5-point for every female player on court

World Wheelchair Rugby. (2023). *Classification*.

Evidence-based classification

- Key point in position stand (IPC)

- Trunk function important for acceleration
- Arm strength assessed between classes
- Most research is based on male players
  - Females had 40-50% less force in able-bodied population with same strength measures

IPC (2015), Tweedy & Vanlandewijck (2011)
Altmann et al. (2014, 2017, 2018), Mason et al. (2020, 2021)

The goal

- 1) Assess the differences in isometric strength and sprint performance between female and male wheelchair rugby players

- 2) Assess fairness of the current 0.5-point competition rule for female wheelchair rugby players

Methods

- Participants

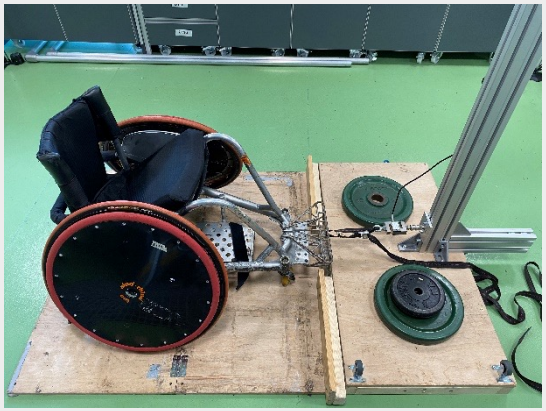
Characteristic	Females	Males
Number (n)	24	58
Age (years)	30±8	33±7
Body weight (kg)	64±10	72±10
WR experience (years)	7±5	11±6
Training volume (hr/week)	8±6	10±5
IWRF score	0.5 (n=3), 1.0 (n=3), 1.5 (n=2), 2.0 (n=5), 2.5 (n=4), 3.0 (n=5), 3.5 (n=2)	0.5 (n=19), 1.0 (n=15), 1.5 (n=6), 2.0 (n=13), 2.5 (n=1), 3.0 (n=2), 3.5 (n=2)

- Materials
  - Isometric strength rig
  - Timing gates

Design

- 6 isometric strength tests (3 x 5s)
  - Shoulder flexion & extension
  - Elbow flexion & extension
  - Push & pull test

- 3 x 10m sprints
  - 2m split times



Dividing groups

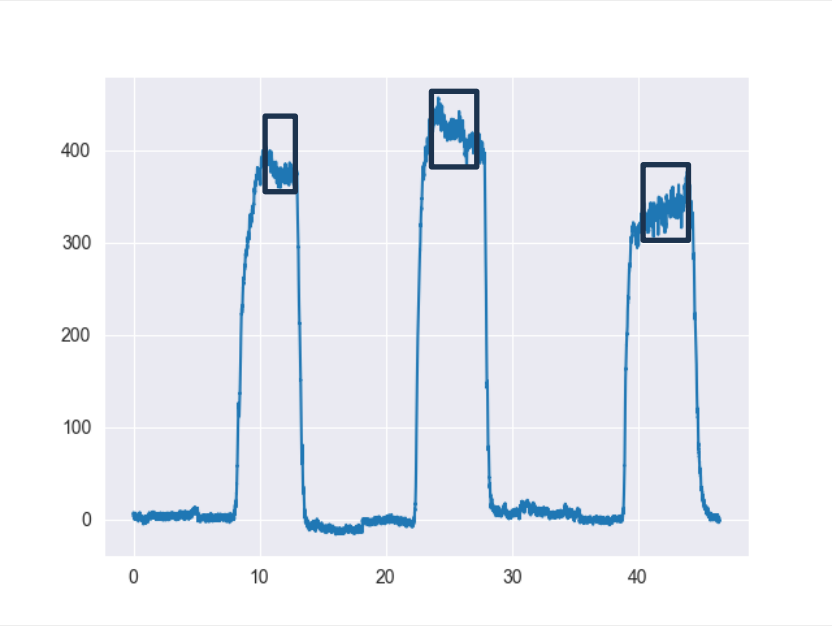
- Female players (F)
- Male players (M)

- Low-point players (<2.0) (LP)
- High-point players (>=2.0) (HP)

- No trunk function players (NT)
- Trunk function players (TR)

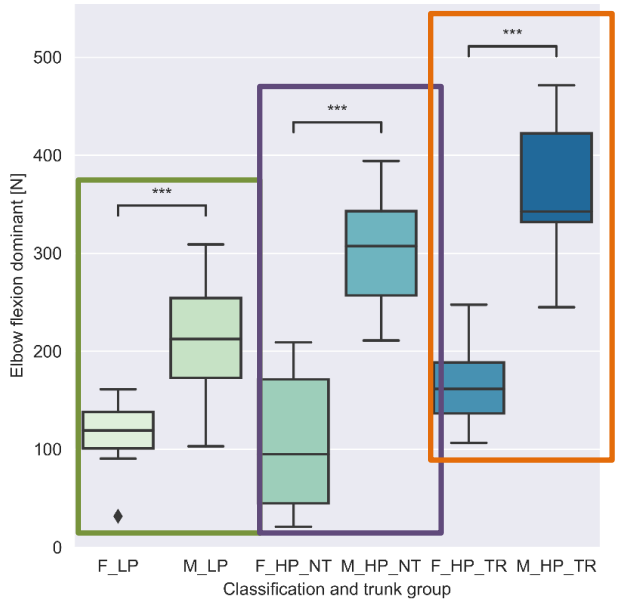
Data and statistical analysis

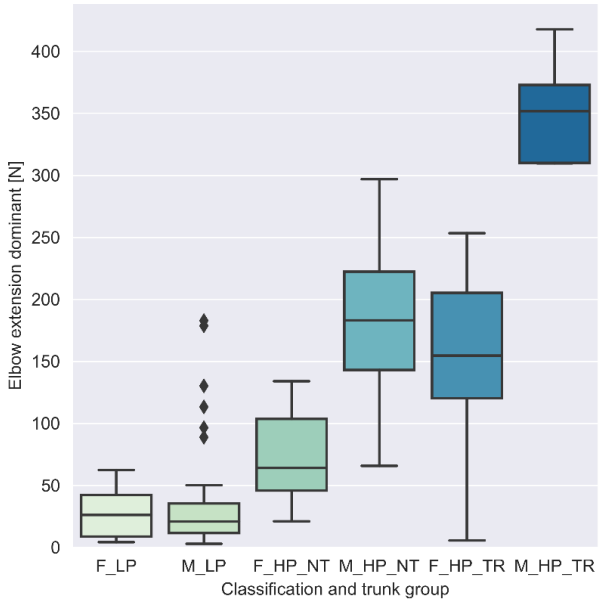
- Isometric strength tests
  - Mean of 2-3s window
  - Best trial of 3
- Sprint test
  - Best 2m and 10m times
- Statistics
  - One-way Anova / Kruskall
  - Tukey-HSD / Dunn test

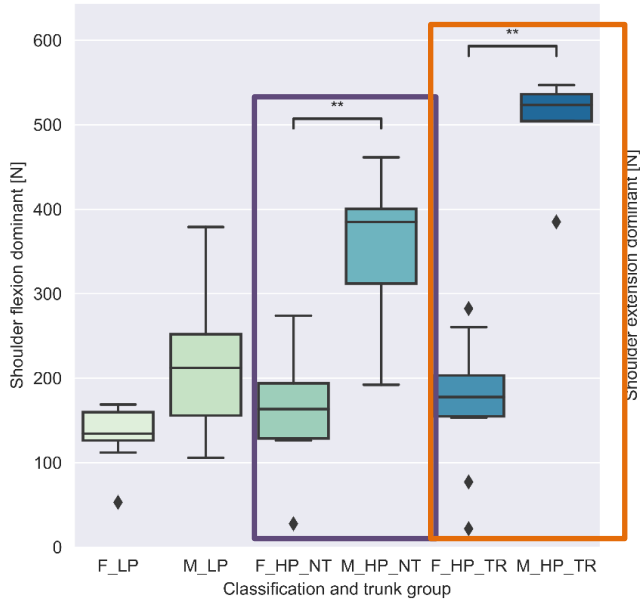


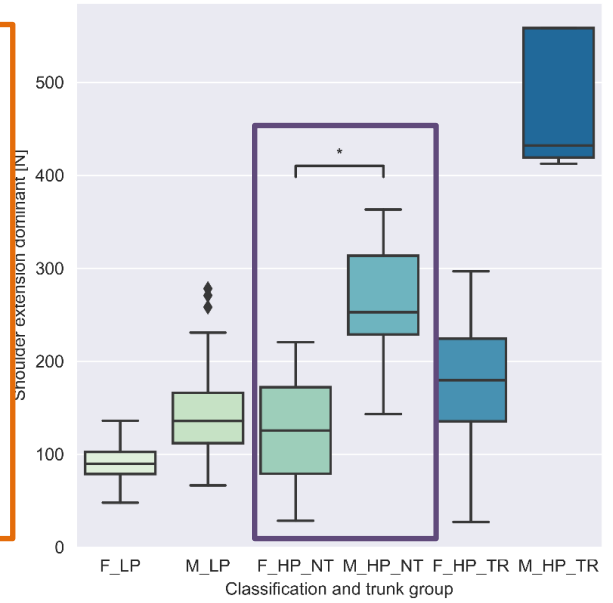
Results

Dominant strength



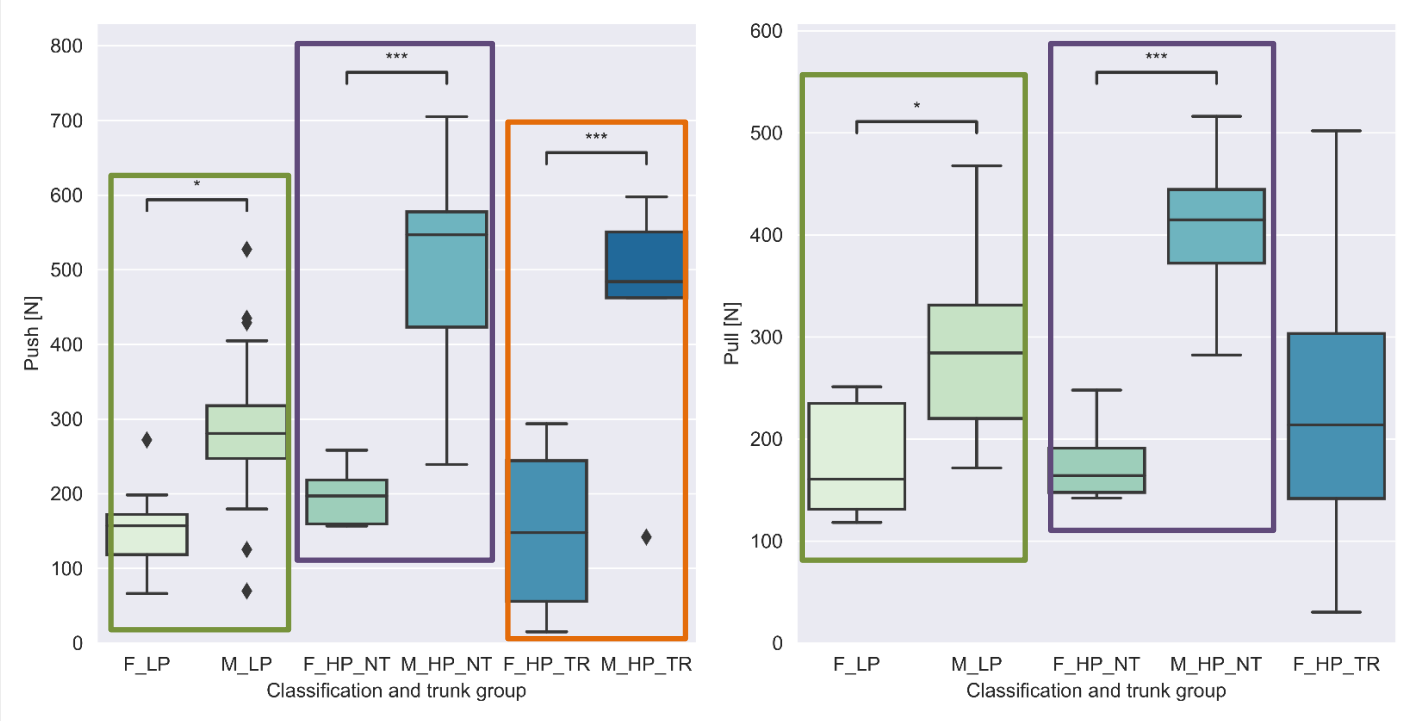




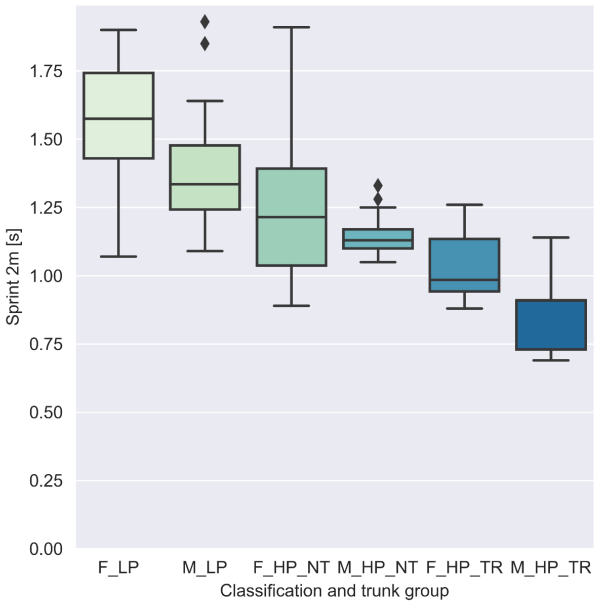


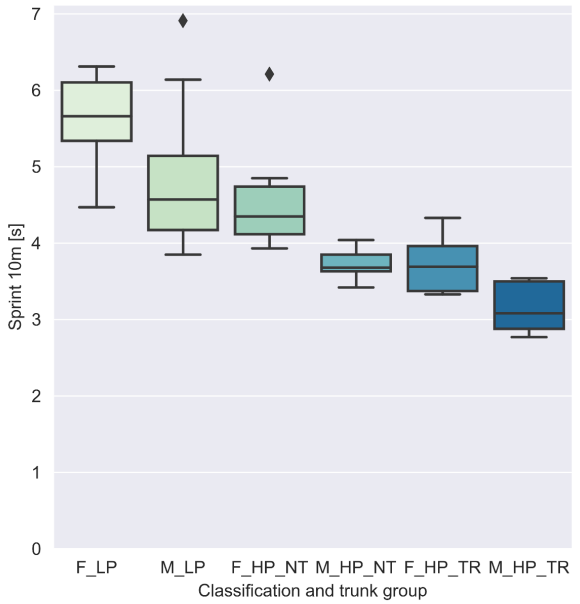
Results

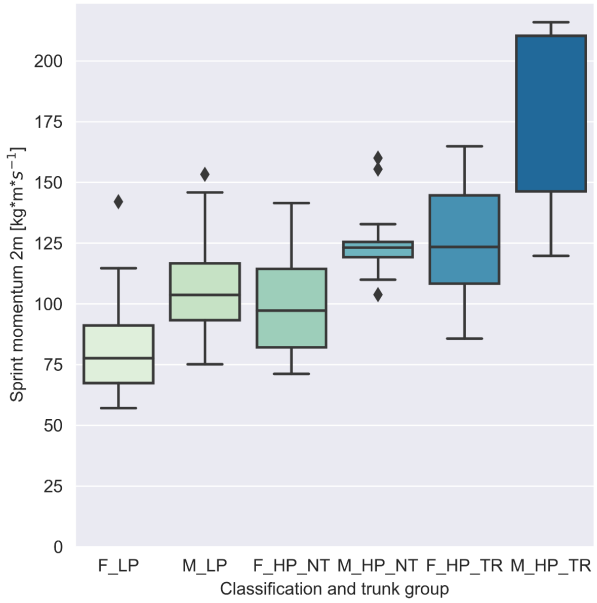
Push & Pull

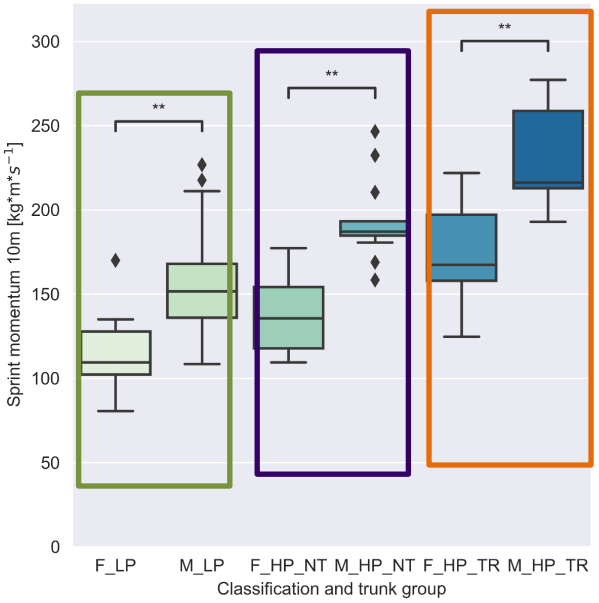


Results: Sprint & momentum

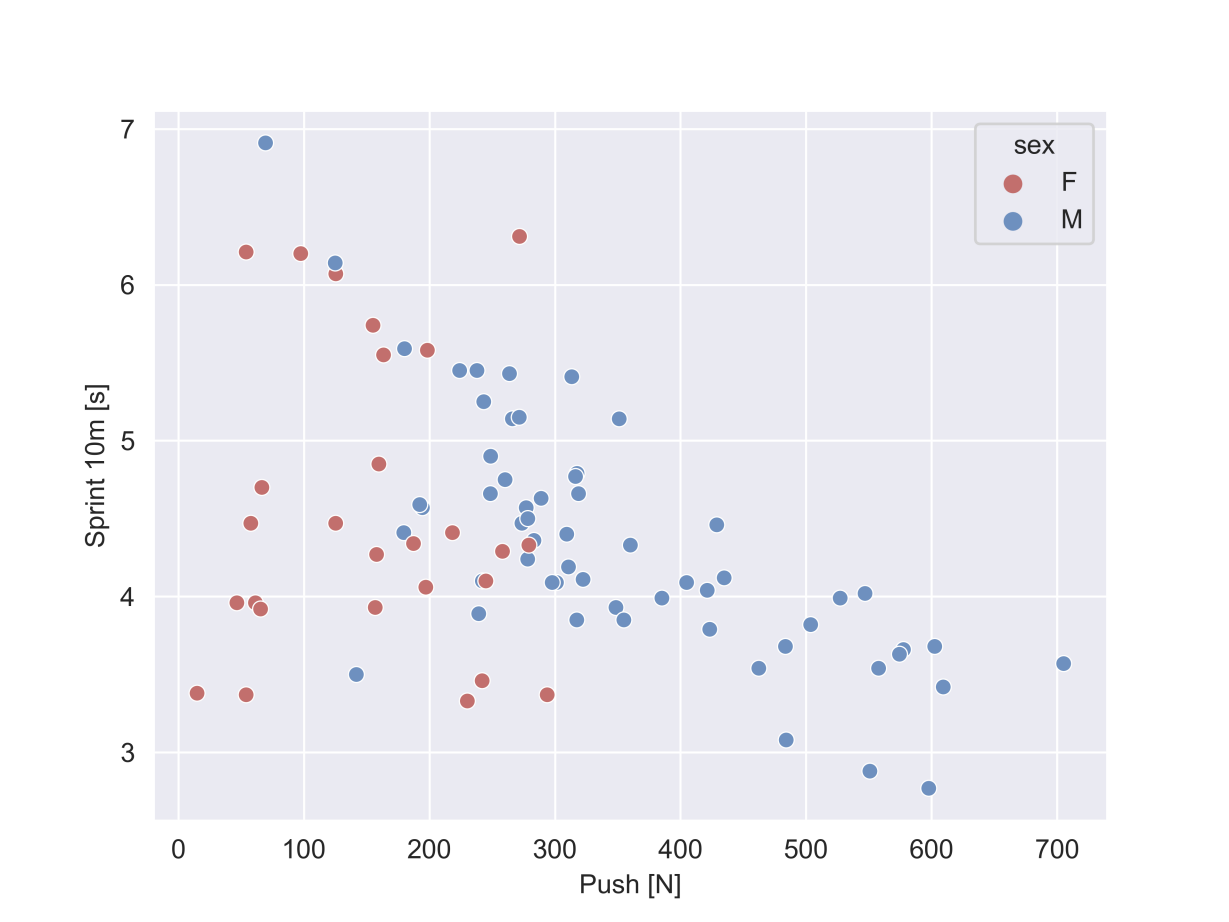








Results Associations



Discussion

- Differences in strength Females vs Males
  - No differences in affected muscles (elbow extension)
  - Differences in partially and unaffected muscles (elbow flexion, shoulder flexion-extension)
  - Difference push-pull signifies wheelchair rugby related activities (pick and block)
  - Differences more profound in HP-players

Discussion

- Sprint performance no differences
  - Influenced by the body mass of the players
  - Sprint momentum shows differences
  - Differences more profound in HP players
  - The ability to take a hit affected

- Association strength and performance
  - Males have a stronger association between strength and sprint performance

Future research and limitations

- Assessment of other aspects
  - Trunk force
  - Wheelchair rugby related activities (picking, blocking, wheelchair mobility performance)
  - Clustering of results

- Interpret data with care
  - Male data skewed towards LP-players
  - Low number players per classification level

Conclusion

- Female and male WR players differ in arm muscle strength across all classification levels.

- There should be a compensation rule for female wheelchair rugby players on court. The rule might need revising for HP players.

Questions?