Influence of the sport practice on (psycho)motor development

Boris JIDOVSTEFF & Noémie PIRET

AIESEP 2019

Introduction: context of the research

- Master thesis of Noémie Piret => classic dancer
- Initial idea: to investigate the effects of classic dancing deliberate practice on children motor development
- In order to investigate the specific effects of the deliberate practice we decided to enlarge the research to other sports

2 Body control oriented sports

2 Object control oriented sports
Introduction : theoretical concept

• Mountain of motor development
  (Clark et Metcalfe, 2002)

Aim of the study

• Q1 : Does a regular sport specific practice results in a specific (psycho)motor development ?

• Q2 : Does a multisport experience results in a superior (psycho)motor development ?
Methods: population

53 prepubescent girls (≈10 years old)

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Age (months)</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>BMI (kg.m⁻²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>10</td>
<td>120±5</td>
<td>34,2±6,5</td>
<td>142±5</td>
<td>16,9±2,5</td>
</tr>
<tr>
<td>Danse</td>
<td>13</td>
<td>119±7</td>
<td>31,5±7,1</td>
<td>138±6</td>
<td>16,3±2,9</td>
</tr>
<tr>
<td>Judo</td>
<td>10</td>
<td>120±7</td>
<td>40,8±11,8*</td>
<td>141±9</td>
<td>20,3±4,3*</td>
</tr>
<tr>
<td>Tennis</td>
<td>10</td>
<td>120±6</td>
<td>31,8±6,5</td>
<td>137±6</td>
<td>16,7±2,1</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
<td>118±5</td>
<td>32,7±7,2</td>
<td>139±7</td>
<td>16,9±2,5</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>119±6</td>
<td>34,0±8,4</td>
<td>139±7</td>
<td>17,4±3,2</td>
</tr>
</tbody>
</table>

≥ 2 years of deliberate and regular practice

≥2H/week
≥30 weeks/year

Methods: (psycho)motor assessement

<table>
<thead>
<tr>
<th>Body control</th>
<th>Flexibility</th>
<th>Object control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flamenco Balance test</td>
<td>Lower limbs</td>
<td>Rhythm</td>
</tr>
<tr>
<td>(Eurofit, 1993)</td>
<td>(Eurofit, 1993)</td>
<td>(Stambach, 1951)</td>
</tr>
<tr>
<td>Forward/back roll</td>
<td>Shoulder</td>
<td>Spatial orientation</td>
</tr>
<tr>
<td>Body schema</td>
<td></td>
<td>Bouncing BB</td>
</tr>
<tr>
<td>(Bertranne, 2007)</td>
<td></td>
<td>(Herrmann et al 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Catching a ball</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Francotte, 1999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throwing test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Herrmann et al 2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bouncing on a racket + stick</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(original test)</td>
</tr>
</tbody>
</table>

Bouncing on a racket + stick
(original test)
Methods: parents questionnaire

Written questionnaire => actual and previous practice:
• Children actual and previous deliberate sport practice
• Children free time activities
• Children musical experience
• Screen time
• Sport experience/level of the parents

Methods: analysis of the results

• Normalised scores (NSc) on a scale ranging from 0 to 1 (Min-Max scaling)
• Q1 => Influence of sport on each individual score/grouped score
• Q2 => correlation analysis
• Q2 => group comparison according to categories of experienced sports

Categories of experienced sports

Object control oriented sport (OC)
- Basketball
- Tennis
- Hockey

Body control oriented sport (BC)
- Dance
- Judo
- Swimming
- athletics
- Gymnastics
- Horse riding

Actual main sport
- Basketball
- Dance
- Judo
- Tennis
- Control

BC + OC
Results

Q1: Does a regular sport specific practice result in a specific (psycho)motor development? **YES!**

<table>
<thead>
<tr>
<th></th>
<th>Body Control</th>
<th>Object Control</th>
<th>Mobility</th>
<th>Rhythm</th>
<th>SpOrient</th>
<th>Global Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basket-Ball</td>
<td>0.48</td>
<td>0.67</td>
<td>0.42</td>
<td>0.38</td>
<td>0.53</td>
<td>0.50</td>
</tr>
<tr>
<td>Control</td>
<td>0.34</td>
<td>0.30</td>
<td>0.45</td>
<td>0.52</td>
<td>0.48</td>
<td>0.42</td>
</tr>
<tr>
<td>Dance</td>
<td>0.61</td>
<td>0.43</td>
<td>0.64</td>
<td>0.53</td>
<td>0.43</td>
<td>0.53</td>
</tr>
<tr>
<td>Judo</td>
<td>0.48</td>
<td>0.36</td>
<td>0.42</td>
<td>0.38</td>
<td>0.40</td>
<td>0.41</td>
</tr>
<tr>
<td>Tennis</td>
<td>0.52</td>
<td>0.54</td>
<td>0.55</td>
<td>0.60</td>
<td>0.73</td>
<td>0.59</td>
</tr>
<tr>
<td><strong>ANOVA</strong></td>
<td><strong>P&lt;0.05</strong></td>
<td><strong>P&lt;0.001</strong></td>
<td><strong>P=0.06</strong></td>
<td><strong>NS</strong></td>
<td><strong>P=0.06</strong></td>
<td><strong>P&lt;0.05</strong></td>
</tr>
</tbody>
</table>

Min 0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 Max
### Questionnaire results according to main sport

<table>
<thead>
<tr>
<th></th>
<th>H sport/w</th>
<th># sports</th>
<th>H Screen /w</th>
<th>Parents sport Lev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basket-Ball</td>
<td>3,9</td>
<td>1,3</td>
<td>5,4</td>
<td>2,7</td>
</tr>
<tr>
<td>Control</td>
<td>0,0*</td>
<td>0,0*</td>
<td>8,3</td>
<td>2,0*</td>
</tr>
<tr>
<td>Dance</td>
<td>3,7</td>
<td>1,5</td>
<td>9,5</td>
<td>2,7</td>
</tr>
<tr>
<td>Judo</td>
<td>3,5</td>
<td>1,4</td>
<td>7,3</td>
<td>2,3</td>
</tr>
<tr>
<td>Tennis</td>
<td>4,4</td>
<td>2,4#</td>
<td>5,9</td>
<td>3,0#</td>
</tr>
</tbody>
</table>

ANOVA: P<0,001 for H sport/W and # sports, P<0,01 for Parents sport Lev

### Relationships between measured variables

<table>
<thead>
<tr>
<th></th>
<th>Body Control</th>
<th>Object Control</th>
<th>Mobility</th>
<th>Rhythm</th>
<th>Sp Orient</th>
<th>Global Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Control</td>
<td>1</td>
<td>0,28</td>
<td>0,42*</td>
<td>0,31</td>
<td>0,16</td>
<td>0,65*</td>
</tr>
<tr>
<td>Object Control</td>
<td>1</td>
<td>-0,03</td>
<td>0,24</td>
<td>0,48*</td>
<td>0,62*</td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>1</td>
<td>0,05</td>
<td>-0,08</td>
<td>0,39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhythm</td>
<td></td>
<td>1</td>
<td>0,48*</td>
<td>0,72*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sp Orient</td>
<td></td>
<td></td>
<td>1</td>
<td>0,71*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Score</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* (p<0,01)

### Relationships between form variables and measured variables

<table>
<thead>
<tr>
<th></th>
<th>Body Control</th>
<th>Object Control</th>
<th>Mobility</th>
<th>Rhythm</th>
<th>Sp Orient</th>
<th>Global Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>H sport/W</td>
<td>0,33</td>
<td>0,41*</td>
<td>0,05</td>
<td>0,07</td>
<td>0,13</td>
<td>0,29</td>
</tr>
<tr>
<td># sports</td>
<td>0,32</td>
<td>0,31</td>
<td>0,10</td>
<td>0,14</td>
<td>0,12</td>
<td>0,30</td>
</tr>
<tr>
<td>Screen H/w</td>
<td>-0,09</td>
<td>-0,15</td>
<td>0,07</td>
<td>-0,15</td>
<td>-0,17</td>
<td>-0,17</td>
</tr>
<tr>
<td>Parents sport Lev</td>
<td>0,09</td>
<td>0,22</td>
<td>-0,06</td>
<td>0,09</td>
<td>0,23</td>
<td>0,19</td>
</tr>
</tbody>
</table>

* (p<0,01)
Q2: Does a multisport experience result in a superior (psycho)motor development?

Results

<table>
<thead>
<tr>
<th></th>
<th>Body Control OS</th>
<th>Object Control OS</th>
<th>Body Control + Object control OS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=33 Yes</td>
<td>N=20 No</td>
<td>N=22 Yes</td>
</tr>
</tbody>
</table>

**BC**

- Dance
- Judo
- Swimming
- Athletics
- Gymnastics
- Horse riding

**OC**

- Basketball
- Tennis
- Soccer
- Hockey

**BC + OC**

- Hockey
- Soccer
- Basketball
- Tennis
- Swimming
- Judo
- Dance

**P values**

- **Body Control OS**
  - H sport/W: p<0.01
  - # sports: p<0.01
  - Screen H/w: NS
  - Parents sport Lev: NS

- **Object Control OS**
  - H sport/W: p<0.01
  - # sports: p<0.01
  - Screen H/w: NS
  - Parents sport Lev: p<0.005

- **Body Control + Object control OS**
  - H sport/W: p<0.01
  - # sports: p<0.01
  - Screen H/w: NS
  - Parents sport Lev: p<0.005

**N=33**

- H sport/W: 3.9
- # sports: 1.7
- Screen H/w: 7.6
- Parents sport Lev: 2.6

**N=20**

- H sport/W: 3.9
- # sports: 1.7
- Screen H/w: 7.6
- Parents sport Lev: 2.6

**N=22**

- H sport/W: 4.3
- # sports: 1.9
- Screen H/w: 5.9
- Parents sport Lev: 2.8

**N=31**

- H sport/W: 4.3
- # sports: 1.9
- Screen H/w: 5.9
- Parents sport Lev: 2.8

**N=12**

- H sport/W: 4.9
- # sports: 2.25
- Screen H/w: 6.2
- Parents sport Lev: 2.9

**N=40**

- H sport/W: 2.6
- # sports: 1
- Screen H/w: 7.7
- Parents sport Lev: 2.4
Limits of the study

• Small size sample
• Original testing battery, not validated
• History of pratice based on parents’s declarations
• Results based on simple statistical analysis

Conclusion

• (Psycho)Motor development seems to be influenced by:
   • Sport deliberate practice
   • Volume of pratice
   • Diversity and complementary of the practice
• Combining OC and BC oriented sports leads to superior global score
• Results in accordance with the « early diversification » theory (Baker et al, 2003; Cote et al, 2014).
Thanks for your attention

b.jidovtseff@uliege.be