Oct 17th, 3:45 PM - 4:15 PM

The relative age effect in youth and elite sport: Did 20 years of research make any difference?

Werner Helsen
Katholieke Universiteit Leuven, werner.helsen@kuleuven.be

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RELATIVE AGE EFFECTS: AN INTERNATIONAL CONFERENCE

The relative age effect in youth and elite sport: what can we learn after 20 years of research?

Prof. Werner Helsen
October 17th, York University, Canada

1. Introduction
2. Questions for the audience?
3. Answers to the audience!
4. Relative Age Effect (RAE): what is it anyway?
5. What about the Late Maturity Effect
6. Underlying mechanisms
7. Solutions

A gymnast from North-Korea with 3 different birth dates

A player with 4 different birth dates
What about the Relative Age Effect?

Special issue December 2016

Introduction

Questions for the audience?

Answers to the audience!

Relative Age Effect (RAE): what is it anyway?

What about the Late Maturity Effect

Underlying mechanisms

Solutions

1. Is football skill determined by the month of birth?

Please use your cards to ‘vote’: YELLOW = YES & Red = No

10/30/18
2. Is the month of birth decisive to play for an U21 team?

3. Is the month of birth decisive to make a successful transition from youth to professional football?

4. Is there any link between month of birth and the chances to play for the national teams?

5. Is there any association between month of birth and salaries in professional football?

Journal of Sports Economics
http://jse.sagepub.com

Selection Bias and Peer Effects in Team Sports: The Effect of Age Grouping on Earnings of German Soccer Players
John Ashworth and Bruno Heyndels
Journal of Sports Economics 2007; 8, 355
DOI: 10.1177/1527002506287695

The online version of this article can be found at:
http://jse.sagepub.com/cgi/content/abstract/8/4/355
6. Are early maturers more skilled than late maturers?

7. Does the federation/club want to loose late maturers for football?

8. Is the identification of ‘talent’ affected by the maturity status of a player?

9. Is the impact of the RAE nowadays greater than 20 years ago?

The relative age effect in European professional soccer: Did ten years of research make any difference?

WERNER F. HELESEN1, JOSEPH BAKER2, STIJN MICHELS1, JOERG SCHORER3, JAN VAN WINCKEL1 & A. MARK WILLIAMS4

1Department of Biomedical Kinesiology, Katholieke Universiteit Leuven, Belgium, 2Kinesiology and Health Science, York University, Toronto, Ontario, Canada, 3Institute for Sport Science, Westfälische Wilhelms-University Münster, Münster, Germany, and 4Centre for Sport Medicine and Human Performance, School of Sport and Education, Brunel University, Uxbridge, Middlesex UB8 1PH, UK

(Accepted 14 August 2012)
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### Definition of the Relative Age Effect (RAE)*

According to Barnsley et al. (1992), relative age refers to the difference in ages between children in the same age category resulting from their different birth dates throughout the “sport” year. In soccer, children with August birth dates possess almost a one-year relative age advantage over children born in July of the following year. Conversely, child:

<table>
<thead>
<tr>
<th>Relative age:</th>
<th>physical</th>
<th>cognitive</th>
<th>coordination</th>
<th>technical skills</th>
<th>experience</th>
<th>maturation</th>
</tr>
</thead>
</table>

Relative Age Effect (RAE)

`Relative age` or `Relative age effect` don’t exist as mesh term! Web search revealed 143 publications.

### Table: Age (in years) vs. Age (in months) vs. Relative age difference (in %)

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Age (in months)</th>
<th>Relative age difference (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>60</td>
<td>20.0</td>
</tr>
<tr>
<td>6</td>
<td>72</td>
<td>16.7</td>
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<tr>
<td>7</td>
<td>84</td>
<td>14.3</td>
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<tr>
<td>8</td>
<td>96</td>
<td>12.5</td>
</tr>
<tr>
<td>9</td>
<td>108</td>
<td>11.1</td>
</tr>
<tr>
<td>10</td>
<td>120</td>
<td>10.0</td>
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<tr>
<td>11</td>
<td>132</td>
<td>9.1</td>
</tr>
<tr>
<td>12</td>
<td>144</td>
<td>8.3</td>
</tr>
<tr>
<td>13</td>
<td>156</td>
<td>7.7</td>
</tr>
<tr>
<td>14</td>
<td>168</td>
<td>7.1</td>
</tr>
<tr>
<td>15</td>
<td>180</td>
<td>6.7</td>
</tr>
<tr>
<td>16</td>
<td>192</td>
<td>6.3</td>
</tr>
</tbody>
</table>

*SCAPPS, London Ontario, October 16-18th, 2014

Quite consistent across many different sports:

- Thomson et al. 1991
- Abernethy et al. 2005
- Barnsley et al. 1992, Carling 2009, Gil 2014
- Grondin et al. 1994
- Edwards 1994
- Daniel & Perella 2007
- Stanaway & Hines 1995
- Daniel & Janssen 1997

1. Is football skill determined by the month of birth? **NO!**

2. Is the month of birth decisive to play for any U21 team? **YES!**

<table>
<thead>
<tr>
<th>Country</th>
<th>Games</th>
<th>Wins</th>
<th>Draws</th>
<th>Losses</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Denmark</td>
<td>11</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>England</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Germany</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>Italy</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Macedonia</td>
<td>14</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>23</td>
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<tr>
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<td>6</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>23</td>
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<tr>
<td>Portugal</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>23</td>
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<tr>
<td>Serbia</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Slovakia</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>23</td>
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<td>Spain</td>
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<td>4</td>
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<tr>
<td></td>
<td>99</td>
<td>76</td>
<td>55</td>
<td>46</td>
<td>276</td>
</tr>
<tr>
<td></td>
<td>35,9</td>
<td>27,5</td>
<td>19,9</td>
<td>16,7</td>
<td></td>
</tr>
</tbody>
</table>
3. Is the month of birth decisive to make a successful transition from youth to professional football?

The Influence of Relative Age on Success and Dropout in Male Soccer Players

WEINER F. HEISEN, JANET L. STARKE, JAN VAN WINKEL, and JAN MAC,

ABSTRACT
The consistent asymmetry in the birth-date distribution of senior professional soccer players has led us to investigate whether similar asymmetries emerge throughout youth categories in soccer. Birth dates were considered for professional players, national youth teams, youth players transferred to top teams, and regular youth league players. Rohmgrov

3. Is the month of birth decisive to make a successful transition from youth to professional football?


The relative age effect in youth soccer across Europe

WEINER F. HEISEN, JAN VAN WINKEL, and A. MARK WILLIAMS

Abstract
The present investigation of the birth-date distribution of youth soccer players across nine European countries (age-cohorts 1995–2000) showed that the distribution of players was strongly skewed towards the beginning of the soccer season. Non-parametric tests were used to compare the distribution of players born in each month and the relative age effect was calculated. The results indicated that the distribution of players was significantly different from a uniform distribution, with players born in January being overrepresented and players born in August being underrepresented. The relative age effect was found to be significant in all nine countries and the relative age effect was higher in the older age groups (15–16 and 16–17 years). The results suggest that the relative age effect is not solely due to the physical advantages of being born early in the season, but also due to other factors such as selection bias and coaching strategies. The implications of these findings for youth development and player recruitment are discussed.

3. Is the month of birth decisive to make a successful transition from youth to professional football?

Table 3: Birth-date distributions among youth players, all of whom were transferred in 2008 to a professional youth team

<table>
<thead>
<tr>
<th>Month of Birth</th>
<th>Age Group</th>
<th>Number of Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-Mar</td>
<td>9-10 years</td>
<td>147</td>
</tr>
<tr>
<td>Apr-Jun</td>
<td>9-10 years</td>
<td>88</td>
</tr>
<tr>
<td>Jul-Sep</td>
<td>9-10 years</td>
<td>81</td>
</tr>
<tr>
<td>Oct-Dec</td>
<td>9-10 years</td>
<td>60</td>
</tr>
</tbody>
</table>

3. Is the month of birth decisive to make a successful transition from youth to professional football?

YES!
4. Is there any link between month of birth and the chances to play for the national teams? **YES!**

Dropout? **YES!**

5. Is there any association between month of birth and salaries in professional football? **YES, but!**

Players born late at the end of the selection year (cut-off date August 1st) earn systematically more!

6. Are early matures more skilled than late matures? **NO!**

Early matures:
- Physical advantage
  - strength, power, speed
- More important for ‘winning’
  - infiltration, shooting, heading

Late matures:
- Develop more creativity & decision making
  - positional, tactical
- Technically more skilled (more harmonic)
- Need to be strong mentally
- Need to avoid physical challenges

7. Does the federation/club want to loose late matures for football? **NO!**
7. Does the federation/club want to loose the late maturers for football?

| Inhabitants | Licensed players | 80.600.000 | 6.800.000 | 8.5% |
| Inhabitants | Licensed players | 16.800.000 | 1.200.000 | 7.1% |
| Inhabitants | Licensed players | 11.000.000 | 420.000 | 3.8% |

7. Does the federation/club want to loose the late maturers for football?

U16 Futures Belgium (1993) (late mature players)

Yannick Ferreira Carrasco (A-Team Belgium, Atletico Madrid)

7. Does the club want to loose the late maturers for football?

In 2 years: from 8 mill € ➔ 40 mill €

8. Is the identification of ‘talent’ affected by the maturity status of a player?

Importance of Peak Height Velocity Timing in Terms of Injuries in Talented Soccer Players

Authors: A. van der Sluis, M. T. Elferink-Gouws, M. S. Bröck, C. Uecker

Affiliations:
1 Center for Human Movement Sciences, University of Groningen, Groningen, the Netherlands
2 School of Sport Studies, Institute of Applied Sciences Coventry, the Netherlands
3 NHL University of Applied Sciences, Nijmegen, the Netherlands
4 Netherlands Institute for Sports, Health and Education, Ede, the Netherlands
Talent Identification in Football

- Mostly based on HIGH PERFORMERS
- Instead of HIGH POTENTIALS
- For immediate competitive needs
- Advantage of ‘relative’ OLDER player
  - More powerful, physically stronger
  - He can make a difference physically!
- More hours of practice
- Advantage of ‘more’ MATURE player
  - More powerful, physically stronger
  - He can make a difference physically!

Youth coaches want to WIN the GAME, but the club loses TALENT!

9. Is the impact of the RAE nowadays bigger than 20 years ago?

European professional teams 2000 versus 2010

<table>
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<td>Total</td>
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</tr>
</tbody>
</table>

High performer versus high potential

9. Is the impact of the RAE nowadays bigger than 20 years ago?

YES!

New cut-off date!
The new ‘cut-off date’ of January even increased the RAE!

**Effect of a Change in Selection Year on Success in Male Soccer Players**

**ABSTRACT** Since 1997 and following the guidelines of the International Football Association, the Belgian Soccer Federation has used January 1st as the start of the selection year. Previously, August 1st was the start. This shift prompted an investigation of changes in birth-date distributions throughout youth categories for 1996-1997 compared to the 1995-1996 competition year. Birth-dates were recorded for qualified youth league players, revealing a continuous decline in old-season born players and an increase in new-season born players. The authors conducted diagnostic analyses to examine whether birth-date distributions were similar between observed and expected birth-date distributions. Significant differences were found between birth and selection year, with number of participants born before and after the August 1st January shift. Specific suggestions are made for the prevention of the over-representation of older children in youth teams. These are calculated as “barcodes” and be exposed to higher levels of coaching. In contrast, younger children born in the new selection year (August to December) were assessed. Specific suggestions are made to reduce the relative age effect. *Ann J Hum Biol* 12(7):729-736, 2001. 

---

9. Is the impact of the RAE nowadays bigger than 20 years ago? **YES!**

**Italian elite youth players championship 2016-17**

**Effect size**

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>absolute</td>
<td>1414</td>
<td>1062</td>
<td>791</td>
<td>490</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>relative</td>
<td>37.6</td>
<td>28.3</td>
<td>21.1</td>
<td>13.6</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**UEFA F4F workshops 2017-18: The RAE across associations (MEN = 3757 players)** **YES! Similar for Women!**

**UEFA in the World Cup (MEN = 736 players)** **YES!**

**The RAE in the World Cup (MEN = 736 players)**
1. Introduction
2. Questions for the audience?
3. Answers to the audience!
4. Relative Age Effect (RAE): what is it anyway?
5. What about the Late Maturity Effect
6. Underlying mechanisms
7. Solutions

---

**Biological (or skeletal) maturity**

- **Early mature players**: biologically speaking far more mature (difference up to 2 years with average mature players)
- **Average mature players**: biological and calendar age are the same
- **Late mature players**: biologically speaking less mature (difference up to 2 years with average mature players)
- **How big is the impact of the Late Maturity Effect?**

---

**Biological maturity**

Unequal battle between early and late mature/born players

- If 31/12
  - + very late mature (-2y)
- If 01/01
  - + very early mature (+2y)
Mirwald et al. (2002) use reference data from the population. But youth players from 8 to 15 years are heavier than non-players. Therefore, the method of Till et al. (2014) is more representative and football specific as it allows to use the data of the sample of youth players.

Using a dynamic Excel sheet with pivot tables and reference values, we can analyze the data:

<table>
<thead>
<tr>
<th>Date of birth</th>
<th>Date</th>
<th>Age</th>
<th>Height</th>
<th>Height (bench)</th>
<th>Height seated</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Youth teams & U14 detection days (N=307)

- Introduction
- Questions for the audience?
- Answers to the audience!
- Relative Age Effect (RAE): what is it anyway?
- What about the Late Maturity Effect
- Underlying mechanisms
- Solutions
Solutions
1. Awareness to provide equal chances to all children
2. Talent detection & selection process (what are the ‘key’ attributes?)
3. Organisation of youth sport by federation (and clubs)
   - Age range (average age in the middle of the 2-year age band)
   - Quota system (wild cards for late born/maturers in the elite schools)
   - Show the month of birth
   - Organisation per 6 months rather than 12 months
   - Training by biological age, rather than chronological age
   - Classification on biological age (Future teams of only late maturers)
   - Rotating cut-off dates
4. Technical changes to decrease physical impact (field hockey, futsal, table tennis, volleyball) & competitive character (American football) in younger age categories
5. Change in mentality: ‘Learning isn’t everything, it’s the only thing’
6. TEAM work makes the dream WORK

Show the month of birth!

Age-ordered shirt numbering reduces the selection bias associated with the relative age effect
David L. Mann (1) and Maaike M. A. van der Weele
MIMI Research Institute Amsterdam, Department of Human Movement Sciences, Faculty of Behavioural and Movement Sciences, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

Abstract
When placing elite age groups for junior sporting competition, the relative differences in age between the participants is not uncommon. Recent research has also shown that a selection bias exists, and that this bias is more prevalent when the selection bias associated with relative age is uncorrected. Therefore, this study aimed to determine whether the selection bias associated with relative age could be reduced. To this end, an elite football club was evaluated, and 15 players were included in the study, who were divided into four groups based on their age of birth. The selection bias was associated with the Relative Age Effect (RAE) and the results showed that the RAE was reduced in those who were included in the study. The results of this study have important implications for sport organisations, which may wish to reduce the impact of selection bias associated with relative age. Future teams!

- Since 2008
  - U16 F tournaments (Denmark, Sweden, Czech Republic, Belgium)
    - Minimum of 50% playing time for each player
    - Great experience and challenge for the players against other “future” players
  - International level
  - Maximum development chances in powerful learning environment

Compose 2 teams per semester rather than 2 teams per birth year!

AS it IS
U10 age group (2 teams per birth year)

January 1st to December 31st

TO BE
U10 First half
U10 Second half

U10 age group (2 teams: for each semester)
"As many as possible, for as long as possible, in the best environment possible"

1. How do you create the best environment possible for both Player A and Player B?

2. How do you motivate Player A to continue for as long as possible?

**Rotating cut-off dates!**

Preview of the 21-month grouping system season X

<table>
<thead>
<tr>
<th>Groupment</th>
<th>Rotation</th>
<th>U10</th>
<th>U12</th>
<th>U14</th>
<th>U16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantaged</td>
<td>June</td>
<td>Sep (12)</td>
<td>Dec (14)</td>
<td>Feb (15)</td>
<td>Mar (15)</td>
</tr>
<tr>
<td>2.</td>
<td>Jul (15)</td>
<td>Sep (13)</td>
<td>Jan (14)</td>
<td>Apr (15)</td>
<td>May (15)</td>
</tr>
<tr>
<td></td>
<td>Nov (15)</td>
<td>Feb (15)</td>
<td>Mar (15)</td>
<td>Apr (15)</td>
<td>May (15)</td>
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<tr>
<td>4.</td>
<td>Dec (15)</td>
<td>Jan (15)</td>
<td>Sep (15)</td>
<td>Nov (15)</td>
<td>Dec (15)</td>
</tr>
<tr>
<td></td>
<td>May (15)</td>
<td>Jun (15)</td>
<td>Sep (15)</td>
<td>Dec (15)</td>
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<td>5.</td>
<td>Apr (16)</td>
<td>Jan (16)</td>
<td>Sep (16)</td>
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<td>Dec (16)</td>
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<td></td>
<td>May (16)</td>
<td>Jun (16)</td>
<td>Sep (16)</td>
<td>Nov (16)</td>
<td>Dec (16)</td>
</tr>
</tbody>
</table>

**TEAM work makes the dream WORK**

- Club
- Federation
- Player

**Take home message!**

The RAE and the LME still have a clear impact on:

- Talent detection & selection
- Transition from youth to senior teams
- National teams
- Drop-out
- Injuries
- Salaries
- Post-career opportunities

RAEs represent a persistent, unfair and unacceptable inequality in elite youth and professional football we all need to be aware of and take our responsibility for!

*Schorer et al. (2013) Plos One*
Thank You

Thank you for the attention!

Questions?

Thank you for the attention!

Questions?

werner.helsen@kuleuven.be
werner.helsen@uefa.ch
twitter: @WeHelsen

Thank You

Percentage 'Belgische speelminten' in eerste helft reguliere competitie

Aantal Beigen dat in actie kwam in eerste helft reguliere competitie