

# Relative age effect in handball players of Murcia: Influence of sex and category of game

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## ABSTRACT

This study aimed to analyze the evolution of the relative age effect on federal handball players in the Region of Murcia. In order to achieve this goal, the sex, date of birth, and category data of 845 federated game players from different teams in the 2013/2014 season and those of 1043 players in the 2015/2016 season were analyzed, performing comparisons and studying differences by means of  $\chi^2$  and Z tests and the Bonferroni method. The analysis of results by trimester and semester of birth revealed that, while there were no statistically significant differences in terms of the season and game category differences, differences were found in terms of sex. The results also confirmed a greater distribution of male players in the second semester and of female players in the first semester. Therefore, it seems to confirm a trend related to the effect of the relative age on federated handball players in Murcia. **Key words:** RELATIVE AGE EFFECT, HANDBALL, ADOLESCENCE, MATURITY.

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## INTRODUCTION

Diverse studies on sport formation coincide in the importance of an athlete, besides being genetically predisposed for the sport specialty they practice, being put through an adequate long-term process of formation (García, Cañadas, & Parejo, 2007) that is adapted as best possible to their age and skill level (Sáenz-López, Feu, & Ibáñez, 2006). According to Moreno (2004), the progress of a handball player depends on the initial quantity and the capacity of work they can accomplish in their formation and preparation stages. In continuation, authors such as Laguna and Torrecusa (2000) point out that a handball player, no matter the natural talent they possess, cannot become competitive if they do not accumulate a significant amount of training.

Currently, the organization and the grouping system of handball players are done chronologically, being grouped in the distinct categories by their natural year of birth. Specifically, each of the categories has a two-year aggrupation, leading to first and second year players being present in the same category. Although at the beginning, this type of aggrupation was used with the objective of trying to prevent differences in the formation of the athletes (González, 2007) through an appropriate development and fair competition with equal opportunities (Musch & Grondin, 2001; Gutiérrez, 2013), but what it really provokes is the existence of differences in age and therefore potentially differences in maturation and experience among the members of a same category (Gutiérrez, 2013). Unfortunately, studies confirm that the distribution of athletes to groups by age provokes differences among the athletes at physical (Delorme & Raspaud, 2009), cognitive (Bisanz, Morrison, & Dunn, 1995), motivational (Dixon, Horton, & Weir, 2011) and existential levels (Musch & Grondin, 2001). For this reason, the players born in the first months of the year come to have a kind of advantage over those born later in the competition year (Carling, Le Gall, Reilly, & Williams, 2009; González, 2007). These aforementioned differences can become decisive in the selection process of the athletes in the sport of competition (García & Salvadores, 2005).

It must also be said that the process of growing and maturation of an athlete is not completely parallel to their chronological age, for which the difference that exists between chronological age and biological age should always be considered (Baxter-Jones, 1995). This difference of chronological age among the members of the same group is known as relative age (RA), and the consequences derived from it as the relative age effect (RAE), according to Gutiérrez (2013) and Prieto, Pastor, Serra, and González (2015). The RAE rarely appears before 12 years of age in non-high-level teams (Helsen, Starkes, & van Winckel, 1998) and tends to reduce as the athletes get older, probably due to the importance of the technical-tactical level and the athletic experience (Salinero, Pérez-González, Burillo, Lesma, & Herrero, 2014).

Consequently, the trainers, conditioned by this effect, tend to complete their teams with players born in the first months of the year. This is about, a priori, athletes that are more mature physically as well as emotionally, which leads to athletes who are born in the last months of the year abandoning the sport at earlier ages when not selected (Barnsley & Thompson, 1988; Delorme, Chalabaev, & Raspaud, 2011; Helsen *et al.*, 1998). Another important aspect is that these athletes with later growth and maturation, due to the current system of competition, have to compete with other more developed athletes, which makes them lose motivation and develop lower self-esteems (Jones, Hitchen, & Stratton, 2000).

Presently, the number of studies that have analyzed the existing relationship between the RAE and the possibilities of participation in handball continue to be limited. After a revision of the literature, it is worth pointing out the most recent studies carried out by Schorer, Cogley, Büsch, Bräutigam and Baker (2009b), Schorer, Baker, Büsch, Wilhelm and Pabst (2009a), Schorer, Baker, Lotz and Büsch (2010), Nakata and

Sakamoto (2011), Schorer, Wattie and Baker (2013) and Karcher, Ahmaidi and Buchheit (2014) in the international field, and those realized in Spain by Gutiérrez, Saavedra, Contreras, and Fernández (2012) and Sánchez-Rodríguez, Yáñez, Sillero, and Rivilla-García (2012). Due to the reduced number of studies on this sport in our country, the objective of this work was to analyze the evolution of the RAE and its influence depending on the trimester and semester of birth over the sex and category of play in the federated handball players of the Region of Murcia.

## MATERIALS AND METHODOLOGY

### **Participants**

The design of the present study is sectional, descriptive and not experimental. The study sample was composed of the total population of athletes registered in the Handball Federation of the Region of Murcia (HFRM) in the Children's (12-14 years old), Youth (14-16 years old), Junior (16-18 years old) and Adult (from 18 years old) categories during the 2013/2014 and 2015/2016 seasons. In the first season there were 845 athletes (574 male and 271 female) with an average age of 19.07 ( $\pm 5,27$ ), and in the second season 1043 athletes (691 males and 352 females) with an average age of 17.25 ( $\pm 5,41$ ), which made a total of 1888 federated handball players.

### **Procedure**

Thanks to the permits of the HFRM, the data was collected at the end of the last analyzed season. The registered variables were: sex, category and date of birth. We emphasize that in handball, the system of subscription for the players in the distinct categories of the competitions creates groups composed of players born in two consecutive years. In general, the investigations of the RAE consulted were carried out with a distribution of players' birthdates into the year's trimesters, so, in this study we also used the aggrupation in function of the semester of birth. Therefore, the variables were calculated and recoded taking into account the trimester of birth of each player (1<sup>st</sup> from January to March, 2<sup>nd</sup> from April to June, 3<sup>rd</sup> from July to September and 4<sup>th</sup> from October to December) and by semester of birth (1<sup>st</sup> from January to June and 2<sup>nd</sup> from July to December).

### **Data Analysis**

The descriptive statistics and frequencies were calculated. The chi-squared ( $\chi^2$ ) test was used to verify if the fact of being born in a concrete period of the year or in another infers an advantage or disadvantage when it comes to forming part of a team. Furthermore, the analysis of the differences in distribution of percentages in each trimester or semester of birth, depending on season and sex, were also calculated with the  $\chi^2$  test. The proportions of the columns were compared through Z tests, utilizing the Bonferroni method in order to correct the  $p$  values of the tests. The calculations were completed with the SPSS 20.0 program.

## RESULTS

### **Descriptive analysis according to sex and category**

The descriptive statistics of the players with a federated license in each of the seasons are indicated in Table 1. The results show an increment of federated players in two years. The 2013/2014 season had a total of 845 athletes registered, of which two of every three were male, while in the 2015/2016 season the number of federated players was at 1043 athletes, and the proportion by sex was one female for every three athletes.

The analysis in function with the category shows that while in the 2013/2014 season the category most represented percentage-wise was the Children's category, two years later, in the 2015/2016 season it was

the Youth category. On the other hand, it can be observed how the results in function of sex show that the male players continue doubling the number of female players when it comes to practicing handball, and a substantial increment of players in the Youth category with the passing of the years occurs.

Table 1. Descriptive statistics of the 2013/2014 and 2015/2016 seasons according to sex and category.

Variable	Season 13/14		Season 15/16	
	N	%	N	%
<b>Sex</b>				
Male	574	67.9	691	66.3
Female	271	32.1	352	33.7
Total	845	100	1043	100.0
<b>Category</b>				
Children's	277	32.8	292	28.0
Youth	211	25.0	311	29.8
Junior	143	16.9	159	15.2
Adult	214	25.3	281	26.9

#### Analysis according to birth trimester and semester

In Figure 1 a similar distribution by trimester is observed in both seasons. It is important to note that in the first and second trimester is where the most players are situated. The  $\chi^2$  test showed statistically significant differences for the 2013/2014 season ( $\chi^2_{(gl=3)}=8,35$ ;  $p=.039$ ) as well as the 2015/2016 season ( $\chi^2_{(gl=3)}=14,73$ ;  $p=.002$ ).

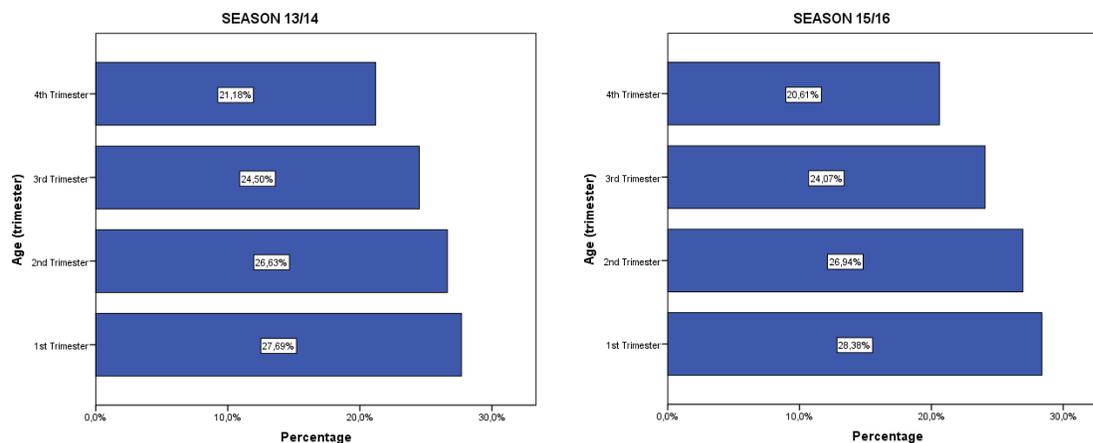


Figure 1. Sample distribution by trimester according to season, 2013/2014 (left) and 2015/2016 (right).

These same results can be verified in a clearer manner analyzing the distribution according to semester (Figure 2). In this distribution it can be observed that 55% of the athletes were born in the first semester, while around 45% were born in the second semester. The values of the  $\chi^2$  test also generate statistically significant values for the 2013/2014 season ( $\chi^2_{(gl=1)}=6,31$ ;  $p=.012$ ) as well as for the 2015/2016 season ( $\chi^2_{(gl=1)}=11,81$ ;  $p=.001$ ).

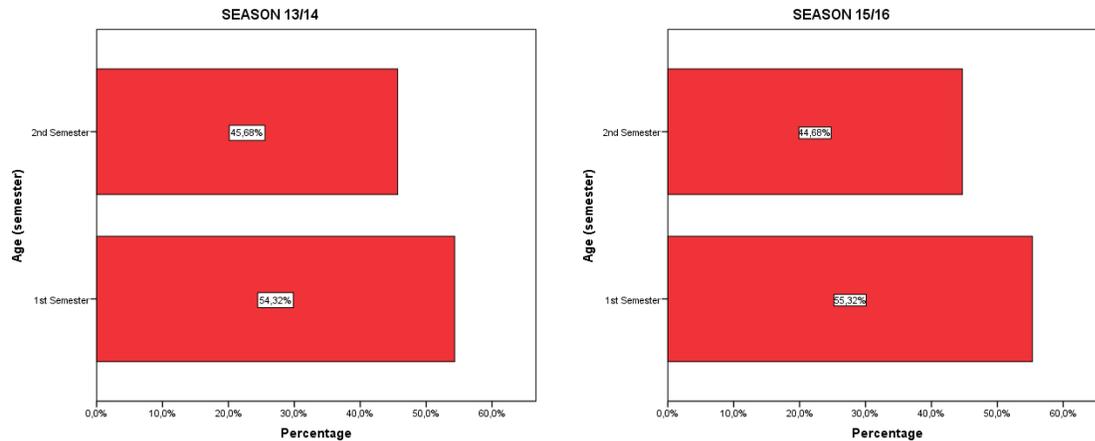


Figure 2. Sample distribution for semester according to season, 2013/2014 (left) and 2015/2016 (right).

**Analysis according to season, sex and category**

Table 2 shows the distribution of the players in function of the season of play, sex, and category, according to the trimester and semester of birth. The results of the  $\chi^2$  test reveal the existence of statistically significant differences related to the variable of sex with values of  $p < .004$  according to the birth trimester, and values of  $p < .003$  according to the birth semester. On the other hand, the variables season and category of play did not present significant differences ( $p > .005$ ). In relation to the sex, it can be appreciated how the main distribution of males is found in the second semester (70.5%), while the distribution of women is high in the first semester (35.9%).

Table 2. Total percentages of players according to season, sex, and category in function of the trimester and semester of birth. Differences according to the chi-squared test.

Trimester	Season		Chi-Squared Sex Test		Male	Female	Chi-Squared Category		Children		Youth		Junior		Adult		Chi-Squared Test		
	13/14	15/16	$\chi^2$	$p$			$\chi^2$	$P$	$\chi^2$	$P$	$\chi^2$	$P$	$\chi^2$	$P$	$\chi^2$	$P$	$\chi^2$	$P$	
1°	44.2	55.8			61.1	38.9			32.6		26.2		15.5		25.7				
2°	44.5	55.5	.204	.977	67.2	32.8	13.11	.004	28.9		28.5		16.4		26.3	5.593	.780		
3°	45.2	54.8			70.7	29.3			30.1		25.5		17.0		27.3				
4°	45.4	54.6			70.3	29.7			28.4		31.0		15.0		25.6				
<b>Semester</b>																			
1°	44.3	55.7	.189	.676	64.1	35.9	8.790	.003	30.8		27.3		15.9		26.0	.480	.923		
2°	45.3	54.7			70.5	29.5			29.3		28.1		16.1		26.5				

$\chi^2$ =value of chi-squared;  $p$  is set at .05. Every letter of the sub index denotes a subset of semester categories whose column proportions do not differ in a significant way among themselves in the .05 level.

**DISCUSSION AND CONCLUSIONS**

The objective of the present study was to analyze the evolution of the RAE and its influence over sex and category of play in federated handball players in the Region of Murcia. In order to do so, an analysis was carried out according to the trimester and semester of birth for the totality of federated handball players in the HFRM during the 2013/2014 and 2015/2016 seasons. The results of each season show statistically

significant differences and demonstrate that there continues to exist a greater probability of forming part of the different teams if an athlete is born in the first six months of the year, if we look at the aggrupation by trimester as well as if we do it by semester. These results coincide with the results found in other team sports that are different from handball (Prieto et al., 2015; Salinero, Pérez, Burillo, & Lesma, 2013; Salinero et al., 2014) and in samples formed by elite handball players in Spain (Gutiérrez et al., 2012; Sánchez-Rodríguez et al., 2012; Sánchez-Rodríguez, Grande, Sampedro, & Rivilla-García, 2013) as well as outside of Spain (Schorer et al., 2009a, 2009b, 2010 and 2013). Additionally, this existing tendency in the formation stages of the Region of Murcia have been shown also in different studies realized with basketball players by Sáenz-López et al. (2006) and Feu, Ibáñez, Sáenz-López, and Giménez (2008) or in football by Vaeyens, Philippaerts and Malina (2005) and Gutiérrez, Pastor, González, and Contreras (2010).

As such, it is confirmed that although years have passed, the RAE continues to exist in the population of federated handball players in the Region of Murcia. This finding reflects that for the trainers of the different teams, influenced by the RAE, the variable month of birth continues to be important as a criterion for the formation of a squad, surely as a consequence of the higher maturity of the players. For Isorna, Vaquero, Vinuesa, and Rial (2014) these selected players will have a greater number of sport opportunities and experiences that can lead to influencing positively in their motivation and growth as a player. On the other hand, and according to other studies, the negative side to this procedure is that players born in the last months of the year tend to become demotivated and abandon the sport at early ages (Barnsley & Thompson, 1998; Helsen, Starkes, & van Winckel, 1998).

Regarding the variable of sex, the results showed that through different studies the RAE affects the males as well as the females. Even so, the majority of the investigations have analyzed this variable separately, being over all more numerous the studies centered on males. As such, the scarcity of existing studies where the sample is composed of males and females at the same time, as our study has done, should be pointed out. The results of the actual study reflect that the greatest distribution of males is concentrated in the second semester of birth, while the females are more distributed in the first semester. Therefore, the RAE affects males as well as females, although it is more pronounced in the latter group. In this way, we coincide with other studies realized in team sports like soccer (Delorme, Boich, and Raspaud, 2010; González, 2007), handball (Schorer et al., 2009b), and individual sports such as kayaking (Isorna et al., 2014). On the other hand, these results contradict the findings of Helsen, Hodges, van Winckel, and Starkes (2000) in soccer, Cogley, Baker, Wattie, and McKenna (2009) in different sports, Gutiérrez et al. (2012) in handball, Leite, Borges, Santos, and Sampaio (2013) in basketball, and Saavedra-García, Gutiérrez-Aguilar, Sa-Marques and Fernández-Romero (2015) in track, in which this effect had a lesser presence or even an absence in the women, independently of the modality of sport practiced.

After confirming that with the passing of the years the RAE continues to exist among nonprofessional federated handball players of the Region of Murcia and that it affects not just males but females as well, the effect being more pronounced in the females, it makes it necessary to raise awareness to the handball trainers in the categories of formation on the consequences of selecting and structuring their teams taking only the maturity of the player into account and not other aspects such as the technical- tactical.

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