Original Article

Relative age effect during the selection of young handball player

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Abstract:

This study analyzed the effect of age on adolescent handball players. To do this, data on gender, date of birth and the playing position of 479 youth players from different regional championship teams in the 2015-16 season were examined. Comparisons and differences were studied using χ^2 and Z tests and the Bonferroni method. The analysis of results based on the quarter and semester of birth revealed the existence of significant differences which prove that athletes born in the early months of the year are more likely to be part of a championship team. As regards gender and specific position, no statistically significant differences were found but a percentage of relative age effects were notable at this stage of training. Performance analysis yielded significant differences in the women's teams. In conclusion, date of birth remains a key factor in the selection of young talent in handball players.

Key words: talent selection, youth sport, performance, chronological age, player position.

Introduction

There are a large number of studies, which seek to understand the factors that influence the development and advancement of talented players in various sports (Feu et al., 2008; Saether, 2015). All studies agree that athletes must follow a development program that is as well adapted as possible to their age and level (Sáenz-López et al., 2006). These studies also show that the process of detection and selection of talents must be based on a multi-dimensional perspective with the aim of avoiding the loss of talent as not all athletes who shine at the outset of their careers continue to do so as they mature (Abbott & Collins, 2004). The development of an athlete has to be considered as a long-term process in which, aside from having the necessary genetic predispositions for the sport concerned, he or she must undergo an appropriate process of training and development.

With regard to handball, the current models of play set out the prototype of player required (Karcher & Buchheit, 2014). It must be remembered that it is the trainer who opts for one or other model of play and selects the player profiles that best suit his individual, collective and strategic approach. Thus there will be as many different teams as there are trainers and playing systems.

In the current sporting world athletes are grouped by age with the aim of assisting their development, fair completion and equality of opportunities (Gutiérrez, 2013). Normally, January 1 is taken as the dividing line for classifying age groups so all the children born in the same calendar year are grouped together in an attempt to avoid differences in the process of their sporting development (González, 2007). However, as Gutiérrez (2013) points out, there will always be age differences and thus also potential differences in maturity level and experience among members of the same category of sport. The process of growth and maturing of the individual as an athlete does not always go in parallel to his or her chronological age and so the difference between biological and chronological age must always be taken into account. This difference in chronological age between members of the same group is known as Relative Age [RA] and the consequences arising from it as the Relative Age Effect (RAE) (Gutiérrez, 2013; Prieto et al., 2015). Thus, the categorization of young athletes by age creates inequalities in training and reduces the possibilities of younger athletes breaking through to the professional level.

The abovementioned differences may turn out to be critical in the process of selecting athletes, especially in competitive sports and also in team sports, where the need to be picked for the team influences the athlete. This process is influenced by the RAE at younger ages, especially adolescence (15-18 years old), when physical differences are more obvious, which leads trainers to tend to select more physically mature athletes, resulting in a greater presence in the team of those born in the early months of the year (Cobley et al., 2009).

These athletes have the best chances of being selected for more representative teams and thus of having access to expert trainers, better training conditions and a higher level of competitiveness both in training and in competitions.

As a result, athletes born in the later months of the year have to compete against others who are more physically mature and this tends to lead to their losing both motivation and self-esteem and, as a result of not being picked for teams, abandoning sport at an early age.

Studies show that RAE is rarely an issue for those less than 12 years old in teams which are not high-level and that it tends to disappear as athletes grow older, probably due to the growing importance of technique and experience at the expense of physical characteristics. It has also been shown that regardless of the sport RAE is more pronounced in the case of male athletes (Cobley et al., 2009; Gutiérrez et al., 2012).

Finally, due to the scarcity of studies in the field of Spanish handball and the specific requirements of this sport, the objective of this study was to determine the influence of the RAE on gender, the specific playing position and performance of young players in the Regional Selections Handball.

Material & Methods

Participants

The design study is sectional, descriptive and non-experimental. The study sample includes 479 handball players (250 male and 229 women) who played the last Spanish Regional Handball Championship for juveniles ($M = 16.60$, $SD = .50$).

Instruments

The study was conducted in January 3-8, 2016 during the Spanish Regional Handball Championship for youth in Almería (Spain). This competition is divided into two levels: the Spanish Championship (eight regional selections) and the Spanish Cup (nine regional selections). Before data collection was carried out permission was obtained from the Royal Spanish Handball Federation and from the teams' trainers. Data were collected in the presence of an interviewer using a self-administered questionnaire. Coaches and players were informed of the purpose of the study and anonymity of their responses.

Procedure

Data collection was carried out in the hotels where the teams stayed during players' rest periods. The following variables were recorded: gender, year of birth, playing position and ranking. In handball the system by which players are registered in the various competition categories produces groups made up of players born in two consecutive years. They are grouped into categories on the basis of the quarter and semester when they were born. The variables were calculated and recoded on the basis of the quarter in which the player was born (1st, Q1 January to March; 2nd, Q2 April to June; 3rd, Q3 July to September and 4th, Q4 October to December), the semester in which each player was born (1st, January to June and 2nd, July to December), as well as each player's position: 1 (goalkeeper), 2 (circle runner), 3 (back), 4 (winger) and 5 (centre). Furthermore, the classification achieved (performance) in the championship is taken into account so that the first three classified in the Spanish Youth Championship (1) and the final three classified in the Spanish Youth Cup (3) in the male and female (the first three -2- and the final three -4-) are analysed

Data analysis

Descriptive statistics and frequencies were calculated. The chi-square (χ^2) test was used to determine whether being born in a particular period of the year produced an advantage or disadvantage with regard to being picked for a team. In addition, analysis of the differences in distribution of percentages in each quarter or semester of birth by gender and playing position was calculated. The χ^2 test was also calculated, the column proportions were compared using Z testing and the Bonferroni method for correcting p test values. A χ^2 test was performed, according to the classification achieved in the championship in both the male and female categories. The calculations were performed using SPSS 22.0.

Results

Analysis by quarter and semester of birth

Figure 1 shows that the most numerous were those born in the first two quarters, more than 27%, while those born in the third and fourth quarters amounted to 21 and 22% respectively. The χ^2 test showed statistically significant differences ($\chi^2_{(gl=3)}=8.76$; $p=.032$). These results can be seen more clearly when the χ^2 is done by quarter of birth ($\chi^2_{(gl=1)}=8.29$; $p=.004$) and show that there is a greater possibility of forming part of these teams for those born in the first six months of the year (Figure 1).

Fig.1. Sample distribution by quarter (left) and semester (right) of birth

Analysis by gender and playing position

The results of the χ^2 test revealed no statistically significant differences by gender or quarter of birth with regard to forming part of a team ($p > .05$) (Table 1). However, the third quarter averages show more than a twelve-point difference between men and women. Likewise, in the fourth quarter the percentage difference is more than six points. In the analysis by semester no significant differences were found, though among boys those born in the second semester outnumber those born in the first and vice versa among girls.

Neither did analysis by quarter find statistically significant differences ($p > .05$) taking into account playing position although some percentages are worth pointing out. Wingers have the highest portion of those born in the first and second quarter, almost tripling the percentage of goalkeepers in both cases. A third of backs were born in the third quarter with much higher averages than the rest of the playing positions, which do not reach 20%. The wingers and backs have the highest averages in the fourth quarter, practically doubling that of the rest of the playing positions. Analysis by semester, by contrast, does show statistically significant differences between the goalkeeper and winger playing positions (Table 1). The percentage of goalkeepers born in the second semester is more than seven points greater than those born in the first semester. By contrast, the percentage of wingers born in the first semester is twelve points more than those born in the second.

Table 1: Percentages of all players by gender and playing position with regard to their quarter of birth. Differences by χ^2 test

Quarter	Sex		χ^2 test		Playing position					χ^2 test	
	Male	Female	χ^2	<i>P</i>	GK	CR	BA	WI	CE	χ^2	<i>p</i>
Q1	51.4%	48.6%	1.40	0.706	11.4%a	14.3%a	24.3%a	31.4%a	18.6%a	20.66	0.056
Q2	48.9%	51.1%			10.7%a	15.3%a	22.1%a	35.1%a	16.8%a		
Q3	56.4%	43.6%			14.9%a	11.9%a	33.7%a	19.8%a	19.8%a		
Q4	53,3%	46,7%			14.0%a	14.6%a	26.1%a	28.0%a	13.3%a		
Semester											
1°	50.2%	49.8%	1.01	0.315	11.1%a	14.8%a	23.2%a	33.2%a	17.7%a	11.92	0.018
2°	54.8%	45.2%			17.8% b	14.4%a	29.8%a	21.2% b	16.8%a		

Note. GK=goalkeeper, CR=central runner, BA=back, WI=winger, CE=center. Each letter of the subscript denotes a subset of semester categories whose column proportions do not differ significantly from each other at the .05 level.

Analysis by classification achieved in the championship

An analysis was performed to test whether the quarter or semester of birth of the members of each team had any connection with the performance level achieved. Among the top three finishers in the men's category ($n=49$) no statistically significant differences ($p > .05$) were found, although those born in the first quarter were more numerous, doubling in number those of other quarters (Table 2). Among the three leading finishers in the female category ($n=47$) statistically significant differences depending on the semester of birth were found, with those born in the first semester doubling in number those born in the second (Table 2).

No differences between the three teams occupying the last positions were found, neither in the female nor male categories ($n=44$). It can be seen, however, that among men there is a more proportionate distribution of births across the four quarters and the largest number of girls was born in the second quarter (Table 2).

Table 2. Analysis by quarter and semester by ranking. Differences by χ^2 test

Ranking	Quarter				χ^2 test		Semester		χ^2 test	
	Q1 (n)	Q2 (n)	Q3 (n)	Q4 (n)	χ^2	p	1 (n)	2 (n)	χ^2	p
First three Sp. Champ. Male	20	10	9	10	6.59	.086	30	19	2.47	.116
First three Sp. Champ. Female	16	16	10	5	7.21	.065	32	15	6.15	.013
Last three Sp. Cup male	12	12	11	9	.44	.931	23	20	.21	.647
Last three Sp. Cup female	11	16	8	9	3.46	.327	27	17	2.27	.132

Discussion

The objective of this study was to identify by quarter and semester of birth the influence of RAE on gender, playing position in handball and the level of performance produced. Notably few studies in this regard have been carried out, both at the Spanish (Gutiérrez et al., 2012; Sánchez-Rodríguez et al., 2012), and international level (Karcher et al., 2014; Nakata & Sakamoto, 2011; Schorer et al., 2009b; Schorer et al., 2009a; Schorer et al., 2010; Schorer et al., 2013) that would allow for a more specific discussion of our results.

The results of both analyses show statistically significant differences and that those born in the first six months of the year have greater possibilities of being selected for regional selections, regardless of whether they are grouped by quarter or semester. These results are consistent with those found in team sports other than handball (Bruner et al., 2014; Campos et al., 2016; Ishigami, 2015; Lewis et al., 2015; Prieto et al., 2015; Salinero et al., 2014; Sedano et al., 2015) and in samples made up of elite handball players both in Spain (Gutiérrez et al., 2012; Sánchez-Rodríguez et al., 2012; Sánchez-Rodríguez et al., 2013) and abroad (Schorer et al., 2009a, 2009b, 2010 y 2013). Thus the existence of RAE is confirmed in team selection at junior levels in Spain. This has been shown in other similar studies such as those carried out by Sáenz-López, et al., (2006), Vaeyens et al. (2005) and Feu et al. (2008).

This shows that, considerations of training and practice being equal, the month of birth variable is decisive in terms of player performance and thus for team selection for the coaches of regional selections. Thus, players born in the early months of the year, unlike those born in the later ones, have greater chances of being selected given that as a result of their more advanced developmental stage they usually have greater physical and coordination qualities. This in turn allows them to have more and better sports opportunities and experience (monitoring and training from better qualified coaches etc.) that positively influence their motivation and growth as players (Isorna et al., 2014).

With regard to the gender variable and the quarter or semester of birth, the majority of studies have only looked at male athletes. The present study shows that there are no statistically significant differences with regard to chances of team selection. However, there are more players born in the second semester in the case of men, more specifically the third quarter. Among the women, the largest number were born in the first semester, more specifically, the second quarter. It is thus demonstrated that RAE affects both males and females although in this study its effects are more pronounced in the case of women and these results are in line with those found in team sports such as football (Delorme et al., 2010; González, 2007) and handball (Schorer et al., 2009b) and individual ones such as canoeing (Isorna et al., 2014). These results contradict those found by Helsen et al. (2000), Cogley et al. (2009), Gutiérrez et al., (2012), Leite et al. (2013) and Saavedra-García et al. (2015) which hold that the RAE is less present or even absent among women, regardless of sport. There is a need for greater research with regard to this phenomenon in female sport to determine the causes of its appearance in sports in which it previously did not exist (Gutiérrez, 2013).

With regard to the playing position variable, some studies of team sports have highlighted its importance in team selection (Prieto et al., 2015; Salinero et al., 2014) and this is even more so in the case of handball, a sport with a great deal of specialisation among those who play it, depending on the position they occupy on the court. (Schorer et al., 2009a, 2009b; Sánchez-Rodríguez et al., 2012). Although the results show no statistically significant differences in terms of quarter of birth, it must be highlighted that the majority of wingers selected were born in the first and second quarters and in the third quarter in the case of backs. Significant differences were found in the case of the goalkeepers and wingers. The goalkeepers are selected above all from those born in the second semester while the majority of the wingers were born in the first. These results coincide with those found by Schorer et al. (2009b) in Germany and Sánchez-Rodríguez et al. (2012) in Spain in which the greatest level of RAE was shown in front line positions (especially left wingers) with a greater number of players being born in the first quarters of the year. This may be due to the anthropometric demands of these particular positions at these ages.

In the abovementioned study carried out in Germany, right wingers along with centres are the most strongly represented among those born in the second and third intermediate quarters, the circle runners have greater representation in the final quarters and the goalkeepers in the first and fourth quarters (Schorer et al., 2009b). By contrast, in the study carried out by Sánchez-Rodríguez et al. (2012), the second line players (backs

and circle runners) have greater representation in the third quarter, while goalkeepers predominate in the first. The results regarding the position of goalkeeper contradict those found in the abovementioned studies.

Finally, the analysis based on ranking shows that among the three leading male teams no statistically significant differences were found, though those born in the first quarter were more numerous. In the case of the three leading female teams, statistically significant differences were found with regard to semester of birth: double the number was born in the first by comparison to the second. No statistically significant differences were found in the last three male or female teams either. In this case it can be seen that while there is a more proportionate spread of male births across the four quarters more women are born in the second quarter. These results show that apparently those born in the first quarters are to be found in the best teams and that this is even more so among females, as among men the spread of birth dates is more proportionate while in the case of women those born in the first semester have the best results. This latter result is of the greatest importance for coaches.

Conclusions

The results obtained in this study show that there is a significant imbalance in terms of quarter of birth of the players. The existence of the RAE is confirmed among the players selected for and who participated in the last Spanish Regional championships for both men and women. It is thus shown that date of birth is a relevant factor in elite level, youth handball in Spain. It is also confirmed that the identification and selection of handball players is currently carried out based on a paradigm consisting largely of physical, anthropometric and performance factors and not on the all-round development of the athlete. We believe that there is a need for longitudinal studies to find out how many of these young talents eventually make their way to high level teams as this tendency to select early developing players usually leads to a loss of talented players. In future studies we will attempt to include other performance factors such as those related to players' individual success according to their specific positions in championships.

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