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ORIGINAL

RELATIVE AGE EFFECT ON NATIONAL SELECTION PROCESS IN TRIATHLON

EFECTOS DE LA EDAD RELATIVA EN EL PROCESO DE SELECCIÓN NACIONAL DE TRIATLETAS

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ABSTRACT

The aim of this study was to analyze the influence of relative age effect on the selection process in triathlon (n = 1321). The sample was divided by category and gender. Each category was allocated into four quartiles - based on date of birth according to the selection year. The Krustal-Wallis and Mann-Whitney test were used to analyze the intra-categorical and intra-gender differences. The results showed a better performance trend in those athletes that were born in the first quartile. In contrast, athletes that were born in the latter part of the year showed poorer overall performance and a lower score in the point scale. However, these results were less consistent for females. This work has shown a significant loss of potential triathlon talent due to the influence of RAE in the selection process and competitive structure.

KEYWORDS: *date of birth, performance, talent selection, mature*

RESUMEN

El objetivo de este estudio fue analizar el efecto de la edad relativa (RAE) en el proceso de selección nacional de triatletas (*n* = 1321) durante las temporadas 2013-2015. La muestra fue divida por categorías y sexo. Cada una fue subdividida en 4 cuartiles según la fecha de nacimiento. Las diferencias fueron analizadas mediante la prueba no paramétrica Krustal-Wallis. Para la comparación múltiple se utilizó *U* de Mann Whitney. Los resultados mostraron que el rendimiento en las pruebas analizadas presentaba una mejor tendencia en aquellos deportistas nacidos en el primer cuartil del año para el sexo masculino. En esta línea, los atletas nacidos en la última parte mostraron un peor rendimiento general. Estos resultados fueron menos consistentes para el sexo femenino. Este trabajo ha puesto de manifiesto la influencia del RAE en los procesos de identificación de talentos y la estructura competitiva, sugiriendo su consideración en los procesos de selección.

PALABRAS CLAVE: fecha de nacimiento, rendimiento, talento deportivo, maduración

INTRODUCTION

In many social structures, date of birth is the factor that determines the entrance of individuals in specific age levels. This process can generate heterogeneous groups in certain areas due to the difference in months that may exist (Delorme, Boiché & Raspaud, 2010a) despite being identified under the same age range. The implications that emerge from this disparity are known as the relative age effect (RAE: Relative age effect). The literature provides evidence of this phenomenon on the school environment, showing how the seasonality of birth is related to the likelihood of academic success (Freyman, 1965; Jinks, 1964; Lien, Tambs, Oppedal, Heyerdahl & Bjertness, 2005; Sprietsma, 2007; Williams, 1964).

Several studies have shown the incidence of RAE in the learning process at early ages. Williams (1964) analyzed the proportion of students with learning disorders in a sample of 265 primary school children, being higher in those students born in the second half of the year (May-December). In a subsequent study, Freyman (1965) obtained a similar result in a sample of 364 British primary school children. The author identified 46.7 % of students who had such learning difficulties were born between the months of May and August. In addition, Sprietsma (2007) conducted an international comparison of RAE using the PISA 2003 report in the first years of education, showing a clear presence of this effect along the educational process in 10 of the 16 countries analyzed.

In the sports field, the training and competitive structure is commonly based on age ranges as in the educational structure in order to equalize opportunities during these periods (Musch & Grondin, 2001). However, errors of this equity system are reflected in the chronological age difference of up 23 months between two athletes who are competing in the same category in case they were not born in the same year, or 11 months in case both athletes were the same age (Delorme et al., 2010a). Campo (2013) indicated that the two-year category system established in many sports acts as an enhancer of RAE as mature differences among athletes increase.

Most studies have examined the effect of this phenomenon from early stages of sport initiation (10-11 years) to elite (16-18 years), demonstrating the presence of RAE in these phases. These intra-categorical differences could be due to the relationship between functional and anthropometric capabilities and the maturing paces (Malina, Bouchard & Bar-Or, 2003; Morrison, Smith & Dow-Ehrensberger, 1995). This hypothesis, which is the most widespread, is consistent with the gradual reduction of this effect as growth stages (Armstrong, 1966) occur up to elite.

The authors have studied the matter in many team sports, highlighting football and ice hockey above all. Nolan & Howell (2010) showed how several hockey teams' U-21 players born during the early part of the year (January-June) reached more probably the elite and had lower dropout levels. Mujika et al. (2009) found similar results in football, analyzing RAE in the Basque youth school football structure, from lower categories (10-11 years) to the elite (16-18 years) in a sample of 13,519 players. The results showed that a higher proportion of selected players were born in the first three months of the selection year (August-October). This birth-date distribution was observed from lower to higher levels. These effects were already shown in previous studies in the football environment, (Helsen, Starkes & Van Winckel, 1998; Salinero, Pérez, Lesma & Herrero, 2014) warning of a possible significant loss of sporting talent in young players (Mujika et al., 2009) due to the sensitivity of the sport training stages (10-18 years) to the RAE.

For individual sports, Costa, Marques, Louro, Ferreira & Marinho (2013) observed the relative age effect on the Portuguese Top 50 swimmers from 12 to 18 years, finding an asymmetric distribution, which had a greater number of swimmers born between the first quartile (January-March) and the second quartile (April -June) of the year. This finding was associated only with male gender (Costa et al., 2013). As part of this approach, Medic, Young, Starkes, Weir & Grove (2009) showed similar results but, unlike previous studies, RAE increased with age. This contrasts with the fact established by Armstrong (1966) on the gradual reduction effect as maturational stages occur. In his review, Mush & Grondin (2001) did not hesitate to qualify RAE as "discriminatory effect" since the identification of the so-called "early promise" could be influenced by this factor, hurting athletes whose birth date are located in the latter part of the year (Delorme et al., 2010b).

The scientific literature indicates that the RAE is present throughout the selection process (Costa et al., 2013; Mujika et al., 2009) or dropout (Delorme et al., 2010a) during the training period and sports development, suggesting a possible loss of skilled athletes. Therefore, its existence is a clear problem in implementing selection programs because talent identification processes may exclude individuals for that reason alone.

On the other hand, the information gathered shows that there is little research on the influence of RAE directly related to the selection processes (Carling, Le Gall, Reilly & Williams, 2009; Deprez, Vaeyens, Coutts, Lenoir & Philippaerts, 2012). It may be due to the difficult access to a large sample in this type of performance testing.

For these reasons, it is necessary to properly understand the variables and the specific context of each sport. This in-depth knowledge would enable the taking of measures in different institutions to implement intervention programs to reduce bias-distribution in favor of those athletes with early maturation as some authors have suggested (Campo, 2013).

Far from being a majority sport, triathlon has experienced a growth in the number of licenses in the last five years, attracting more young athletes. Besides the two-year category system, some authors have identified other enhancers of RAE as increasing the competitive level, early specialization or popularity of sports (Campo, 2013). These elements may jeopardize proper talent identification process and therefore, the review of its organizational structure is necessary as some authors proposed in other sports (Horn & Okumura, 2011).

Based on the studies described above, the purpose of this research was to analyze the effect of RAE on the performance in a group of triathletes during the national selection process.

MATERIAL AND METHODS

Sample

The sample was composed by 1.321 triathletes, 919 male (16,75 ± 1,30 years-old) and 402 female (16,3 ± 1,10 years-old). Both genders aged between 15 and 19 years old (16,61 ± 1,26 years-old). Samples were divided into age groups according to 2015 FETRI regulation. Between 2013 and 2015, male participation was 198, 217 and 225 cadet (16,04 ± 0,82 years) of first, second and third year respectively; and 174 and 105 junior triathletes (18,38 ± 0,48 years) of first and second year. For females: 116, 134 and 88 cadet (15,94 ± 0,78 years) of first, second and third year respectively; and 51 and 13 junior (18,20 ± 0,40 years) of first and second year.

Procedure

For this purpose, the Spanish Triathlon Federation (FETRI) provided retrospective data of the national talent identification process from 2013 to 2015. This work was conducted respecting the principles of the Declaration of Helsinki [36/2015], which describes fundamental ethical principles and the framework of human research.

The selection process includes freestyle swimming timekeeping for 100 m and 1000 m; and track running for 400 m and 1000 m. Regional Federations, whose data is transferred to the National Institution, conducted the implementation and organization. Then, these performance times become specific scores according to the scale established by the FETRI. This conversion allows comparison of performance amongst all participants to detect sports talent in a particular age group. This research also analyses their times in seconds for both genders in order to ensure more accurate results and allow adding or comparing data with other research. This event starts each year in January, ending in early February. Therefore, the first month corresponds with the start date of the selection process (Mujika et al., 2009), which in this case coincides with the first month of the calendar year. Thus, December was considered as the last month.

In view of the above, the year was subdivided into four quartiles: first quarter (Q1) - born between January and March; second quarter (Q2) - born between April to June; third quarter (Q3) - born between July to September; fourth quarter (Q4) - born between October to December. This subdivision was done in order to group athletes according to their date of birth and analyze the effect of relative age.

Statistical analysis

Descriptive statistic and inferential analyses were performed using SPSS software (version 21.0) for OS-X. The non-parametric Kruskal-Wallis test was used to determinate intra-categorical and intra-gender differences between quartiles in the dependent variables (time in 100 m and 1000 m swimming - NA100 and NA1000 respectively, time in 400 m and 1000 m running tests -CC400 and CC1000- and finally the total score -PT-). The Mann-Whitney U test was used for multiple comparison between quartiles, setting the alpha level by Bonferroni correction (α/ No. comparisons), in this case p= 0,05/6; p= 0,0083. In addition, the effect size was measured by *d* Cohen (1988).

RESULTS

First, it is important to note that no significant differences were found in the distribution of the sample between groups for both conditions: categories and gender. Regarding the range of intra-categorical skewness and kurtosis, statistical analysis showed values between -3,68 and 2,56; -1,96 and 20,56, respectively. Likewise, the results of the Shapiro-Wilk were inadequate ($p < 0,05$) for all female categories and junior in both, male and female. In relation to male categories, the values of the Kolmogorov-Smirnov test did not meet the assumption of normality in most cases ($p < 0,05$).

Table 1 shows the data analysis for males organized by categories for each quartile and peer group comparison. The frequency of triathletes is similar between quartiles; being lower among those born in October-December (Q4). However, in all categories except JN2 significant differences between pairs Q1 and Q4 were found. In all cases the performance was higher in athletes born in the early part of the year (Q1). In addition, it is observed how cadet categories are more sensitive than junior to RAE. No influence of RAE was observed in any of the tests analyzed for JN2 category. This fact could be due to the smaller sample size in this case.

Table 1. Intra-categorical differences by quarter for males.

	Q1 *M ± SD*	Q2 *M ± SD*	Q3 *M ± SD*	Q4 *M ± SD*	K-W	Q1 vs Q2	Q1 vs Q3	Q1 vs Q4	Q2 vs Q3	Q2 vs Q4	Q3 vs Q4
CD1 *(n)*	56	55	41	46							
NA100	69,4 ± 7,3	70,6 ± 8,3	73,2 ± 10,7	71,8 ± 10	2,91	-	-	-	-	-	-
NA1000	891,1 ± 132,1	886,9 ± 124,7	919,6 ± 131,2	905,7 ± 140	1,31	-	-	-	-	-	-
CC400m	67,8 ± 8,4	69 ± 7,1	70,5 ± 6,8	71,2 ± 7,1	10,52^{b}	-	-2,47^{*1}	-2,90^{*1}	-	-	-
CC1000m	199,6 ± 23,8	199,7 ± 18,6	207,3 ± 21	205,3 ± 18,9	7,39	-	-	-	-	-	-
PT	13,6 ± 13,1	11,2 ± 10,6	7,9 ± 8,6	9 ± 8,5	4,31	-	-	-	-	-	-
CD2 *(n)*	56	60	57	44							
NA100	69,4 ± 12,1	69,4 ± 7,6	69,8 ± 6,3	69,5 ± 6,6	3,41	-	-	-	-	-	-
NA1000	882,3 ± 152,8	896,3 ± 121,8	904,8 ± 113,7	884,7 ± 104,6	2,35	-	-	-	-	-	-
CC400m	63,9 ± 5,3	65,5 ± 4,9	65,8 ± 6	68,8 ± 7,5	14,66^{b}	-	-	-3,60^{*2}	-	-	-
CC1000m	188,6 ± 16,8	193,7 ± 16,1	194,3 ± 15,4	201,1 ± 19,5	10,87^{c}	-	-	-3,20^{*2}	-	-	-
PT	18 ± 12,7	12,1 ± 10,5	10,6 ± 9,6	9,7 ± 9,7	14,58^{b}	-2,59^{*2}	-	-3,27^{*2}	-	-	-
CD3 *(n)*	57	59	62	47							
NA100	65,6 ± 7,2	66,6 ± 5,7	66 ± 5,9	67,8 ± 6,2	6,06	-	-	-	-	-	-
NA1000	839,8 ± 125	859,5 ± 101,8	868,5 ± 104,7	903,2 ± 117	9,76^{b}	-	-	-2,92^{*2}	-	-	-
CC400m	62,4 ± 4,2	62,9 ± 4,2	63 ± 5,2	63,8 ± 4	5,13	-	-	-	-	-	-
CC1000m	183,4 ± 13,1	186,8 ± 14,8	187,1 ± 19	189,8 ± 13,7	6,31	-	-	-	-	-	-
PT	21,4 ± 11,7	17,6 ± 11,4	18,8 ± 9,2	14,1 ± 9,2	12,16^{b}	-	-	-1,92^{*2}	-	-	-
JN1 *(n)*	44	45	51	34							
NA100	62,8 ± 11,3	65,5 ± 6,5	67,7 ± 9,1	66,8 ± 7,8	3,20	-	-	-	-	-	-
NA1000	823 ± 105,1	857,7 ± 116,3	877,5 ± 137,9	860,2 ± 133,4	4,02	-	-	-	-	-	-
CC400m	61,7 ± 4,4	61,5 ± 4,1	61.4 ± 3,8	64,3 ± 5,1	8,96^{c}	-	-	-2,43^{*2}	-	-2,59^{*2}	-
CC1000m	179,7 ± 13,9	182 ± 12,8	184,9 ± 16,3	186,5 ± 13,8	4,90	-	-	-	-	-	-
PT	20,5 ± 11,7	18,2 ± 12,1	17,4 ± 10,9	15 ± 12,1	4,20	-	-	-	-	-	-
JN2 *(n)*	26	34	23	22							
NA100	63,8 ± 6,3	66,2 ± 10	65,4 ± 8,1	64,6 ± 5,6	0,65	-	-	-	-	-	-
NA1000	825,7 ± 109,9	856,9 ± 131,6	837,8 ± 118,5	842,7 ± 101,8	0,78	-	-	-	-	-	-
CC400m	60,5 ± 3,3	61,6 ± 4,3	61,4 ± 3,6	62,5 ± 3,8	3,46	-	-	-	-	-	-
CC1000m	175 ± 12,5	179,4 ± 15,1	180,4 ± 14,1	181,8 ± 12,1	4,04	-	-	-	-	-	-
PT	22,6 ± 11	19,1 ± 12,2	19,9 ± 11,3	17,7 ± 9,9	2,26	-	-	-	-	-	-

Note: ^{a} *p* < 0,001; ^{b} *p* < 0,01; ^{c} *p* < 0,05 (Kruskal-Wallis test).* *p* < *0,0083* (U Mann-Whitney test and Bonferroni correction). $^{1\ 2\ 3}$ Effect size (Cohen´s *d*: ^{1} small: *d* >0,20, ^{2} medium: *d* >0,50, ^{3} large: *d* >0,80); CD1 = cadet of first year; CD2 = cadet of second year; CD3 = cadet of third year; JN1 = junior of first year; JN2 = junior of second year.

The intra-categorical results for females (Table 2) were not so consistent; although some significant differences between quartiles were observed. According to the results for this gender, the swimming tests –NA100 and NA1000- may be more sensitive than athletics tests –CC400 and CC1000- to RAE (*e.g.*, CD2 –Q3vsQ4-).

Table 2. Intra-categorical differences by quarter for females.

	Q1 *M ± SD*	Q2 *M ± SD*	Q3 *M ± SD*	Q4 *M ± SD*	K-W	Q1 vs Q2	Q1 vs Q3	Q1 vs Q4	Q2 vs Q3	Q2 vs Q4	Q3 vs Q4
CD1 *(n)*	38	34	21	23							
NA100	75,6 ± 10,9	75,9 ± 7,3	78,4 ± 12,7	72,4 ± 5,8	2,96	-	-	-	-	-	-
NA1000	937,4 ± 120,4	949 ± 105,5	940,5 ± 156,9	883,4± 76	4,26	-	-	-	-	-	-
CC400m	79 ± 11,4	76,5 ± 7,3	76,9 ± 7,4	78,2 ± 9	0,93	-	-	-	-	-	-
CC1000m	234,6 ± 33,8	224,2 ± 23,7	224,9 ± 22,3	228 ± 28,5	2,06	-	-	-	-	-	-
PT	16,9 ± 13,9	16,2 ± 11,5	20,4 ± 15,6	19,7 ± 13	1,62	-	-	-	-	-	-
CD2 *(n)*	38	35	29	32							
NA100	75,7 ± 9	73 ± 6,2	77,7 ± 8,1	73 ± 8,3	$8,02^c$	-	-	-	$-2,43^{*2}$	-	$-2,40^{*2}$
NA1000	942,5 ± 129,9	908,8 ± 96	976,4 ± 121,9	896,1 ± 114,3	$8,35^c$	-	-	-	-	-	$-2,62^{*2}$
CC400m	77,3 ± 7,4	77,4 ± 7,9	80,1 ± 8,2	74,7 ± 6,3	3,67	-	-	-	-	-	-
CC1000m	227,3 ± 25,6	229,2 ± 25,2	234,9 ± 25,8	223 ± 25,3	1,77	-	-	-	-	-	-
PT	15,1 ± 12,4	16,7 ± 13,3	11,1 ± 10,5	18,9 ± 14,2	6,32	-	-	-	-	-	-
CD3 *(n)*	26	24	16	22							
NA100	74,3 ± 8,3	72,7 ± 7,1	72,7 ± 4,4	73,8 ± 7,9	0,49	-	-	-	-	-	-
NA1000	928,1 ± 139,2	906,9 ± 114,6	895 ± 77,8	912,1 ± 117	0,14	-	-	-	-	-	-
CC400m	74,7 ± 6,3	73,6 ± 5,1	78,9 ± 9,2	75,5 ± 8,6	3,09	-	-	-	-	-	-
CC1000m	223 ± 25,3	220,5 ± 19	228,5 ± 28,46	222,5 ± 26,4	0,70	-	-	-	-	-	-
PT	18,9 ± 14,2	20,1 ± 10	16,1 ± 13,4	19 ± 13,9	1,00	-	-	-	-	-	-
JN1 *(n)*	11	17	10	13							
NA100	74,8 ± 8,5	71,2 ± 8,7	69,6 ± 3,4	71,3 ± 8,3	2,34	-	-	-	-	-	-
NA1000	924,2 ± 141,6	875,2 ± 127,5	849 ± 62,6	902,1 ± 146,6	1,16	-	-	-	-	-	-
CC400m	75,2 ± 5,7	73,7 ± 7,3	78,4 ± 11,8	76,6 ± 6,6	1,53	-	-	-	-	-	-
CC1000m	218,9 ± 23,1	215,2 ± 22,3	223,4 ± 24,2	229,6 ± 26,1	2,68	-	-	-	-	-	-
PT	17,1 ± 13,9	22 ± 10,6	18,8 ± 13,3	16,9 ± 13	1,85	-	-	-	-	-	-
JN2 *(n)*	5	4	2	2							
NA100	74,1 ± 5,8	68,9 ± 4,6	82,7 ± 19,3	70,4 ± 4,8	2,64	-	-	-	-	-	-
NA1000	933 ± 118,8	839,5 ± 104,2	955 ± 227,6	915,5 ± 94	2,38	-	-	-	-	-	-
CC400m	74,9 ± 8,1	77,3 ± 4,8	72,1 ± 2,9	69,5 ± 9,1	2,21	-	-	-	-	-	-
CC1000m	226,2 ± 34,4	221 ± 9	203 ± 7	209 ± 19,7	1,59	-	-	-	-	-	-
PT	14,7 ± 14,5	20,2 ± 4,1	22,9 ± 15,1	20,8 ± 13,1	0.61	-	-	-	-	-	-

Note: ^{a} $p < 0,001$; ^{b} $p < 0,01$; ^{c} $p < 0,05$ (Kruskal-Wallis test)*.* * $p < 0,0083$ (U Mann-Whitney test and Bonferroni correction)*.* $^{1\,2\,3}$ Effect size (Cohen´s *d*: ^{1} small: $d > 0,20$, ^{2} medium: $d > 0,50$, ^{3} large: $d > 0,80$); CD1 = cadet of first year; CD2 = cadet of second year; CD3 = cadet of third year; JN1 = junior of first year; JN2 = junior of second year.

Table 3 reveals significant intra-gender differences between quarterly birth date intervals. In that case, skewness values between -0,04 and 2,52 were obtained; and kurtosis in the range -1,12 to 13,44. The results of the Kolmogorov-Smirnov test were not adequate in most cases ($p < 0,05$) for the performance variables in different quartiles. The results show that males seem more sensitive to RAE. It is also noted as the performance is lower in athletes born in the latter part of the year (Q4) due to significant differences for all variables analyzed between male athletes born in the first quartile (Q1) and the others (Q2 Q3 and Q4), except for CC400m in the Q1vsQ3 comparison. Also, it is observed that as performance decreases progressively from Q1 to Q4 in the masculine gender, in case of females no significant differences were found.

Table 3. Intra-gender quarterly birth date intervals comparison.

	Q1 *M ± SD*	Q2 *M ± SD*	Q3 *M ± SD*	Q4 *M ± SD*	K-W	Q1 vs Q2	Q1 vs Q3	Q1 vs Q4	Q2 vs Q3	Q2 vs Q4	Q3 vs Q4
MAS *(n)*	239	254	233	193							
NA100	66,7 ± 9,6	67,9 ± 7,7	68,4 ± 8,3	68,6 ± 7,8	10,80^{c}	-	-2,58^{*1}	-2,98^{*1}	-	-	-
NA1000	857,2 ± 131,1	874,2 ± 119	885,1 ± 122,5	885,1 ± 122,7	10,76^{c}	-	-2,95^{*1}	-2,76^{*1}	-	-	-
CC400m	63,7 ± 6,1	64,5 ± 5,8	64,4 ± 6,1	66,6 ± 6,7	30,47^{a}	-	-	-5,37^{*1}	-	-3,70^{*1}	-3,38^{*1}
CC1000m	186,8 ± 18,8	189,5 ± 17,1	190,9 ± 18,9	194,6 ± 18,3	22,87^{a}	-	-2,43^{*1}	-4,73^{*1}	-	-2,55^{*1}	-2,58^{*1}
PT	18,7 ± 12,5	15,2 ± 11,6	14,7 ± 10,8	12,5 ± 10,2	27,77^{a}	-3,13^{*1}	-3,37^{*1}	-5,11^{*2}	-	-	-
FEM *(n)*	118	113	79	92							
NA100	75,2 ± 9,2	73,12 ± 6,7	77,1 ± 9,3	73,3 ± 7,9	6,09	-	-	-	-	-	-
NA1000	935,4 ± 125	907,5 ± 108,8	947 ± 123,3	908,1 ± 115,9	5,01	-	-	-	-	-	-
CC400m	76,9 ± 7,5	75,2 ± 6,4	79,1 ± 9,1	77,5 ± 8,4	4,19	-	-	-	-	-	-
CC1000m	227,8 ± 27,9	220,1 ± 20	229,3 ± 24,8	228,9 ± 27,1	1,72	-	-	-	-	-	-
PT	16,2 ± 13,7	19,3 ± 11,64	14,5 ± 12,4	17,9 ± 13,6	4,49	-	-	-	-	-	-

Note: ^{a} $p < 0{,}001$; ^{b} $p < 0{,}01$; ^{c} $p < 0{,}05$ *(*Kruskal-Wallis test*).* * *p < 0,0083 (*U Mann-Whitney test and Bonferroni correction*)*. $^{1\ 2\ 3}$ Effect size (Cohen´s *d*: ^{1} small: *d* >0,20, ^{2} medium: *d* >0,50, ^{3} large: *d* >0,80)

DISCUSSION

The purpose of this research was to determine the importance of the relative age effect on the talent identification process in a group of triathletes. Data from this study have shown that athletes born in the first quartile of the year -Q1- (January-March) obtained better times in most of the tests performed than those born in the last quartile of the year -Q4- (October- December). In addition, the results show that the differences are accentuated progressively as quartiles that are more distant are compared. However, these results have not been so consistent for females, in accordance to the findings of Costa et al. (2013) and Helsen et al. (2005) which indicate the absence or lower presence of RAE in women's sports. However, Campos (2013) highlights the need to consider the phenomenon in females due to recent studies, which have identified its influence in elite women's sports (Delorme et al., 2010c).

The analysis for males have shown the existence of RAE during the selection process and how its influence may determine, in many cases, the result of athlete performance tests. These findings are in the line marked by previous research that examined it in other sports like swimming (Costa et al., 2013), football (Deprez et al., 2012) or more recently in alpine skiing where Müller, Hildebrant & Raschner (2015) demonstrated the way RAE influences performance during the competition. These authors warn that athletes born in the last quartile of the competitive year are less likely to reach the elite due to the influence of this factor.

Furthermore, Delorme et al. (2010a) observed that the ratio of athletes who experienced negative experiences, frustration or sport dropout was higher in soccer players born in the latter part of the competitive year. In this regard, our study warns that triathletes whose birth date is between October and December may suffer similar experiences more frequently than the rest; however, further research is required to analyze this situation.

Differences between categorical ranges also show the sensitivity of the outcome to chronological age. Timekeeping on CC400 and CC1000 were better in those athletes born in the early part of the year (January-March), occurring the most significant difference between Q1-Q4 in cadet group of first and second year. In this work, swimming tests seem to be less sensitive to this effect. These results contrast with those found by Costa et al. (2013) in this discipline. The difference in the composition of the sample, professional swimmers and triathletes, may be the main cause of the results. It is important to point out that the technical aspect in this discipline is essential. While in the research of Costa et al. (2013) the technique could remain homogeneous in the different groups in our research could be greater intra-individual differences in the categories analyzed. This hypothesis could not be verified in the present work but it may serve as model that sets forth a direction for future research.

Several authors (Deprez et al., 2012; Horn & Okumura, 2011; Müller et al., 2015) have shown evidence of the problem that the influence of the relative age effect assumed in other sports. The goal of this study was to determine the presence of RAE in the structure of talent identification in triathlon. The data show that the major differences between quarterly birth date intervals, for categories and genders, corresponding to the total score in the scale. In cadets of the second year category significant differences between Q1-Q4 were observed. Similarly, considerable differences between Q1-Q4 for third year cadets were found. In male cases, there were significant differences in PT between Q1 and the other quartiles. Therefore, the analysis suggests that in addition to influence of RAE on the performance variables, the scoring system itself could be another enhancer element of "discrimination effect" (Musch & Grondin, 2001) that may increase the differences between pairs of groups.

CONLUSION AND FUTURE CONSIDERATIONS

In conclusion, this research has shown evidence of influence of RAE in the variables that determine the final outcome of the selection and identification talent process in triathlon. Probably these differences are due not only to a hypothesis, but as some authors (Campo, 2013) indicated as well as maturity, there are other factors such as experience, self-concept or competitive structure, which contribute to the emergence of RAE in sport. According to the background (Campo, 2013; Costa et al., 2013; Delorme et al., 2010b; Horn & Okumura 2011) given the results it is evident that the current approaches to selection and competitive structure should be reviewed in order to decrease the influence of RAE. To this end, some authors have constructed proposals that consider changes in the competitive organization or bases of selection processes in clubs (Horn & Okumura, 2011) with reference to the subdivision into quartiles according to the date of birth of athletes. However, none has scientifically shown to be effective (Campo, 2013). The main problem with this type of strategy is its applicability in the difficult and complex sort of sport contexts.

Future research should be aimed at improving the selection process, rejecting the timekeeping and chronometric structure performance tests in favor of continuous assessment approaches during the training process taking into account variables such as biological age, which would adjust the results to maturation and not to the chronological age of the athlete. In addition, studies should be increased in order to determine the influence of RAE in women's sport since in this work we have achieved some significant intra-categorical differences limited by the sample size.

Despite the limitations of this study, the found data have revealed the presence of RAE in the process to identify sport talent and its influence on performance. Thus, these results suggest that the inclusion of RAE matter in coach training programs could favor the identification of temporary benefits related to the individual maturation. Finally, to minimize the relative age effect it is essential to act responsibly from all official institutions and to become aware of this problem for improving this kind of process in order to provide equal opportunities for all athletes.

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