COMPARING SMASH PERFORMANCE AND TECHNIQUE BETWEEN ELITE MALE AND FEMALE BADMINTON PLAYERS

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SPORTS BIOMECHANICS

• mechanical understanding and explanation of movement in sport

• identify the factors that are important
  • performance
  • injuries
PHILOSOPHY

• some factors are critical for elite performance

• other factors are less important and will be governed by coaching, individual variation etc
BADMINTON SMASH - BUILD UP OF SPEED
BADMINTON SMASH - BUILD UP OF SPEED
EXAMPLE MALE BADMINTON SMASH
EXAMPLE FEMALE BADMINTON SMASH
PURPOSE

• how does smash performance and technique compare between elite male and female badminton players?

(majority of research to date has been on male players)
# DATA COLLECTION – PARTICIPANTS

<table>
<thead>
<tr>
<th>variable</th>
<th>male</th>
<th>female</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>age (y)</td>
<td>25.5 ± 4.6</td>
<td>23.0 ± 2.7</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.82 ± 0.06</td>
<td>1.71 ± 0.07</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>75.9 ± 4.0</td>
<td>63.6 ± 8.9</td>
</tr>
<tr>
<td>world ranking</td>
<td>59 ± 36</td>
<td>54 ± 24</td>
</tr>
</tbody>
</table>
DATA COLLECTION - BADMINTON ENGLAND DEC’ 2016
DATA COLLECTION - WORLD CHAMPIONSHIPS – GLASGOW
RAW DATA
SKELETON
# RESULTS

<table>
<thead>
<tr>
<th>parameter</th>
<th>male</th>
<th>female</th>
</tr>
</thead>
<tbody>
<tr>
<td>shuttlecock speed (m/s)</td>
<td>98.7 ± 3.6</td>
<td>78.5 ± 8.2</td>
</tr>
<tr>
<td>racket head speed (m/s)</td>
<td>63.3 ± 2.9</td>
<td>51.0 ± 4.7</td>
</tr>
<tr>
<td>swing duration (ms)</td>
<td>183 ± 15</td>
<td>211 ± 33</td>
</tr>
<tr>
<td>shuttle vertical angle (°)</td>
<td>13.3 ± 2.2</td>
<td>7.3 ± 2.6</td>
</tr>
<tr>
<td>contact height (m)</td>
<td>2.90 ± 0.13</td>
<td>2.46 ± 0.15</td>
</tr>
<tr>
<td>jump height (cm)</td>
<td>53.6 ± 9.4</td>
<td>14.5 ± 11.0</td>
</tr>
</tbody>
</table>
SHUTTLE OUTCOME COMPARISON

0 - 0.41 s
(male shuttle has landed)

based on average velocities, vertical angle and height of contact
SHUTTLE OUTCOME COMPARISON

extra 0.08 s to reach equivalent position (to the right) of males (+20%)
extra 0.2 s to land compared to males (+49%)
VISUAL TECHNIQUE COMPARISON

male

female
VISUAL TECHNIQUE COMPARISON

male

female
male players had **more counter-rotated trunks** (x-factor) during the backswing phase
• male players have **more flexed trunk positions** during the backswing phase
• male players had more laterally flexed trunk positions (to the left if right-handed) during the backswing phase
• male players held their arm further behind the body (shoulder plane of elevation) during the backswing phase.
• male players used a smaller elbow flexion/extension range of motion
SUMMARY

• 25% quicker smash, ≈40 cm higher jump height, steeper smash, shorter swing time

• clear differences mainly during backswing phase

• similar position at impact
ACKNOWLEDGEMENTS

• Badminton England
• Badminton World Federation
• All students and staff at Loughborough
THANK YOU
VISUAL TECHNIQUE COMPARISON

male

female