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A comparison of 3 v 3 wheelchair basketball game formats for inclusion at the Commonwealth Games: a multidisciplinary approach

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Introduction

- Wheelchair basketball (WB) is a 5 v 5 team sport played on a 28 x 15 m court



- WB is due to be included as a medal event at the 2022 Commonwealth Games for the 1st time in a **3 v 3 format**

- Three versions of 3 v 3 WB currently exist:

- **Full court** 28 x 15 m (2 baskets)
- **Half court** 14 x 15 m (single basket)
- **Modified court** 22 x 15 m (2 baskets)

Aim



- To conduct some **preliminary** evidence-based research to help inform the International Governing Body about the most suitable 3 v 3 format to propose for the Commonwealth Games



User perceptions



THE UNIVERSITY OF BRITISH COLUMBIA

Dr Andrea Bundon
University of British Columbia

Methods

- 15 WB players participated in three different formats of 3 v 3 and a 5 v 5 match:
 - **Full court (FC)** 28 x 15 m (2 baskets)
 - **Half court (HC)** 14 x 15 m (single basket)
 - **Modified court (MOD)** 22 x 15 m (2 baskets)
- 5 v 5 match:
 - 4 x 10-min periods
 - Game clock
 - 24-s shot clock
 - Substitutions
 - 14pt classification limit
- 3 v 3 formats:
 - 2 x 10-min periods
 - Running clock
 - 18-s shot clock
 - No substitutions
 - 8.5pt classification limit

Testing schedule for all 3 v 3 formats.

Team		Team
1	v	2
3	v	4
5	v	1
2	v	3
4	v	5

Methods – Physical Demands

External workload was monitored using an indoor tracking system (ITS):

- Relative distance covered ($\text{m}\cdot\text{min}^{-1}$)
- Peak speed ($\text{m}\cdot\text{s}^{-1}$)
- Time spent in fixed speed zones (%):

Z1 - $< 0.5 \text{ m}\cdot\text{s}^{-1}$

Z2 - $0.5 - 1.5 \text{ m}\cdot\text{s}^{-1}$

Z3 - $1.5 - 2.5 \text{ m}\cdot\text{s}^{-1}$

Z4 - $2.5 - 3.0 \text{ m}\cdot\text{s}^{-1}$

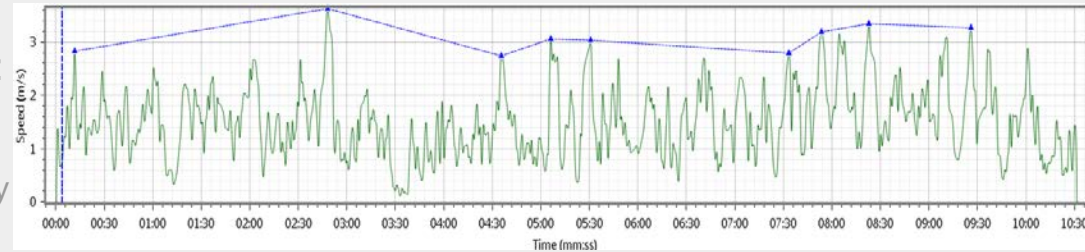
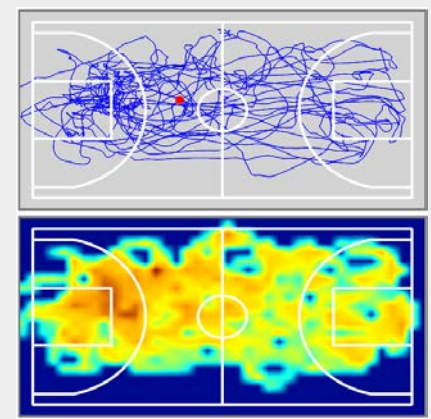
Z5 - $3.0 - 3.5 \text{ m}\cdot\text{s}^{-1}$

Z6 - $> 3.5 \text{ m}\cdot\text{s}^{-1}$

Low speed activity

Mod speed activity

High speed activity



Internal workload was monitored via:

- Mean & peak heart rate (HR) ($\text{beats}\cdot\text{min}^{-1}$)
- Borg CR-10 RPE scale

Methods – Technical Demands

- All formats were filmed with actions coded to describe activities performed in relation to:

Possession - Time, passes received

Passing - Number, type (long/short)

Shooting - Number, type (field goal/3 pts), success rate

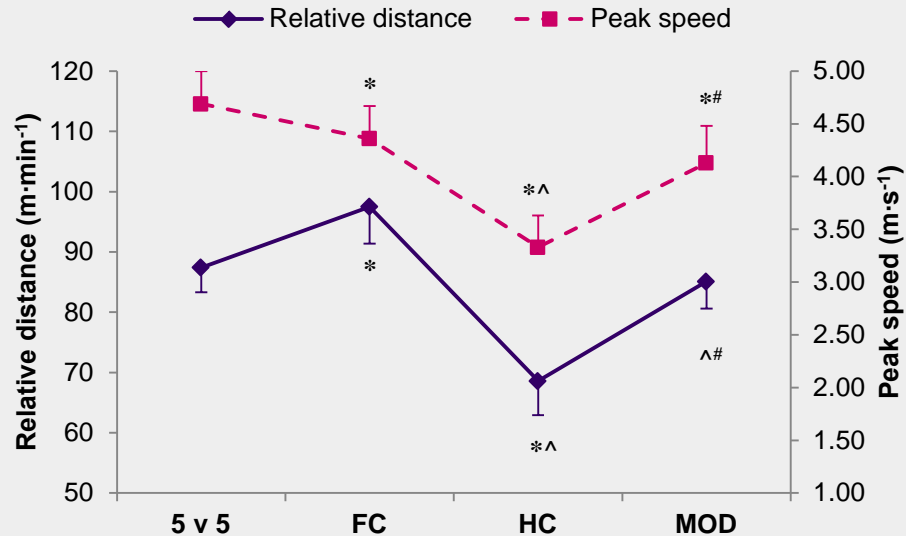
Defensive - Forced turnovers, rebounds, blocks

Errors - Fouls, turnovers, ball handling errors (catching/passing)

- Activities were expressed relative to time (10-mins)
 - Different playing times existed between 5 v 5 and 3 v 3 formats (due to substitutions & clocks)
- Activities were only analysed when ball was in play during 3 v 3 formats



Results – Physical Demands



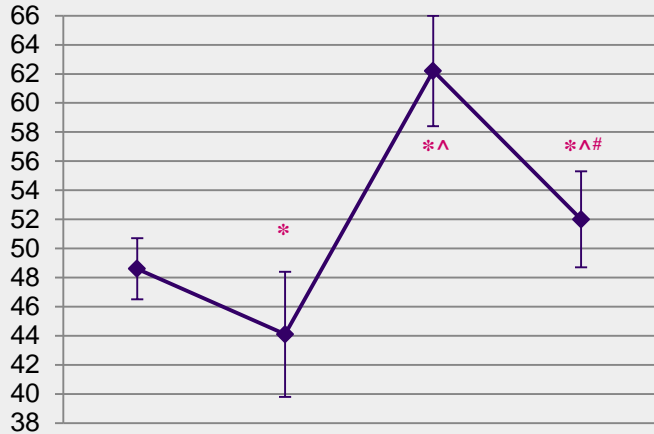
significantly different to: * 5 v 5; ^ FC; # HC

- \uparrow distance covered during FC formats
 = ES = 1.0 (very large)
- \downarrow distance covered during HC
 = ES = 1.8 (very large)
- No significant difference in distance covered between MOD & 5 v 5
 – ES = 0.5 (moderate); 90% CI (-0.3 to 1.4)

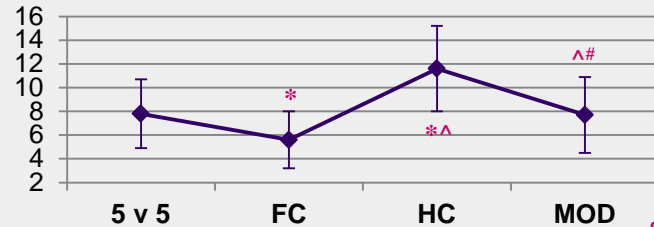
Results – Physical Demands

Low Speed Activity:

Z2



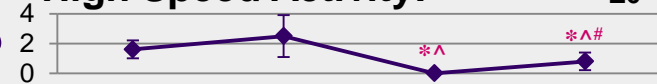
Z1



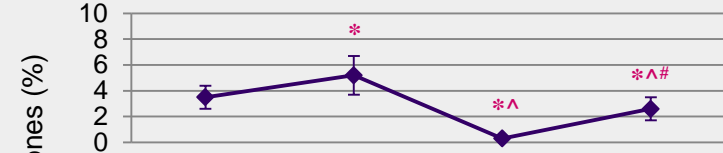
significantly different to: * 5 v 5; ^ FC; # HC

High Speed Activity:

Z6

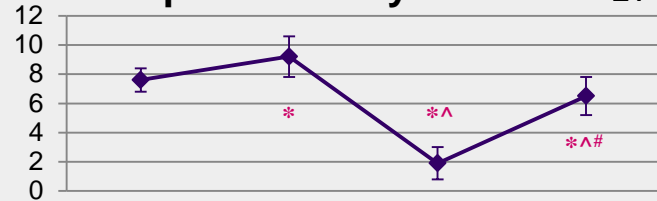


Z5

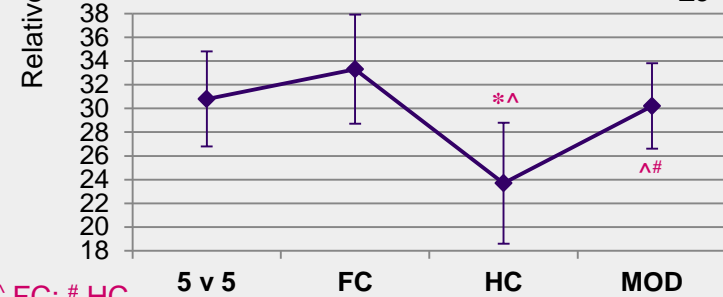


Mod Speed Activity:

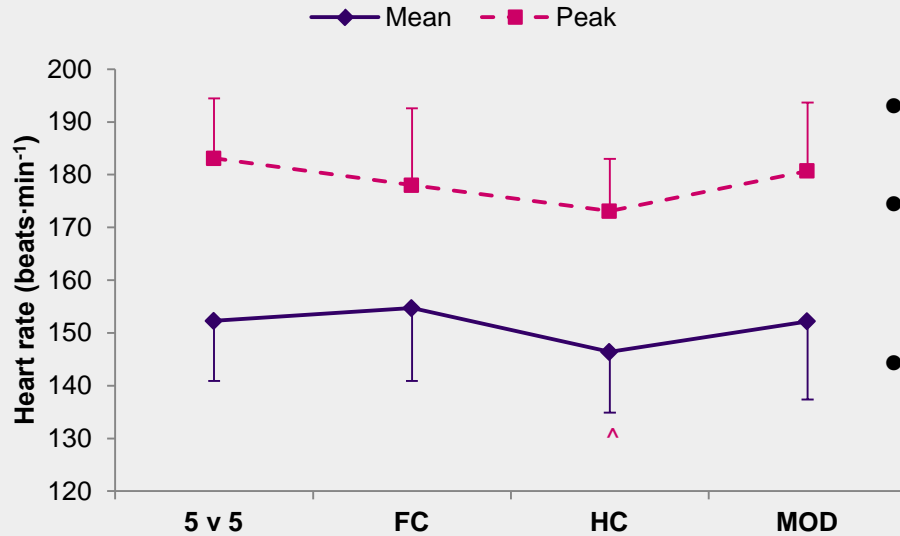
Z4



Z3



Results – Physical Demands



significantly different to: * 5 v 5; ^ FC; # HC

- No significant differences in peak HR
- Mean HR ↑ during FC vs. HC
 - ES = 0.7 (moderate)
- RPE ↑ for 5 v 5 & FC vs. HC & MOD
 - ES ≥ 0.9 (moderate)

Results – Technical Demands

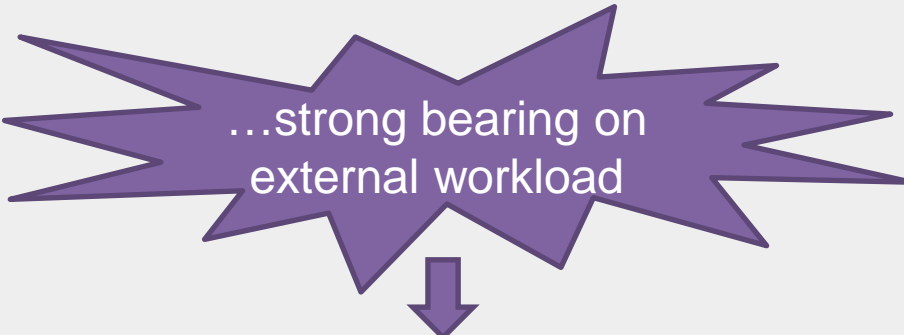
Mean (\pm SD) technical parameters during game formats

	5 v 5	FC	HC	MOD
Possessions (s)	46 (30)	77 (39)	81 (42)	70 (33)
Passes (n/10-min)	9.9 (4.4)	14.4 (4.6)	12.0 (3.6)	14.1 (4.4)
Shots (n/10-min)	3.7 (2.4)	6.2 (2.8)	6.8 (3.5)	7.2 (3.3)
Rebounds (n/10-min)	1.6 (1.2)	2.7 (1.7)	3.5 (1.9)	3.4 (2.1)

- Only differences existed between all 3 v 3 formats in relation to 5 v 5:
 - ES \geq 0.8 (moderate)
 - ES \geq 1.0 (moderate)
 - ES \geq 1.0 (moderate)
 - ES \geq 0.8 (moderate)
- No differences within 3 v 3 formats

Key Findings

- Game format of 3 v 3 WB has a:

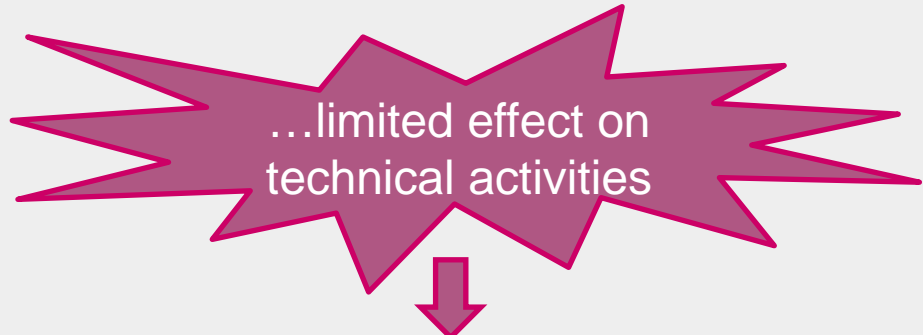


...strong bearing on external workload

↓

- Likely to be associated with changes in relative court area per player
 - Rhodes et al. (2016); Torres & Schelling (2016)

FC	HC	MOD
70 m ²	35 m ²	55 m ²





...limited effect on technical activities

↓

- Attributable to the fixed 18-s shot-clock?
- Under constant time constraints court dimensions don't seem to impact upon technical performance?

Implications

- Current data could be interpreted in a number of ways.....dependent upon priorities of IWBF.....
- High speed, dynamic version of the sport
 - FC↑ external demands; no Δ technical performance

Full court most suitable format??
- Representative of 5 v 5 WB.....
 - No significant difference in distance covered, low or mod speed activity between MOD & 5 v 5

22m court most suitable format??
- Half court would not appear to be a favourable format under the current studies design
 - Slower pace, without increase in technical activities

Conclusion & Future Considerations

Not currently in a position to make any strong recommendations about which 3 v 3 format might be most appropriate.....



- Future research should explore the impact of different shot-clock durations
 - Could different time pressures affect technical performance?
- Need to incorporate **qualitative findings**
 - Determine what the expectations of 3 v 3 WB actually are??
 - Does it need to look like 5 v 5 WB??
 - What are the priorities??
 - What logistical considerations need to be accounted for?

Thank you for listening



Any questions.....

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