Prevention of pediatric ('youth') sports injuries

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YOUTH (6-12 YEARS)
- Evolvement from participants in joyful play to participants in competitive sports
- Everything that is learned in this phase will reflect in sports participation at later ages
- Copying of behaviour of professional role models
- "Pupils" are not miniature Olympic athletes, and happy and safe play should be emphasised

ADOLESCENCE (12-20 YEARS)
- Entry in competitive sports
- Being held responsible for their own behaviour
- Children may not see the dangers of certain behaviors on the field
- Proper examples and education in earlier childhood is needed

YOUTH OLYMPICS
- English language papers that expressed data on injury risk (injury incidence)
- Age range included at least 14-18 years
- Athletes had to compete at the national or international level
YOUTH OLYMPICS
- 13 studies identified
  - 10 prospective
  - 8 football, 1 hockey, 1 gymnastics
- 4 studies included ages in the range 8 to 12
- Little knowledge is available on injury epidemiology among young elite athletes

SCARCE LITERATURE
- Focus on specific injury
  - not necessarily sports related
- Focus on specific sport
- General overview
  - comparison of different sports
  - wide array of injuries

CONCUSSION
- Children between 8 and 13 years old accounted for 40% of all pediatric sports-related concussions in US
  - Bakhos et al. 2010
- Developmental fragility of the young athlete’s brain
- More conservative management in younger patients, including academic planning for appropriate cognitive rest
  - Meekhan et al. 2011

OVERSCHEDULING
- Overuse injuries as a result of overscheduling in 6 and 18 years old
- Fatigue-related injuries were more common than acute injuries
  - Luke et al. 2011

KNEE INJURIES
- Knee injuries are a significant problem for athletes in general
- 0.5% to 3% of all ACL injuries are in the skeletally immature
- Sex is of particular importance with regard to ACL injuries
  - Schub et al. 2011

SELECTION OF KEY STUDIES
PROSPECTIVE COHORT STUDY

- Follow-up of one school year (Sept 2007 - May 2008)
- 20 primary schools
- 1,091 children; 10-12 yrs old
- Registration of exposure & injuries during...
  - Physical Education
  - Leisure time PA
  - Sports

INJURY DEFINITION

- An injury was recorded if it occurred during either PE class, leisure time PA, or sports, and caused the child to:
  1. Stop his/her current activity; and/or
  2. Not (fully) participate in the next planned physical activity (applicable as well to regular leisure time PA); and/or
  3. Be unable to go to school the next day; and/or
  4. Seek medical attention (ranging from onsite care by e.g. first aid personnel, to personal care by e.g. physiotherapist or sports physician

COHORT DEMOGRAPHICS

<table>
<thead>
<tr>
<th></th>
<th>Total Population</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>996</td>
<td>493</td>
<td>503</td>
</tr>
<tr>
<td>Age</td>
<td>10.7 (0.8)</td>
<td>10.7 (0.8)</td>
<td>10.6 (0.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>PA level (hours per week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE classes</td>
<td>1.5</td>
</tr>
<tr>
<td>Leisure time PA</td>
<td>4.0 (2.0)</td>
</tr>
<tr>
<td>Sports</td>
<td>3.0 (1.7)</td>
</tr>
</tbody>
</table>

INCIDENT INJURIES (N=104)

- PE class: 40
- Leisure time PA: 22
- Sports: 48

INCIDENT INJURIES (N=104)

- Boys: 23, 17, 9
- Girls: 17, 13, 31

INJURY INCIDENCE DENSITY

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>PE classes</th>
<th>Leisure time PA</th>
<th>Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>0.48</td>
<td>0.50</td>
<td>0.39</td>
<td>0.66</td>
</tr>
<tr>
<td>Girls</td>
<td>0.61</td>
<td>0.50</td>
<td>0.39</td>
<td>0.66</td>
</tr>
</tbody>
</table>
**MECHANISMS OF INJURY**

- 8% - Striking, Bumping
- 6% - Collision with material
- 12% - Collision with other person
- 23% - Falling from a bike or other vehicle
- 8% - Falling from a height
- 14% - Injury in motion
- 25% - Unknown

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**INJURY RISK FACTORS**

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Hazard Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>0.72 (0.43-1.21)</td>
</tr>
<tr>
<td>Q2</td>
<td>0.53 (0.39-0.73)</td>
</tr>
<tr>
<td>Q3</td>
<td>0.39 (0.24-0.64)</td>
</tr>
<tr>
<td>Q4</td>
<td>0.35 (0.21-0.59)</td>
</tr>
</tbody>
</table>

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**MOTOR FITNESS 1980 VERSUS 2006**

- Boys
- Girls

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Injury risk is found to be highest for participation in organised sports where most injuries are caused through non-contact leading to ligament injuries to the lower extremities.

In this specific age group girls require special attention as they seem to be at higher injury risk than boys.