RAAK Project

The Perfect Sports Wheelchair

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Content

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- BEd physical education teacher
- MSc human movement sciences
- PhD the perfect sports wheelchair

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  Anatomy, physiology, mechanics and research ➔ sports studies

Main question

Which wheelchair settings fit a wheelchair basketball player best, based on physical capacity, skills field position?

➔ Determine physical demands optimal performance
Introduction

Performance aspects
Introduction
Team performance
Introduction
Athlete performance
Introduction

Mobility performance
Introduction

Aim

Determine differences between field positions in wheelchair-athlete activities for offense and defense situations during wheelchair basketball matches.

Hypothesis

Each game state has influence on the specific roles and therefore specific wheelchair-athlete requirements.
Method

Participants

- National (n=27) and International teams (n=29)
- Australia, The Netherlands, Italy, Great Britain, Canada

Video observation
Method

Observation scheme

Athlete

Wheelchair

Environment

Driving forward

Driving backward

Block

No movement

Rotation

no hands on the rim

2 hands on the rim

1 hand on the rim

Quarter

Possession

Game state

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Results

![Bar chart showing results for different driving maneuvers and positions.]

- **Driving forward**: Largest difference, with significant variance indicated by asterisks.
- **Driving backward**: Minimal difference compared to others.
- **Rotation**: Moderate difference with noticeable variance.
- **Standing still**: Small difference.
- **Brake**: Lowest difference.

Legend:
- Blue: Guard
- Red: Forward
- Green: Center
# Results

<table>
<thead>
<tr>
<th>Field Position</th>
<th>Active play time (minutes)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guard</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>Forward</td>
<td>23</td>
<td>9</td>
</tr>
<tr>
<td>Centre</td>
<td>26</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Position</th>
<th>Offense % (SD)</th>
<th>Defense % (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guard</td>
<td>51(8)</td>
<td>43(6)</td>
</tr>
<tr>
<td>Forward*</td>
<td>48(10)</td>
<td>41(6)</td>
</tr>
<tr>
<td>Centre</td>
<td>44(6)</td>
<td>44(4)</td>
</tr>
<tr>
<td>Guard</td>
<td>2(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Forward</td>
<td>2(1)</td>
<td>2(2)</td>
</tr>
<tr>
<td>Centre</td>
<td>2(1)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Guard</td>
<td>27(9)</td>
<td>32(10)</td>
</tr>
<tr>
<td>Forward</td>
<td>28(8)</td>
<td>33(8)</td>
</tr>
<tr>
<td>Centre</td>
<td>26(7)</td>
<td>30(6)</td>
</tr>
<tr>
<td>Guard</td>
<td>15(6)</td>
<td>19(8)</td>
</tr>
<tr>
<td>Forward</td>
<td>17(7)</td>
<td>20(7)</td>
</tr>
<tr>
<td>Centre*</td>
<td>23(7)</td>
<td>20(6)</td>
</tr>
<tr>
<td>Guard</td>
<td>3(2)</td>
<td>3(2)</td>
</tr>
<tr>
<td>Forward</td>
<td>3(2)</td>
<td>3(2)</td>
</tr>
<tr>
<td>Centre</td>
<td>3(2)</td>
<td>3(1)</td>
</tr>
</tbody>
</table>

Interaction effect between field position and game state \( (p<0.05) \)

Main effect for game state \( (p<0.05) \)
Discussion

○ **Game state influences mobility performance**
  ○ Guards and forwards during offense
    ○ Driving forward ↑
    → *Benefit more from acceleration settings?*
  ○ Centres during defense
    ○ Standing still ↓
    → *Defensive basketball strategies*
    → *Stability more important for centres?*
  ○ All field positions during defense
    ○ *Rotation* ↑
    ○ *Differences between clockwise and counterclockwise*
    → *Wheelchair settings to improve rotation*
    → *Training advise*

*Question: Determine whether differences between field positions in wheelchair-athlete activities are different between offense and defense situations during wheelchair basketball matches.*
Further research

- Optimize wheelchair-athlete configurations for task-specific handling.
  - Compromise between configurations, disability, field position and playing standard.

  Field-based mobility test to test effects of wheelchair configurations on mobility performance.

Thanks for your attention
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