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## THE RELATIVE AGE EFFECT IN SPANISH PROFESSIONAL FOOTBALL

## EFECTO DE EDAD RELATIVA EN EL FÚTBOL PROFESIONAL ESPAÑOL

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### ABSTRACT

The purpose of this study was to determine if there is a relative age effect in Spanish professional football in which there is a cut-off age for classification that is based on the calendar year. The relative age effect was also examined in relation to players' positions. The analysis has included all the footballers playing in the First Division in Spain during the 1999/2000, 2008/2009, 2009/2010, and 2010/2011 seasons.

The results of our study confirmed a relative age effect in professional football in Spain at present, but not for the 1999/2000 season. When examining the effect by playing position, there has been a relative age effect occurrence for defenders and midfield players during the last four years.

**KEY WORDS:** relative age effect, soccer, Spain, playing position

## RESUMEN

El objetivo de este trabajo es valorar si se produce el efecto de la edad relativa en el fútbol profesional en España, donde el corte de edad actual para la formación de las diferentes categorías es el del año natural y su análisis por demarcación en el terreno de juego. El análisis ha incluido a todos los futbolistas de la primera división española de las temporadas 1999/2000, 2008/09, 2009/10, 2010/11, y 2011/12.

El resultado de nuestro estudio confirma un efecto de la edad relativa en el fútbol profesional en España en la actualidad, no así en el año 2000. Diferenciando por posición de juego, se muestra la incidencia de RAE solamente en las posiciones de defensa y centrocampista en los cuatro últimos años.

**PALABRAS CLAVE:** Edad relativa, fútbol, España, posición de juego

## INTRODUCTION

When classification for sport participation is based on date of birth there can be various advantages and disadvantages that result for individuals according to the timing of their birth date. The effect of birth date differences in sport has been labeled the “relative age effect” (RAE) and has been examined in various studies (Wattie, Cogley & Baker, 2008). Barnsley, Thompson and Barnsley (1985) are credited with originally identifying this phenomenon. In one study conducted in elite Canadian hockey it was discovered that across the various teams that nearly 40% of the players were typically born in the first trimester of the year.

In the soccer environment, various studies have been conducted with the same focus on the relative age effect. Barnsley, Thompson and Legault (1992) published the first research to identify the relative age effect in soccer with under-20 and under-17 year-old players participating in the soccer World Cup of 1990. A similar effect has been found in professional leagues in different countries around the world including Germany, Japan and Brazil (Musch & Hay, 1999); Belgium (Vaeyens, Philippaerts, & Malina, 2005); and Spain (Lesma, Pérez, & Salinero, 2011; Salinero, Pérez, Burillo, & Lesma, 2013). It is of particular relevance to note the work of Helsen, Hodges, Van Winckel and Starkes (2000) who found that a change in the month from August to January that corresponded to the cut-off date for classification resulted in a demonstrable change in the proportion of players selected from the second to the first half of the calendar year. In a relatively short span of time, this differential distribution according to birth date resulted in a very limited representation of players born during the final trimester of the calendar year. It is also important to mention the work of Helsen, Starkes and Van Winckel (1998) who found evidence that those players born in the latter months of the year tended to terminate their sport involvement if they were not selected for participation.

The age difference relative to birth date carries with it differences in physical maturation that can determine team selection outcomes. García and Salvadores (2005) found that differences of 10 centimeters in height and 10 kilograms in weight existed among 14 year-old players born within the same calendar year. In a similar fashion, in a study conducted in France with elite young players (Carling, le Gall, Reilly & Williams, 2009) it was found that players born in the trimester closest to the initiation date of the classification period had advantages in height, weight, maximal quadriceps strength, maximal anaerobic capacity and estimated  $VO_2$  max. In a study conducted with 281 hockey players of 14 and 15 years of age, the players who were selected to teams were taller, heavier and more likely to be born in the first half of the year (Sherar, Baxter-Jones, Faulkner & Russell, 2007). In another study with young soccer players, differences in height were found as a consequence of timing of birth even when biological maturation had been controlled (Hirose, 2009).

It is during adolescence that the relative age effect becomes a major issue as a consequence of age-related differences in physical maturation. The RAE issue has been identified by researchers in various countries such as the USA (Vincent & Glamser, 2006), Brazil (Rogel, Alves, França, Vilarinho & Madureira, 2007), France (Carling et al., 2009), Spain (González, 2007; Gutierrez, Pastor, González & Contreras, 2010; Perez & Pain, 2008; Salinero et al., 2013) and Belgium (Helsen, van Winckel & Williams, 2005). In this line of work, Cobley, Baker, Wattie and McKenna (2009) have stated that the influence of the RAE should be particularly influential in popular male sports and for participants between the ages of 15 to 18 years. Nonetheless, the most highly talented players can still stand out irrespective of birth date as noted by Ford, Webster and Williams (2008) who analyzed the 180 athletes most highly recognized for their sporting success and concluded that the RAE did not affect these athletes but that among athletes of more common technical and tactical capacities that a greater physical capacity can be related to birth date and can prove to be the determining factor in their selection.

The selection process is mediated by the relative age effect at younger ages which gives rise to the greater presence of players born earlier in the calendar year at the younger age levels which inevitably leads to the greater probability that the same players will be participating at higher levels of play. It is reasonable to think that these physical differences will be important relative to the selection of players and to their position of play given that physical size differences exist for goalkeepers and defenders relative to the other position players (Gil, Gil, Ruiz, Irazusta & Irazusta, 2007; Reilly, Bangsbo & Franks, 2000). Nonetheless, no studies that have been conducted to date in Spain have found differences in the relative age effect for position players in youth football (Gutierrez et al., 2010).

The objective of the present study was to verify the presence of the relative age effect in the top division of Spanish soccer and to examine whether differences also existed in relation to playing position.

## MATERIALS AND METHODS

### SAMPLE

Included in the study are all of the players who participated over five seasons of Spanish professional football. Data from the 1999-2000 season as well as from the most recent four competitive seasons (totaling 2430 players) were included with their respective birth dates (Table 1).

**Table 1.** Participants included in overall sample.

	Frecuency	Percentage
Spanish League 99/00	472	19.4
BBVA League 08/09	478	19.7
BBVA League 09/10	481	19.8
BBVA League 10/11	482	19.8
BBVA League 11/12	517	21.3
Total	2430	100.0

### DESIGN

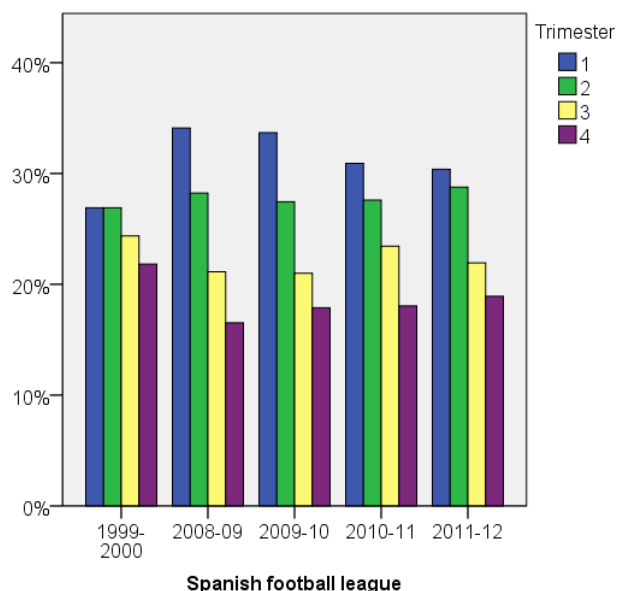
The information relative to the date of birth and playing position was obtained from the web pages of the different teams participating during these five years of competition and triangulated with information from the *Marca* guide for each season.

### DATA ANALYSIS

For the statistical analysis we employed the statistical program SPSS version 18 for Windows. Through this analysis, frequencies of birth dates were obtained and the *chi square* statistic was calculated to examine the homogeneity of the distribution of birth dates across the four trimesters.

## RESULTS

Figure 1 presents the distribution of the players' birth dates across each of the trimesters relative to the five competitive years analyzed.



**Figure 1.** Distribution of players' birth dates across the trimesters by season.

It is noted in Figure 1 that the season in which there was the greatest amount of homogeneity among the trimesters was the 1999-2000 season whereas the 2008/2009 season produced the greatest differences relative to trimester of birth and that there has been a progressive decline in the proportion of players born in the first semester for the subsequent seasons. The *chi square* statistic and associated significance levels for each of the seasons is reported in Table 2.

**Table 2.** Chi square values and statistical significance of differences across trimesters by each of the seasons analyzed.

Season		
1999-2000	Chi-square	3.420
	df	3
	Signif.	.331
2008-2009	Chi-square	34.435
	df	3
	Signif.	.000
2009-2010	Chi-square	28.480
	df	3
	Signif.	.000
2010-2011	Chi-square	17.817
	df	3
	Signif.	.000
2011-2012	Chi-square	17.825
	df	3
	Signif.	.000

A significant difference in the homogeneity of the distribution was found for the most recent four competitive seasons ( $p = .000$ ) in which there was an overrepresentation of players born in the first three trimesters of the year relative to the players born latest in the year. Nonetheless, in the 1999-2000 season the RAE was not found to be present ( $p = .331$ ).

If we analyze the representation of players according to playing position we find notable differences in that birth dates during the first three trimesters of the year are overrepresented at certain positions, most notably among defenders as well as among midfielders (Figures 2-6).

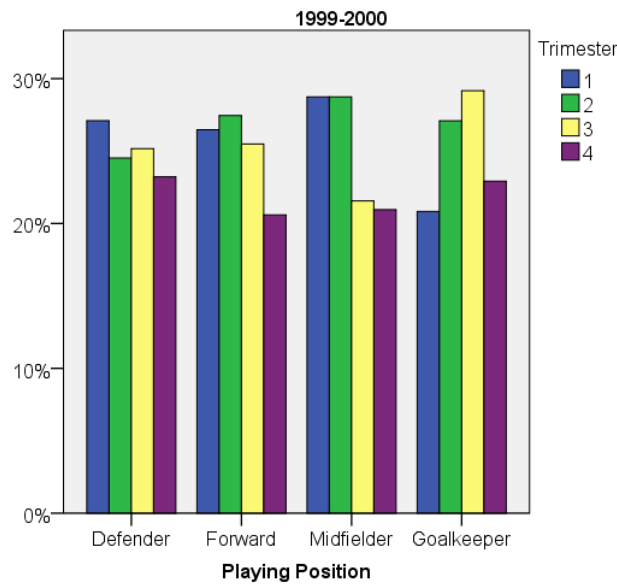


Figure 2. Distribution of birth dates by trimesters and position for the 1999-2000 season.

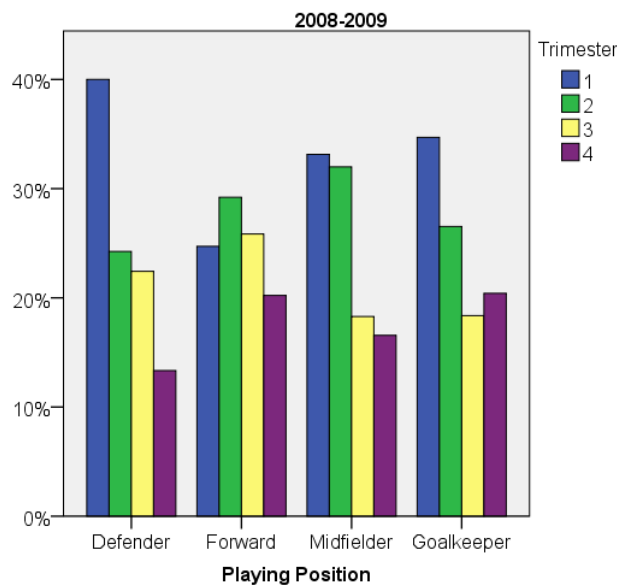


Figure 3. Distribution of birth dates by trimesters and position for the 2008-2009 season.

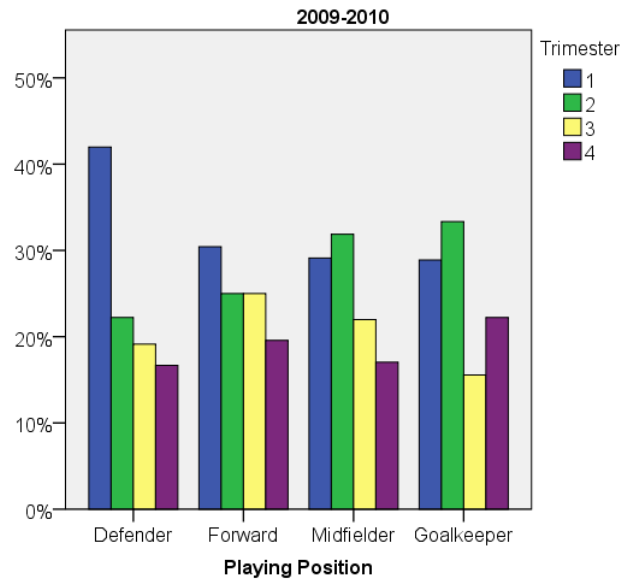


Figure 4. Distribution of birth dates by trimester and position for the 2009-2010 season.

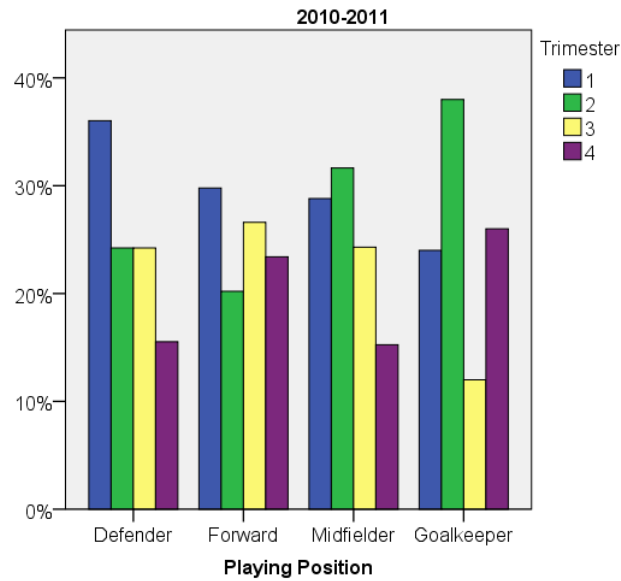
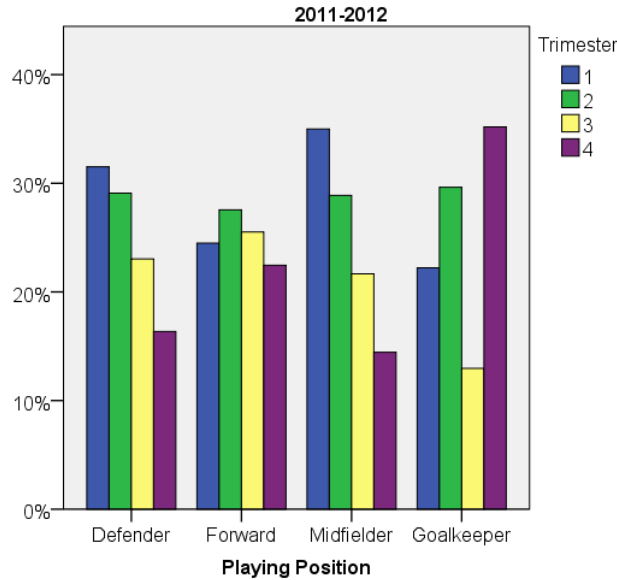


Figure 5. Distribution of birth dates by trimester and position for the 2010-2011 season.



**Figure 6.** Distribution of birth dates by trimester and position for the 2011-2012 season

Significant differences in birth date frequencies by trimester were found for the defenders and the midfielders during the four most recent seasons although no significant differences in birth date frequencies were found for the 1999-2000 season for any position. In the case of the goalkeepers and forwards there was not a significant relative age effect (Table 3).

**Table 3.** Chi square significance by position across the various seasons.

	Def	Mid	For	GK
1999-00	.922	.289	.768	.841
2008-09	<b>.000</b>	<b>.001</b>	.689	.367
2009-10	<b>.000</b>	<b>.019</b>	.537	.352
2010-11	<b>.003</b>	<b>.012</b>	.590	.079
2011-12	<b>.028</b>	<b>.001</b>	.912	.112

## DISCUSSION

A snapshot of the relative age effect at any level of competition may reveal some differences (Lesma et al., 2011; Musch & Hay, 1999; Wiium, Lie, Ommundsen & Enksen, 2010) but there is little doubt that a longer view reveals greater insight into the relative age effect. The relative age effect has been verified during the four most recent season of the BBVA League which is in contrast to the 1999-2000 season in which birth date frequency by trimester differences were much less with only a 5.1% difference between the first and last trimesters. By the 2008-2009 season this difference had increased to 17.6% but by the 2011-2012 season it had diminished to 11%. As such, there appears to a gradual diminishment of the effect over time. In the 1999-2000 season we found a RAE that was very similar to the findings obtained three seasons later by González (2007) (54.7% of birth dates in the first half of the



year vs. 45.3% for the second half of the year). For the 2006-2007 season, Pérez and Pain (2008) found values slightly lower than those encountered for the 2008-2009 season if data for both the First and Second Divisions in Spain are included in the analysis. In light of these findings, it appears that in Spain that the RAE shows some fluctuations with an important increase since the beginning of the decade (2000) with subsequent leveling off followed by a recent slight decline.

The data analysis also revealed a difference in the presence of the relative age effect by position on the field. A previous study with young soccer players did not find these differences (Gutierrez et al., 2010) but, in the present study, which examined professional players who had reached the highest level of Spanish football, the findings were apparent. Physical differences relative to height exist across the different playing positions and favor goalkeepers and defenders relative to midfielders (Gil et al., 2007; Reilly et al., 2000; Shephard, 1999) and would suggest that the positions of goalkeepers and defender would be the positions in which the RAE would be found. Nonetheless, the RAE was greatest for the defenders and midfielders but not for the goalkeepers. One possible explanation could be linked to the peculiarities of the Spanish competitions and the styles of play of the teams. The previous studies that have found that the midfielders were shorter than were players at the other positions (Reilly et al., 2000; Shephard, 1999) were conducted in countries where the style of play is different and play tends to be at a lower competitive level (Gil et al., 2007).

In whichever circumstance, and in light of the findings from the present investigation, we suggest that it is absolutely essential that there be a modification in the processes by which players are selected at younger ages and the selection system to which the professional teams currently adhere. Alternative approaches have been proposed including changes to the organizational structure of the clubs (Gutierrez, 2013) but the problem is complex and will require both short-term and long-term changes. One approach involves a longer term view of the sport development programs in which there is consideration of athlete potential and capacity for development. In this way, there would not only be a more consistent and fair program for the youngest hopefuls but also the sport clubs could optimize their results, including their economic outcomes, by investing appropriately in the development and promotion of their own players rather than relying upon the acquisition of players from other clubs. In our opinion, given the apparent social and economic implications of these changes, future research could be directed toward estimating the socioeconomic impact of addressing the relative age effect in professional soccer.

## **CONCLUSIONS**

It was demonstrated that the relative age effect was found in the most recent four seasons of the Spanish professional league whereas this effect was not found for the 1999-2000 season.

There was also evidence that the relative age effect was more apparent among those players who play defense and midfield which suggests that there is an advantage to be gained from an earlier birth date in relation to certain physical characteristics.

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