The Relative Age Effect in the Two Professional Men's Football Leagues in Spain

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Abstract
The age difference among individuals of the same group is known as Relative Age. Relative Age Effect refers to the consequences derived from it, such as delayed physical, cognitive and mental development of children born later in the year. The aim of this study was to observe the Relative Age Effect by analyzing players’ dates of birth throughout three seasons in the two professional football competitions in Spain based on the game positions and the teams’ classification at the end of the season. The sample was made up of players (n=4097) from both professional competitions (LaLiga Santander=1864), and LaLiga Smartbank=2233). The data were collected from two public-access football statistics websites. The cut-off date was established on January 1, the year was divided into four quartiles (Q1: January-March, Q2: April-June, Q3: July-September and Q4: October-December). Results confirmed significant differences on dates of births’ distribution (p<0.05) for the competitions — LaLiga Santander and LaLiga Smartbank — during three seasons, as well as for player position, with a larger effect observed for goalkeepers and defenders. Significant difference was also observed depending on classification. Results show a clear decreasing percentage of those born in quartile 4 in relation to those born in quartile 1, it can be concluded that the Relative Age Effect phenomenon is present in the Spanish professional football which may lead to an inappropriate talent selection technique in football, with recruitment oriented to the short term, to immediate results, and possibly caused by the early start of the player selection process.

Key words: Birth quartile, talent identification, development, Soccer.

Introduction
In areas such as sports and education, subjects are grouped by age, which, in most countries coincides with the beginning of the calendar year. The objective of this type of grouping is to achieve homogeneous sets of individuals with equal opportunities. However, when considering this type of grouping more thoroughly, inequalities can be found that are related to the month of an individual’s birth. This approach to grouping can generate gaps of up to a year for individuals who have about the same level of maturation. Consider, for example, the individual born in the first days of January when compared to another who was born in the last days of December (Helsen et al., 2005). This chronological age difference between subjects in the same age group is known as relative age and its consequences as Relative Age Effect (RAE) (Campbell, 2013).

Within sports, age difference has great relevance for younger participants. At early ages, a great diversity of anthropometric and physical measurements can be observed, depending on the maturation of the individual. This provides an advantage to those more developed, normally the ones born closer to the cut-off date (Bell et al., 2009). González-Villoria and Pastor-Vicedo (2012) pointed to invasion sports: — especially football, basketball, handball, hockey, and rugby — as those in which RAE has been studied. A large number of these studies focus on RAE as a key variable (De Oliveira Castro, et al., 2022; Wrang et al., 2018), and some others examine it in relation to other variables, such as individual performance (minutes played), nationality, player position, collective performance (team classification, team competition level, results) (Augste and Lames, 2011).

Football is played all over the world. Because of its popularity and global impact, it has been a frequent subject of research. Within Europe, Helsen et al. (2012) compared the birth distributions of football players from nine major European leagues (England, Germany, Belgium, Netherlands, Spain, France, Italy, Denmark and Sweden) from the seasons 2000-01 to 2010-11. In turn Yagüe et al. (2020a) assessed RAE in international professional football in 2015, analyzing 115 teams from the Union of European Football Associations (UEFA) and 110 teams from the South American Football Confederation (CONMEBOL), producing a total sample of 6448 people. That research found a strong effect of relative age in all the leagues, except in the Premier League (England), which has a cut-off date different from the rest of the competitions. The English Football Association changed the categories division’s cut-off date, substituting January 1 as the first day of the cut-off date for January 1 September (González-Villoria et al., 2015).

Several studies have been carried out over time, focusing on the influence of RAE on the Professional Spanish Football League. Lesma et al. (2011) assessed this effect during the 2009-10 season in the BBVA League (Spanish First Division), where 61% of the players were born in the first half of the year. In addition, they carried out a segmentation analysis by nationality, finding that 63.53% of the players who came from other countries were born in the first half of the year. Later, Prieto-Ayuso et al. (2015) analyzed the presence of relative age in the same league during the 2013-14 season obtaining similar results.

It should be noted that RAE has also been studied in the Spanish football youth categories (Jiménez and Pain, 2008). Gutiérrez Díaz del Campo et al. (2010) analyzed the youth categories of the 20 participating teams in the National Professional Football League, together with five amateur team academies during the 2005/06 and 2008/09 seasons. The overrepresentation of players born in the first
semester was verified, especially in elite teams, but with a decrease in the RAE effect throughout the period analyzed. This effect also occurred in other countries such as Germany (Augste and Lames, 2011), Italy (Brustio et al., 2018), Russia (Bezuglov et al., 2019), and Brazil (Silva et al., 2015). In the same way, Yagüe et al. (2020b) analysed the RAE in youth Spanish categories (U12, U14, U16 and U19) and in professional Spanish football players, finding similar results, with an overrepresentation of players born in the first semester of the year. Their results showed a greater influence of RAE, the lower the category, and a progressive decrease as they approached the professional level, though some current investigation show results in the opposite direction (Figueiredo, et al., 2022).

As it has shown, this phenomenon has been widely studied. The strength of the present study is based on three main issues: the characteristics of the sample, the number of analyzed seasons, and the studied variables. The aim was to determine the effect of RAE in the two main professional male football leagues in Spain (LaLiga Santander and LaLiga Smartbank), during the 2018-19, 2019-20 and 2020-2021 seasons, as well as to assess how it affected the game, according to the players’ positions and teams’ classification at the end of the season, and in this way to analyze whether this phenomenon has attenuated, remains or has increased in recent years.

Methods

Participants
The sample consisted of all the players (n=4097) of the two professional football competitions in Spain, LaLiga Santander (First Division) and LaLiga Smartbank (Second Division) of the Spanish Professional Football League and the Royal Spanish Football Federation during 2018-19, 2019-20 and 2020-21 seasons. Forty-two teams per season took part (20 teams in LaLiga Santander and 22 in LaLiga Smartbank). The characteristics of the sample are shown in Table 1.

The study was performed in a manner that respected the principles established by the Declaration of Helsinki and by the Ethics Committee of the authors’ university.

Measures
The variables used in this research have been categorized and conceptualized in Table 2.

Table 1. Sample distribution according to the variables analysed.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variables</th>
<th>fr</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competition</td>
<td>LaLiga Santander (1st Division)</td>
<td>1864</td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>LaLiga Smartbank (2nd Division)</td>
<td>2233</td>
<td>54.5</td>
</tr>
<tr>
<td>Game position</td>
<td>Goalkeeper</td>
<td>451</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Defender</td>
<td>1350</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Midfielder</td>
<td>1203</td>
<td>29.4</td>
</tr>
<tr>
<td></td>
<td>Forward</td>
<td>1093</td>
<td>26.7</td>
</tr>
<tr>
<td>Season</td>
<td>2018/19</td>
<td>1357</td>
<td>33.1</td>
</tr>
<tr>
<td></td>
<td>2019/20</td>
<td>1378</td>
<td>33.6</td>
</tr>
<tr>
<td></td>
<td>2020/21</td>
<td>1362</td>
<td>33.2</td>
</tr>
</tbody>
</table>

Note. fr= frequency; %= percentage.

Table 2. Definition of study variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth quartile</td>
<td>Players’ date of birth has been classified into four quartiles (Helsen et al., 2012): Q1 (January 1 – March 31), Q2 (April 1 – June 30), Q3 (July 1 – September 30) and Q4 (October 1 – December 31)</td>
</tr>
<tr>
<td>Playing Position</td>
<td>The players were classified according to the different roles that occur in football such as goalkeepers, defenders, midfielders and forwards.</td>
</tr>
<tr>
<td>Classification</td>
<td>It refers to the qualifying position of the teams in the leagues studied during the 2018/19, 2019/20 and 2020/21 seasons. The teams have been classified into three groups adapting the criteria used by Vogelbein et al. (2014): the first four places in each league (n=782), the last four places (n=777) and the middle of the table (the teams that were not in any of the previous groups, n=2538).</td>
</tr>
</tbody>
</table>

Note. Q= quartile.
**Results**

The distribution of the birthdates in the total sample for all three time periods showed significant differences in relation to the expected distribution ($X^2=193.545; p=0.000$) and a medium size effect of RAE on the studied population ($V=0.217$). Further, when both competitions were analyzed separately, significant differences were observed in the distribution across the quartiles, with a higher probability of birth dates occurring in Q1 compared with Q4. These results were reinforced by the odds ratio. The values of Cramer’s $V$ suggest a medium effect size, which would indicate that RAE is evident, in both competitions throughout the three seasons analyzed (Table 3).

One of the innovations in this investigation is shown in Table 4, where the evolution of the RAE was clear. Added to the statistical differences in the global distribution of the participants’ birth dates, there was a greater frequency in the case of the first quartile of the year, to-gether with a medium effect size of the RAE, in all game positions.

Finally, as Table 6 shows, the same distribution was found as with the independent variables considered previously, with subjects born in Q1 being significantly more frequent in the subgroups (teams classified in the top four places in their league, ranked mid-table, and belonging to the last four places). Once again, medium effects were found within the corresponding competitions (LaLiga Santander and LaLiga Smartbank). The impact of RAE was evident in the three groups: a higher clustering of players with birth dates in the first quartile of the year in the teams with the best performance at the end of the season. The finding was statistically significant ($p<0.000$), producing a medium effect size ($Cramer’s V$) in the three classification groups ($V_{four first places}=0.280$).

Table 3. Distribution of the birth quartile according to the analysed league.

<table>
<thead>
<tr>
<th>League</th>
<th>Quartile</th>
<th>Total</th>
<th>$X^2$</th>
<th>df</th>
<th>$p$</th>
<th>$V$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q2 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q3 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q4 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1359</td>
<td>1077</td>
<td>895</td>
<td>766</td>
<td>4097</td>
<td>3.203</td>
</tr>
<tr>
<td>LaLiga Santander</td>
<td>641</td>
<td>488</td>
<td>404</td>
<td>331</td>
<td>1864</td>
<td>114.116</td>
</tr>
<tr>
<td>LaLiga Smartbank</td>
<td>718</td>
<td>589</td>
<td>491</td>
<td>435</td>
<td>2233</td>
<td>82.721</td>
</tr>
</tbody>
</table>

Table 4. Distribution of the birth quartile according to the season analysed.

<table>
<thead>
<tr>
<th>Season</th>
<th>Quartile</th>
<th>Total</th>
<th>$X^2$</th>
<th>df</th>
<th>$p$</th>
<th>$V$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q2 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q3 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q4 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1359</td>
<td>1077</td>
<td>895</td>
<td>766</td>
<td>4097</td>
<td>1.884</td>
</tr>
<tr>
<td>2018-2019</td>
<td>453</td>
<td>350</td>
<td>309</td>
<td>245</td>
<td>1357</td>
<td>67.363</td>
</tr>
<tr>
<td>2019-2020</td>
<td>451</td>
<td>362</td>
<td>301</td>
<td>265</td>
<td>1378</td>
<td>57.907</td>
</tr>
<tr>
<td>2020-2021</td>
<td>455</td>
<td>365</td>
<td>286</td>
<td>256</td>
<td>1362</td>
<td>69.959</td>
</tr>
</tbody>
</table>

Table 5. Distribution of the birth quartile according to the game position.

<table>
<thead>
<tr>
<th>Position</th>
<th>Quartile</th>
<th>Total</th>
<th>$X^2$</th>
<th>df</th>
<th>$p$</th>
<th>$V$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q2 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q3 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q4 fr (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1359</td>
<td>1077</td>
<td>895</td>
<td>766</td>
<td>4097</td>
<td>12.008</td>
</tr>
<tr>
<td>Goalkeeper</td>
<td>313</td>
<td>263</td>
<td>218</td>
<td>187</td>
<td>451</td>
<td>31.115</td>
</tr>
<tr>
<td>Defender</td>
<td>463</td>
<td>364</td>
<td>283</td>
<td>240</td>
<td>1350</td>
<td>85.716</td>
</tr>
<tr>
<td>Midfielder</td>
<td>408</td>
<td>302</td>
<td>265</td>
<td>228</td>
<td>1203</td>
<td>60.099</td>
</tr>
<tr>
<td>Forward</td>
<td>343</td>
<td>275</td>
<td>248</td>
<td>227</td>
<td>1093</td>
<td>27.977</td>
</tr>
</tbody>
</table>

Note. Q= quartile; fr= frequency; %= percentage; $X^2=chi square; df =degrees of freedom; p= significance level; $V= Cramer’s V$.
Discussion

The main aim of this study was to analyze the birth dates of the players in order to observe the RAE using data from the 2018-19, 2019-20 and 2020-21 seasons in LaLiga Santander and LaLiga SmartBank, the two professional male football competitions in Spain. Likewise, it is intended to analyze the RAE according to the game position and the classification of the teams at the end of the season.

In our research, we found a significant overrepresentation of players born in Q1 participating in both studied leagues (LaLiga Santander and LaLiga Smartbank) supported with a medium size effect. The data obtained evince a clear decreasing percentage of those born in Q4 (17.8% in LaLiga Santander and 19.5% in LaLiga Smartbank) in relation to those born in Q1 (34.4% in LaLiga Santander and 32.2% in LaLiga Smartbank). In addition, a higher odds ratio was estimated when comparing Q1 and Q4 in LaLiga Santander in relation to LaLiga Smartbank. These results might indicate a talent selection linked fundamentally to anthropometric, physical and physiological variables, closely related to the RAE.

We have observed similarities in our study with different researches that address various competition leagues. First, Helsen et al. (2012) with data from the 2010-11 season, found significant differences in the RAE effect for all the leagues analyzed (England, Germany, Belgium, Netherlands, Spain, France, Italy, Denmark and Sweden), except for the Primeira Liga (Portugal). Second, Padrón-Cabo et al. (2016) during the 2014-15 season, showed that this phenomenon was present in all the leagues of his study (Spain, Germany, Italy, France, Portugal, Holland, Belgium, Ukraine, South Africa, Australia, Mexico and Brazil), except in the Premier League (England), the Primeira Liga (Portugal) and the K-League Classic (South Korea). Third, Yagüe et al. (2020b) analyzed the 2016-17 season and found significant differences in all the leagues studied (six from UEFA and six from CONMEBOL), except for the English league (Premier League). And fourth, Ubeda-Pastor et al. (2020) analyzed the five most powerful European leagues (Spain, Italy, Germany, France and England) in the 2016-17 season and their results showed statistically significant differences with respect to the expected distribution in all the leagues except for the English one (Premier League).

Other studies that only approach the Spanish league, such as the present study, confirmed a greater representation of players born in the first quartile (Q1). Lesma et al. (2011) confirmed the RAE during the 2009-10 season; Prieto-Ayuso et al. (2015) in the 2013-2014 season, Reverte-Masia et al. (2016) analyze the RAE on the U23 players of LaLiga Santander during the 2018-19 season. It should be noted that the longitudinal study by Salinero et al. (2014) reveals a significant RAE during the 2008-09, 2009-10, 2010-11 and 2011-12 seasons, and a more homogeneous distribution along the quartiles of birth during the 1999-2000 season. Most of the results coincide with those of the present study, where the three seasons analyzed (2018-19, 2019-20 and 2020-21) show a significant presence of the RAE. In addition, we can appreciate that, during these three years analyzed, the results did not offer any significant changes in the RAE in professional Spanish football depending on any of the independent variables analyzed, which emphasizes the robust nature of the phenomenon.

This effect has been studied with varied research designs in other countries, reaching similar results: an overrepresentation of those born in the first quartile of the year, as in Italy (Brustio et al., 2018), Belgium (Helsen et al., 2005), Brazil (Costa et al., 2012), Germany (Auguste and Lames, 2011; Götze and Hoppe, 2021) or Australia (Van Den Honert, 2012). Mulazimoglu (2014) shows the presence of RAE in Turkey’s elite football teams as well as in players from the best Turkish youth football clubs (n=2936 players).

Regarding the independent variable position played in the game system, the scientific literature (Lesma et al., 2011; Salinero et al., 2014) is not unanimous, it may be due to a structural weakness when approaching this variable, i.e. players sometimes change positions after selection or at the time of the study. Therefore, our results are consistent with some previous studies, showing significant distribution differences in the four positions analyzed (defenders, midfielders, forwards and goalkeepers), a higher odds ratio when comparing Q1 with the reference quartile, and higher RAE’s effect size in goalkeepers and defenders in relation to the other positions. Padrón-Cabo et al. (2016) also found the presence of the RAE in every player position in the 2014-15 season, but discrepancies in the degree of RAE according to the position (defender specific position was the most affected and the goalkeeper the least). Our findings partially disagree with Prieto-Ayuso et al. (2015), who analyzed the 2013-2014 season and found significant differences among the RAE in the defender and forward positions. In addition, the study by Lesma et al. (2011) shows little influence of the RAE on the goalkeeper, the

### Table 6. Distribution of the birth quartile according to the classification at the end of the season.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Quartile</th>
<th>Total</th>
<th>$X^2$</th>
<th>df</th>
<th>$p$</th>
<th>$V$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1 fr (%)</td>
<td>Q2 fr (%)</td>
<td>Q3 fr (%)</td>
<td>Q4 fr (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1359</td>
<td>1077</td>
<td>895</td>
<td>766</td>
<td>4097</td>
<td>5.953</td>
</tr>
<tr>
<td>Four first places</td>
<td>285</td>
<td>194</td>
<td>159</td>
<td>144</td>
<td>782</td>
<td>61.366</td>
</tr>
<tr>
<td>Mid-table classified</td>
<td>815</td>
<td>675</td>
<td>563</td>
<td>485</td>
<td>2538</td>
<td>97.125</td>
</tr>
<tr>
<td>Four last places</td>
<td>259</td>
<td>208</td>
<td>173</td>
<td>137</td>
<td>777</td>
<td>41.754</td>
</tr>
</tbody>
</table>

Note: Q= quartile; fr= frequency; %= percentage; $X^2$= chi square; df= degrees of freedom; $p$= significance level; $V$= Cramer’s V. *** $p < 0.001$. 

- First, Helsen et al. (2012) with data from the 2010-11 season, found significant differences in all the leagues studied (England, Germany, Belgium, Netherlands, Spain, France, Italy, Denmark and Sweden), except for the Primeira Liga (Portugal). 
- Second, Padrón-Cabo et al. (2016) during the 2014-15 season, showed that this phenomenon was present in all the leagues of his study (Spain, Germany, Italy, France, Portugal, Holland, Belgium, Ukraine, South Africa, Australia, Mexico and Brazil), except in the Premier League (England), the Primeira Liga (Portugal) and the K-League Classic (South Korea).
- Third, Yagüe et al. (2020b) analyzed the 2016-17 season and found significant differences in all the leagues studied (six from UEFA and six from CONMEBOL), except for the English league (Premier League). 
- In addition, the study by Lesma et al. (2011) shows little influence of the RAE on the goalkeeper, the
same as Figueiredo et al. (2022) in their current study with Brazilian elite soccer. This is surprising because height could be a performance factor for the goalkeeper position. It seems that the strongest conclusion of this study variable in football is that the defender position is the most affected by the RAE phenomenon, because it requires specific anthropometric characteristics (Salinero et al., 2014). In addition to the European research, there are studies in China and in the Turkish Super League. In the first case (Li et al., 2020), the results are consistent with our findings, showing significant values in all positions analyzed. In the Turkish league case, Arslan et al. (2020) obtained somewhat similar results with our research, with a total coincidence in the League 2 and League 3 leagues. However, the RAE was not significant in League 1 in any position, nor in the Super League for the goalkeeper and the forward.

Finally, if we approach the incidence of the RAE related to the final classification of the teams in both leagues for the 2018-19, 2019-20, and 2020-21 seasons, significant differences were observed among the three subgroups analyzed (teams ranked in the top four, in the middle of the rankings and in the last four positions). In addition, a greater concentration of players born to the first quartile of the year was observed in the best-ranked teams’ group at the end of the season. These results allow us to comment, cautiously, on the importance of the RAE in the selection of top professional players as was also seen in research with young players (Augste and Lames, 2011). However, this statement must be interpreted cautiously, since both leagues do not have the same number of teams, and therefore of participating players, as well as the conditioning factor of the differences in terms of competitive level.

The widespread negative perception of the consequences of the RAE in sport talent recruitment has led to several proposals in the scientific literature, aimed at limiting its effects in order to achieve a hypothetical equality of opportunities and avoiding the loss of natural talent (Helsen et al., 2005; Padrón-Cabo et al., 2016). Our first proposal, given the complexity of the issue, would be to count on transversal teams during the selection proceedings (sports technicians, doctors, psychologists, biomechanics, etc.). This could allow greater knowledge about each footballer as a whole, perhaps avoiding the strong influence of chronological age during recruitment. This is what has been called bio-banding (Cumming et al., 2017), a strategy that consists of grouping athletes according to attributes related to growth and maturational development instead of using only chronological age as a selection criterion. A second option would be to modify the cut-off dates from time to time, so that all athletes at some point would benefit from the RAE phenomenon (Sierra-Diaz et al., 2017). Unfortunately, it seems that changing the cut-off date only produces a change in the distribution by months in elite football. Following this proposal, the Australian Football Federation decided to replace the January 1st cut-off date, for August 1st in its youngest categories. However, subsequent investigations showed that this change simply altered the birth months favored by the RAE (Musch and Hay, 1999).

The third solution involves expanding the number of competition categories, for example, by at least one category per year. This means a smaller age difference between the players belonging to the same category and, therefore, with less impact (or effect) due to variable maturational players. Finally, Mann and Van Ginneken (2017) carried out an experiment that consisted of observing a series of football matches with three groups of players: (1) without information on age, (2) with knowledge of the players’ birth dates and (3) the players wore a jersey with a number consistent with their relative age (the oldest wears the one, the youngest the largest number). The results revealed a significant selection bias for the first two groups, which was eliminated in the third group, when the coaches watched the matches knowing that the jersey number corresponded to the players’ relative age. However, we must be cautious with this evidence due to the possible influence of the previous information available to coaches.

We are aware that one of the limitations of the present study was not assessing the effective times played for each athlete in competitions. The inclusion of this kind of information could provide important insights into the degree of opportunities these players receive based on RAE. Based on the reflections of Figueiredo et al. (2022), we agree that future research should be directed towards the use of longitudinal approaches and the control of players’ participation in official matches. Finally, it could also be interesting to extend the sample to women’s football, a modality in clear development, and study the effect on some national team competitions organized by FIFA.

Conclusion

In conclusion, the results confirmed a greater representation of players born in Q1 and Q2, compared to other quartiles, indicating statistically significant values and a medium size effect for LaLiga Santander (First Division) and LaLiga Smartbank (Second Division) of the Spanish Professional Football League and the Royal Spanish Football Federation, for the 2018-19, 2019-20 and 2020-21 seasons. This significance was repeated for the player position variable. In addition, a higher odds ratio is estimated when comparing Q1 and Q4, as well as a higher effect size of the RAE in goalkeepers and defenders in relation to the rest of positions. Finally, in the classification at the end of the season variable, we can observe a significant effect in the three subgroups considered, with a greater concentration of players born in the first quartile of the year in the teams with the best performance at the end of the season.

The general conclusion confirms that, despite the strategies that literature proposes and practice apply in order to correct or, at least, to limit the RAE phenomenon, the problem persists in all the studied variables. Therefore, we must continue studying the phenomenon with the aim to restrict its harmful consequences in different aspects, highlighting to stand out an unfocused selection of talents with a recruitment oriented to the short-term aspects and results. It seems that a revision in the selection processes may be necessary in order to balance the chances of success for players born later in the year. Knowing the complexity of the subject, we propose a recruitment in which various aspects should be taken into consideration (psychological,
technical, tactical, family and social environment, etc.) through transversal teams. The main idea would be selecting young footballers according to their talent, rather than their physical level, with the aim of removing this social inequality that influences the experiences of the players, especially in their maturation. Recruitment should be far more sophisticated, with a long-term strategy that focuses on talent and long-term success rather than just immediate success.

Acknowledgements

The authors have no conflict of interest to declare. The present study complies with the current laws of the country in which it was performed. The datasets generated and analyzed during the current study are not publicly available, but are available from the corresponding author who was the organizer of the study.

References


Vogelbein, M., Nopp, S., and Hökelmann, A. (2014). Defensive transition in soccer – are prompt possession regains a measure of success?
Key points

- The relative age effect (RAE) was present in a significant way in LaLiga Santander (First Division) and LaLiga Smartbank (Second Division) of the Spanish Professional Football League and the Royal Spanish Football Federation, for the 2018-19, 2019-20 and 2020-21 seasons.
- According to player position (goalkeeper, defender, midfielder and forward), defenders and goalkeepers were those that show a greater RAE.
- Based on the competitive ranking of each analysed leagues, there was RAE at all performance levels, that is to say the better performance, the greater concentration of players born in the first quartile.
- It is recommended to review the processes of talents’ selection in football, proposing a long-term strategy that focuses on talent and long-term success rather than just immediate success.

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