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Evidence of Relative Age Effects in Swedish Women’s Ice Hockey
Andreas Stenling and Stefan Holmström

Abstract: Relative age effects (RAEs) refer to consequences of differences in chronological age among individuals within age-grouped cohorts. RAEs advantage relatively older players and have consistently been found in male ice hockey, but research in women’s ice hockey is scarce. This study examined RAEs in Swedish women’s elite (N = 688) and junior elite (N = 399) ice hockey and a moderator of RAEs, playing position. RAEs were also examined in the entire population of youth female ice hockey players (N = 2811). Chi-square analyses showed significant RAEs (p < .05) in all three samples. The elite and junior elite sample showed RAEs among defensemen and forwards, but not among goalies. In the youth sample, RAEs were evident in all age groups. RAEs were present in all age groups, from the youngest players (5–6 years) to the elite players. Despite a weak depth of competition, RAEs were displayed in Swedish women’s ice hockey, indicating that other mechanisms seem to influence RAEs.

Keywords: relative age effect, elite, youth player position, female sports, talent development

Relative Age Effects
Annual age grouping is applied in practically all organized sports to create equal opportunities for athletes (Musch & Grondin, 2001). It reflects a belief that individuals born during the same year approximately are on a similar developmental level and develop at a similar pace (Baker, Schorer, & Cobléy, 2010). For example, Swedish ice hockey players are grouped according to the calendar year, starting on January 1st and ending on December 31st. However, a problem with this kind of age grouping is that chronological age may differ up to a year between an athlete born early in the year and an athlete born late in the year. Besides the chronological age difference, the level of physical and cognitive maturity may differ more than a year, although belonging to the same age group (Musch & Grondin, 2001). Consequences of these differences are known as relative age effects (RAEs) and are often displayed in sports, particularly in popular team sports such as football or ice hockey (Cobléy, Baker, Wattie, & McKenna, 2009). A pattern often found in sports is a skewed distribution of athletes’ month of birth, with an overrepresentation of relatively older athletes born early in the year and an underrepresentation of relatively younger athletes born late in the year. On the one hand, this may be seen as a natural element of sports or, as argued by many researchers, a discriminating mechanism imbedded in our sport developmental systems that promotes inequalities (e.g., Cobléy et al., 2009; Musch & Grondin, 2001).

Several potential causes of RAEs in sports have been put forward in the literature. One of the most common explanations refers to differences in physical maturity (Barnsley & Thompson, 1988). Relatively older athletes may be advantaged due to greater maturity, especially during childhood and adolescence. Support for the notion of an advantage in physical maturity have been found among male youth academy football players (Carling, le Gall, Reilly, & Williams, 2009), female and male youth basketball players (Delorme &
Raspaud, 2009), male youth ice hockey players (Sherar, Baxter-Jones, Faulkner, & Russel, 2007), and male youth rugby players (Till et al., 2010). Although these studies found differences between relatively older and relatively younger athletes on some anthropometric and physiological characteristics (e.g., height, weight, physical maturity), no differences were displayed on several other physiological tests (e.g., vertical jumps, sprints, VO\textsubscript{2max}), indicating that RAEs are not always linked to physical capacity. It is also unclear how greater physical maturity early affects athletes' long-term development (Baker et al., 2010).

There is also evidence suggesting that differences in physical maturity influence the likelihood of being selected to teams on higher levels during adolescence (Sherar, Bruner, Munroe-Chandler, & Baxter-Jones, 2007; Till et al., 2010). Relatively older athletes, who are taller, heavier and faster, compared to their relatively younger peers, receive more attention from coaches (Baker et al., 2010) and receive better resources, more opportunities to practice at an early age, increasing the gap between those selected, and those not selected (Cobley et al., 2009; Helsen et al., 1998). It appears that maturation and selection effects early in athletes' careers influence their developmental pathways and possibilities to acquire the amount and quality of practice necessary to enhance skill and performance. This discriminating process in young ages occurs in sports although very little evidence exists for the predictive ability of early sport success on sport success in adulthood (Côté, Baker, & Abernethy, 2007; Vaeyens, Lenoir, Williams, & Philippaerts, 2008).

In sports, RAEs were first detected among Canadian ice hockey players (Grondin, Deshaies, & Nault, 1984). Since then RAEs have been found in a variety of sports, ages and levels such as ice hockey (Barnsley & Thompson, 1988), baseball (Thompson, Barnsley, & Stebelsky, 1991), football (Dudink, 1994; Helsen, Starkes, & Van Winckel, 1998), basketball (Delorme & Raspaud, 2009), handball (Schorer, Coblely, Büsch, Bräutigam, & Baker, 2009), and rugby (Till et al., 2010). In a recent meta-analysis, it was concluded that relatively older athletes (born in the first three months after the cut-off date) were 10% more likely to be represented in these sport contexts compared to relatively younger athletes (born in the last three months of the annual age group; Cobley et al., 2009).

The majority of research on RAEs has been conducted on male athletes and several researchers (e.g., Cobley et al., 2009; Musch & Grondin, 2001) have highlighted the need for more research among female athletes. According to Cobley et al. (2009), only 2% of the RAE research has been done with female athletes and the findings so far have revealed equivocal patterns. Data on female junior football players from Europe (Helsen, Van Winckel, & Williams, 2005) and USA (Vincent & Glamser, 2006) indicated no RAEs while more recent research found RAEs in French female youth football and basketball in all age categories from U8 to U17 players (Delorme, Boiché, & Raspaud, 2010a; Delorme & Raspaud, 2009). However, RAEs were not displayed at the elite level among French female football or basketball players (Delorme, Boiché, & Raspaud, 2009). Similar patterns have been found among German female handball players (Schorer et al., 2009) and Swiss women football players (Romann & Fuchlocher, 2011) where RAEs were present in the youth samples but not in the elite samples.

**RAEs in Ice Hockey**

RAEs are well documented in male ice hockey, both at youth and elite level (e.g., Barnsley & Thompson, 1988; Nolan & Howell, 2010). In Cobley et al.'s (2009) meta-analysis, it was concluded that ice hockey was the most studied sport context with 32.8% of the included studies focusing on ice hockey. Ice hockey was one of the first sport contexts where RAEs were found (Grondin et al., 1984) and have been established as a sport with high risks for RAEs among male players (Cobley et al., 2009). Interestingly, all studies on RAEs in ice hockey included in the meta-analysis were conducted in North American contexts. Although RAEs more recently have been examined among French male elite ice hockey (Delorme, Boiché, & Raspaud, 2009) and male World Junior ice hockey players from...
Relative Age Effects in Swedish Women’s Ice Hockey

Canada, USA, Sweden and Finland (Bruner, Macdonald, Pickett, & Côté, 2011), North American samples have dominated RAE researching ice hockey. Aside from this lack of sample diversity, research on RAES in women’s ice hockey is also surprisingly scarce (Cobley et al., 2009).

According to the International Ice hockey Federation (IIHF), the number of female players has grown substantially over the last two decades. In contrast to male ice hockey, women’s elite ice hockey is a relatively new phenomenon. The first World Championship was played in 1990, the first Olympic tournament in 1998, and the first U18 tournament was played in 2008 (IIHF, 2012). This development in combination with the consistent findings of RAES in male ice hockey raises the question whether the increased popularity and competition fosters the development of RAES, as suggested by Musch and Grondin (2001), also in women’s ice hockey.

Despite the development of women’s ice hockey, few studies have examined RAES in women’s ice hockey. Wattie et al. (2007) reported no RAES among women’s elite ice hockey players in Canada competing in the National Championship in 2004 and 2006, which was in contrast to the comparative male sample of NHL players. It was argued by the authors that these gender differences might be caused by differences in the level of competition, that body checks are not permitted in women’s hockey, and that the number of participants may not yet have reached a level that creates a similar competitive environment as in male ice hockey. In a more recent study, RAES were examined in a larger sample of Canadian women ice hockey players competing at elite level during 1998-2009 (Weir, Smith, Paterson, & Horton, 2010). RAES were displayed for players competing at national and international level with an overrepresentation of players born in the first and second quartile. However, the pattern differed slightly from the traditional RAES pattern, with the largest overrepresentation in the second quartile. Although the RAES pattern in this study did not follow the traditional RAES pattern found in male samples, a clear overrepresentation (60%) of players was shown in the first two quartiles, similar to previously reported findings in male ice hockey contexts (e.g., Barnsley, Thompson, & Barnsley, 1985). More recently, significant RAES were found in a large sample of youth female Canadian ice hockey players aged 4–14 (Hancock, Seal, Young, & Ste-Marie, 2011). Post-hoc tests indicated a significant overrepresentation of players in Q1 and Q2, and an underrepresentation of players in Q4. The trend of RAES was similar across each age cohort. In all of these studies in women’s ice hockey, RAES were examined in various samples of Canadian ice hockey players were depth of competition may foster RAES (Hancock et al., 2011; Musch & Grondin, 2001). However, to our knowledge, no research has been conducted in women’s ice hockey in countries lacking depth of competition.

Playing Position and RAES

Several moderating factors of RAES have been suggested in previous research (see Baker et al., 2010, for a review) and one potential moderator in ice hockey is player position. Early work on professional male ice hockey players observed that RAES were strongest among goalies, with two-thirds of the goalies born in the first quartile (Grondin & Trudeau, 1991). Also among female ice hockey players, differences in RAES have been found between player positions. Weir et al. (2010) found significant RAES for the skating positions (defensemen & forwards), but not for goalies, which is in contrast to previous findings (Grondin & Trudeau, 1991). Grondin and Trudeau argued that the strong RAES among goalies could be explained by higher physical demands than the other positions, partly due to the heavy equipment goalies wear. This argument is also applicable to the skating positions in terms of the anaerobic and aerobic demands of skating (Geithner, Lee, & Bracko, 2006), which may explain the results in the Weir et al. (2010) study. Positional differences in physical, fitness, and skating performance characteristics have been reported among women ice hockey players. Forwards and defensemen were more agile than goalies, and forwards were leaner and had a greater anaerobic and aerobic capacity than defensemen, followed by goalies (Geithner et al., 2006).
Differences in RAEs among player positions have also been examined in other sports, such as handball (Schorer et al., 2009), male professional rugby (Till et al., 2010) and Swiss women's football (Romann & Fuchslocher, 2011). For handball players, a significant overrepresentation of players born in the first two quartiles was shown for the backcourt players. Players in backcourt positions are advantaged by height and strength. Among the rugby players, an uneven distribution of birth quartiles was found for “Outside backs” and “Backrowers,” and although backrow positions are advantaged by size and strength, other positions with similar physical demands did not display RAEs. In Swiss women’s football, RAEs were stronger for defenders and goalkeepers compared to midfielders. Taken together, these findings indicate that player position is an important factor to take into consideration when examining RAEs.

**Purpose**

There is a scarcity of research examining RAEs in women’s ice hockey and the research so far has focused on Canadian samples. The purpose of this study was twofold: (1) to examine RAEs and differences in RAEs due to player position in women’s elite and junior elite ice hockey in Sweden, a country lacking the same depth of competition as Canada; and (2) examine RAEs in the entire population of youth female ice hockey players (5–20 years) in Sweden.

**Methods**

**Participants and Procedure**

Data on birth date and position of Swedish elite and junior elite women ice hockey players was collected from the Swedish Ice Hockey Associations (SIHA) homepage (www.swehockey.se). The elite sample consisted of ice hockey players participating in the national championship during the 2001/2002–2006/2007 seasons and the women’s elite league “Riksserien” during the 2007/2008–2010/2011 seasons. These players were collapsed into a single sample in the analyses, representing all players who had participated in the highest women’s elite league in Sweden during the last ten years ($N = 688$).

The junior elite sample consisted of all players who had participated in the women’s U-18 regional tournament between the 2001/2002–2010/2011 seasons. These players were also collapsed into a single sample in the analyses, representing all players who had participated in the women’s U-18 regional tournament in Sweden during the last ten years ($N = 399$). Players competing in consecutive seasons were included only once in the analyses. Data for each individual player was coded according to birth quartile (Jan–Mar = Q1; Apr–June = Q2; July–Sept = Q3; Oct–Dec = Q4), player position (goalies = 1; defensemen = 2; forwards = 3). We were unable to retrieve position data on three of the players in the elite sample. These players were excluded from the analyses on player position.

The youth sample ($N = 2811$) consisted of all licensed youth female ice hockey players in Sweden during the 2011/2012 season between 5–20 years of age. The categorization of youth players was based on the Swedish Sports Confederations (SSC) classification of players as youth players until the age of 20 years. The SSC views up to12-year-old players as child athletes, while 13–20 year old players are classified as adolescent athletes (Riksidrottsförbundet, 2012). Data on birthdates was obtained from the SIHAs database and data for each individual player was coded according to birth quartile. Only Swedish players were included in the analyses.

**Data Analyses**

Birth quartile distributions were examined with Chi-square goodness of fit tests and the significance level was set to .05 in all of the analyses. Cohen’s $w$ was used to calculate
effect sizes, .10 was viewed as a small effect size, .30 a medium effect size and .50 a large effect size (Cohen, 1988). Analyses were performed separately for the elite, junior elite, and youth sample. Additionally, in the elite and junior elite samples, analyses were performed separately for the whole sample and player position (goalies, defensemen, forwards). Comparisons were made on the assumption of equal distribution of births across the months of the year, as in previous research (e.g., Schorer et al., 2009; Weir et al., 2010). The expected frequency in each quartile was 25%. In cases of significant chi-square values, post-hoc tests (standardized residuals) were used to determine which of the quartiles deviated from the expected distribution. A standardized residual at ±1.96 was equivalent to \( p < .05 \).

**Results**

The data for the elite sample is presented in table 1. When looking at the whole sample, there was a significant overrepresentation of players born in Q1 and Q2 and a significant underrepresentation of players born in Q4. The effect size for this analysis was small (\( w = .25 \)).

When the elite sample was divided into player position, a significant overrepresentation of players born in Q2 and a significant underrepresentation of players born in Q4 was shown for defensemen. Among forwards, a significant overrepresentation of players born in Q1 and a significant underrepresentation of players born in Q4 was shown, while the goalies did not display RAEs (table 1). The effect size was medium for defensemen (\( w = .31 \)) and small for forwards (\( w = .25 \)).

**Table 1. Elite Players’ Birth Quartile Distribution for the Whole Sample and Different Positions**

<table>
<thead>
<tr>
<th>Sample</th>
<th>( N )</th>
<th>( \chi^2 )</th>
<th>( w )</th>
<th>( \text{Relative age frequencies} )</th>
<th>( \text{Standardized residuals} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q1</td>
<td>Q2</td>
</tr>
<tr>
<td>All players</td>
<td>688</td>
<td>43.87*** .28</td>
<td>215</td>
<td>204</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31.3%</td>
<td>29.7%</td>
<td>23.9%</td>
</tr>
<tr>
<td>Goalies</td>
<td>90</td>
<td>4.76</td>
<td>25</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>27.8%</td>
<td>32.2%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Defensemen</td>
<td>237</td>
<td>22.12*** .31</td>
<td>73</td>
<td>78</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30.8%</td>
<td>32.9%</td>
<td>22.8%</td>
</tr>
<tr>
<td>Forwards</td>
<td>358</td>
<td>21.64*** .25</td>
<td>117</td>
<td>97</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>32.7%</td>
<td>27.1%</td>
<td>24.6%</td>
</tr>
</tbody>
</table>

*Note. df = 3, *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \), \( w \) = Cohen’s \( w \)*

**Table 2. Junior Elite Players’ Birth Quartile Distribution for the Whole Sample and Different Positions**

<table>
<thead>
<tr>
<th>Sample</th>
<th>( N )</th>
<th>( \chi^2 )</th>
<th>( w )</th>
<th>( \text{Relative age frequencies} )</th>
<th>( \text{Standardized residuals} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q1</td>
<td>Q2</td>
</tr>
<tr>
<td>All players</td>
<td>399</td>
<td>21.90*** .23</td>
<td>127</td>
<td>112</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31.8%</td>
<td>28.1%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Goalies</td>
<td>45</td>
<td>5.58</td>
<td>18</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40.0%</td>
<td>17.8%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Defensemen</td>
<td>132</td>
<td>11.46** .29</td>
<td>41</td>
<td>44</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31.1%</td>
<td>33.3%</td>
<td>19.7%</td>
</tr>
<tr>
<td>Forwards</td>
<td>222</td>
<td>12.85** .24</td>
<td>68</td>
<td>60</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30.6%</td>
<td>27.0%</td>
<td>27.5%</td>
</tr>
</tbody>
</table>

*Note. df = 3, *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \), \( w \) = Cohen’s \( w \)*
Similar patterns were displayed in the junior elite sample; however, some differences were noticed, as seen in table 2. For the whole sample, there was a significant overrepresentation in Q1 and a significant underrepresentation in Q4. When divided into positions, a significant underrepresentation was shown only in Q4 for defensemen and forwards, while no RAE was displayed among goalies. All of the effect sizes were small ($w < .30$) and similar to the elite league sample, with the largest effect size shown for defensemen ($w = .29$).

As seen in table 3, RAEs were evident at all levels among Swedish female youth ice hockey players from 5 to 20 years of age. When combining all age groups, the standardized residuals displayed a significant overrepresentation in Q1, Q2 and a significant underrepresentation in Q4. Analysis in each age group separately shows RAEs in all age groups, with an overrepresentation of players born in the first half of the year. All effect sizes were small ($w < .30$), and the largest effect size was shown among the 5–6 year old players ($w = .23$).

**Discussion**

The purpose of this study was to examine RAEs among Swedish women’s elite, junior elite, and youth ice hockey players and to extend previous RAE research in sports, particularly the work in women’s ice hockey (Hancock et al., 2011; Wattie et al., 2007; Weir et al., 2010).

The findings from the current study indicate that RAEs exist in Swedish women’s elite, junior elite, and youth female ice hockey. This was in contrast to the findings of Wattie et al. (2007) and supported the more recent findings by Weir et al. (2010) and other findings from Canadian women’s ice hockey (Hancock et al., 2011). However, a difference from the Weir et al. (2010) study was that the RAE pattern shown in Swedish women’s elite ice hockey corresponded to a more traditional RAE pattern (except for defensemen) often found in male ice hockey, with a decrease of players born from Q1 to Q4. Most effect sizes were small and similar to previous findings in women’s ice hockey (Weir et al., 2010).

Similar to Hancock et al. (2011) findings among youth female ice hockey players in Canada, RAEs also exists among Swedish youth female players, despite a weak depth of competition. Similar to other studies where RAEs have been examined in female youth sports (Delorme et al., 2010a; Delorme & Raspaud, 2009), RAEs appeared in all youth age groups and were present from the age of five among Swedish youth female ice hockey.

**Table 3. Youth Female Players’ Birth Quartile Distribution for Different Age Categories in the Entire Population of Youth Female Players**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>$\chi^2$</th>
<th>w</th>
<th>Relative age frequencies</th>
<th>Standardized residuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q1</td>
<td>Q2</td>
</tr>
<tr>
<td>Total (5–20)</td>
<td>2811</td>
<td>58.94***</td>
<td>.14</td>
<td>789</td>
<td>779</td>
</tr>
<tr>
<td>5–6 years</td>
<td>458</td>
<td>23.35***</td>
<td>.23</td>
<td>152</td>
<td>112</td>
</tr>
<tr>
<td>7–9 years</td>
<td>693</td>
<td>8.88*</td>
<td>.11</td>
<td>168</td>
<td>196</td>
</tr>
<tr>
<td>10–12 years</td>
<td>495</td>
<td>12.34**</td>
<td>.16</td>
<td>147</td>
<td>137</td>
</tr>
<tr>
<td>13–15 years</td>
<td>460</td>
<td>12.97**</td>
<td>.17</td>
<td>116</td>
<td>144</td>
</tr>
<tr>
<td>16–20 years</td>
<td>705</td>
<td>21.34***</td>
<td>.17</td>
<td>206</td>
<td>190</td>
</tr>
</tbody>
</table>

*Note. df = 3, *p < .05, **p < .01, ***p < .001, w = Cohen’s w
This could indicate that rather than having selection mechanisms within the sports development systems, a self-selecting mechanism may be evident prior to the engagement in sports. Sports where physical attributes represent an advantage may be less attractive to relatively younger individuals (Delorme, Boiché, & Raspaud, 2010b).

One explanation for differences in RAES between males and females has been that the competition is less among females to reach a position on an elite team (Delorme et al., 2009). It has also been suggested that as the popularity of a sport increases and the number of players increases, so does the competition for the available spots on the teams, which is likely to foster RAES (Musch & Grondin, 2001). This hypothesis is applicable to research on women’s ice hockey in e.g., Canada or the USA where the number of players is very large, which increases the competition for the available spots. Although women’s ice hockey in Sweden has developed over the last ten years, with several successful seasons for the national team and an increasing number of licensed players, the depth of competition is weak (cf. licensed players, Canada = 85 827; Sweden = 3075, IIHF, 2012). However, despite a weak depth of competition, RAES were evident among Swedish women’s elite, junior elite, and youth ice hockey players, pointing towards other mechanism than depth of competition fostering RAES.

Another commonly occurring hypothesis regarding RAES is that relatively older players have physiological advantages compared to relatively younger players (Barnsley & Thompson, 1988). A recent study found that university women players in Canada born in Q1 were significantly faster on speed, acceleration, agility, MRSS tests, and push-ups compared to players born in Q4 (Geithner & Bracko, 2010). These results indicate that among women’s ice hockey players, physical maturity may be an important factor for the occurrence of RAES. However, this study contained a small sample ($N = 88$) and only included adult elite players. If physical maturity is related to RAES also in younger age groups in female ice hockey is an important issue for future research to examine. Previous findings from youth female basketball, where relatively older players were significantly taller than relatively younger players in all youth age-categories, except 17-year old players (Delorme & Raspaud, 2009), indicate that physical maturity may be an important factor for the emergence of RAES in female youth sports.

The data in this study also suggests that the strength of RAES in women’s elite and junior elite ice hockey may be position dependent. Similar to the Weir et al. (2010) study, defensemen and forwards showed an overrepresentation of players born in Q1 and Q2 and an underrepresentation in Q3 and Q4. When inspecting the standardized residuals, significant differences were found in Q2 and Q4 for defensemen and in Q1 and Q4 among forwards in the elite sample. In the junior elite sample, a significant underrepresentation was found only in Q4. No significant RAЕ was shown among the goalies, which is in contrast to previous findings in professional male ice hockey, where goalies showed a stronger RAЕ than the defensemen and forwards (Grondin & Trudeau, 1991). The authors attributed these findings to the high physical demands of being a goalie, particularly pertaining to the heavy equipment they wear. More recent research evidence suggests that it may be the other way around in women’s elite ice hockey, and that due to the amount and variety of work, forwards have the highest physical demands, followed by defensemen and goalies (Geithner et al., 2006).

In summary, the current findings add to the scarce research literature on RAES among female athletes and provide evidence that RAES exist on all levels in women’s elite, junior elite, and youth female ice hockey in Sweden. These findings suggests that although depth of competition is weak, we still find RAES on all levels in Swedish women’s ice hockey comparable to previous findings in Canadian women’s ice hockey (Hancock et al., 2011; Weir et al., 2010). As in previous research in youth female sports (Delorme & Raspaud, 2009), RAES were evident in the youngest age-group (5–6 year old players), which may indicate some kind of self-selecting mechanism by relatively younger individuals, making them less prone to engage in sports where physical attributes can advantage relatively older players.
Limitations and Directions for Future Research

First, although we were able to detect RAEs on all levels in Swedish women’s ice hockey, we can only speculate regarding the underlying mechanisms for the emergence of RAEs. Future research should try to uncover these underlying mechanisms, for example if physical maturity is related to RAEs also in youth female ice hockey and if it is possible to detect some kind of self-selecting mechanism by relatively younger athletes. This issue could be addressed using qualitative interviews with children and their parents regarding their thoughts on engagement in sports. Such research could potentially uncover if a self-selecting mechanism prior to children’s initial sport engagement exists. Related to this are the findings from Thompson, Barnsley, and Battle (2004), showing that relatively young age at entry into the formal school education system was related to reduced self-esteem at entry and several years later. If similar patterns regarding emotional development are related to entry into sports is an interesting question for future research to answer.

Second, the limited number goalies included in this study may have influenced the outcome and needs to be replicated with a larger sample of goalies.

Third, the data presented is cross-sectional in nature, which precludes any conclusions regarding causality. Future research would benefit from more longitudinal research and examine if RAEs varies over time within age cohorts. A further step would be to try to link these variations to events within and outside the sports development systems. To examine RAEs in a broader perspective, including factors within and outside of sports would likely provide a more complete understanding of factors influencing the emergence of RAEs.

The current findings and previous findings (e.g., Romann, & Fuchslocher, 2011; Schorer et al., 2009; Weir et al., 2010) have highlighted the existence of moderating factors of RAEs, such as position, and these and other potential moderators should be emphasized in future RAE research in women’s sports.

Finally, similar to male ice hockey, the developmental system for female ice hockey players in Sweden also seems to advantage players born early in the year and this needs to be taken into consideration if we want to create more opportunities for girls to engage in ice hockey in the future.

References


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