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review article

Relative age effect and its relationship with morphological characteristics and performance in young soccer players

Efeito da idade relativa e sua relação com as características morfológicas e de desempenho em jovens futebolistas.

Augusto Pedretti[1]
André Seabra[2]

Abstract – In soccer, the relative age effect (RAE) was observed in both adult and young players. The RAE appears to be more pronounced in elite sports, probably by the need to select the best players to compete internationally. This study review: (1) the prevalence of RAE in soccer players, (a) considering competitive level (b) and specific position and (2) association between RAE (a) and anthropometric characteristics, (b) physical fitness components and technical skills. A total of 12 studies met all inclusion criteria for this review. One trial (meta-analysis) was included after the eligibility process. Overall, 77675 young soccer players were analysed. In all studies, significance level of 0.05 was set for the type I error. There is a consensus about the presence of an RAE in men's soccer, and the percentage of players born in the first quarter in the selection year for professionals is high, with peak values found for elite young athletes, and a large decrease is evident throughout the regional and school representation. The relationship between RAE and the specific position is controversial, according to few studies. It is likely that players born in the first quarter differ in a variety of anthropometric characteristics and physical fitness components compared with peers born in the last quarter. Researchers need to understand the mechanisms by which RAE increase and decrease in order, to reduce and eliminate this social inequality that influence the experiences of athletes, especially in periods of development. Organizational and practical intervention is required.

Key words: Physical fitness; Relative age effect; Soccer,

Resumo – *No futebol, o 'efeito da idade relativa' foi encontrado tanto em jogadores adultos quanto em jovens. O 'efeito da idade relativa' parece ser mais pronunciado em esportes de elite, provavelmente, pela necessidade de selecionar os melhores jogadores para competir em nível internacional. Revisamos: (1) a prevalência do 'efeito da idade relativa' em jogadores de futebol, (a) considerando o nível competitivo (b) e a posição específica e (2) a associação entre o 'efeito da idade relativa' (a) sobre as características antropométricas, (b) componentes da aptidão física e habilidades técnicas. Um total de doze estudos preencheram todos os critérios de inclusão para esta revisão. Um ensaio (meta análise) foi incluído após o processo de elegibilidade. O total de 77675 jovens futebolistas foi analisado. Em todos os estudos, um nível de significância de 0.05 foi estabelecido para o erro tipo I. É consenso na literatura a presença de um EIR no futebol masculino, sendo a porcentagem de jogadores nascidos no primeiro trimestre do ano de seleção alta para os profissionais, com valores de pico encontrados para os jovens de elite, e que ao longo da representação regional e escolar se evidencia um grande decréscimo. Para posição específica, a relação com EIR é controversa dado aos poucos estudos. É provável que os jogadores nascidos no primeiro trimestre do ano de seleção diferem em uma série de medidas antropométricas e aptidão física, em comparação com os pares que nascem no último semestre. Os pesquisadores precisam entender os mecanismos pelos quais o 'efeito da idade relativa' aumenta e diminui, para reduzir e eliminar esta desigualdade social que influencia as experiências dos atletas, especialmente, em períodos de desenvolvimento. É necessária a intervenção organizacional e prática.*

Palavras-chave: *Aptidão física; Efeito da idade relativa; Futebol.*

1 University of Porto. Faculty of Sport. Center of Research, Education, Innovation and Intervention in Sport. Porto, Portugal

2 University of Porto. Faculty of Sport. Research Centre in Physical Activity, Health and Leisure. Porto, Portugal

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INTRODUCTION

In order to provide appropriate development, competition and equal opportunities for successful training, children are usually grouped by chronological age in many sports[1-4]. However, considerable complexities can arise due to the existence of significant interindividual variations related to growth and biological maturation especially evident in childhood and adolescence[5]. The Fédération Internationale de Football Association[6] (FIFA) established January 1st as the start date for the selection year for international competitions (specifically from 1st January to 31 December). This age difference among individuals in the same age group is referred to as relative age, and its consequence is known as the relative age effect[4] (RAE).

The majority of studies on this topic are focused on assessing the distribution of the different quartiles and their relationship with the sporting success. The strong linear relationship between month of birth and the proportion of players in the National Hockey League and Canadian leagues was demonstrated for the first time[7]. There are approximately four times more players born in the first quarter of the year compared to the last quarter[1,8]. Soccer, like ice hockey, is among the most popular sports around the world featuring a high prevalence of RAE[1].

In soccer, RAE is observed in both adult[9-13] and young players[13-17]. RAE appears to be more pronounced in elite sports[18], probably by the need to select the best players to compete internationally. Players belonging to high competitive level[19] teams tend to be slimmer and to show greater muscle mass compared to those of lower competitive level.

The influence of relative age is also observed in the functional and technical performance of athletes. Many classifications were created in an attempt to explain the specific psychomotor skills required by certain types of sports[8]. A key element of the selection process[20] is the analysis of the anthropometric characteristics and performance of participants. Considering the importance of these characteristics, different mechanisms have been proposed to explain the causes of RAE[21]. Variations in biological maturation and physical attributes (greater aerobic capacity, muscle strength and height) appear to be also important aspects.

The advantage of having been born at the beginning of the selection year may relate to physical precocity, in other words, players have the advantage of up to 12 months in physical maturation over their peers born at the end of the selection year[8]. This difference can lead to significant changes in anthropometric variables (height, body mass), development of physical fitness (strength, speed, endurance), cognitive skills (game analysis, insight, tactical ability) and psychological variables[5,8]. However, these athletes may not always emerge as the best athletes during adulthood[4]. Rather, these advantages may only contribute to the existence of RAE in soccer, especially among younger players[3,22].

It is noteworthy that there are few studies that relate RAE, competitive level and specific position on anthropometric variables, physical fitness

and technical skills of young soccer players. As a way to fill the gap in literature, this study aims to review RAE, competitive level (professional, amateur, elite, regional and local), specific position (defenders, midfielders and forwarders) and anthropometric variables, physical fitness and technical skills in young soccer players aiming to conclude what extent is the knowledge about this issue and what are the future research directions.

An extensive search of the online electronic database was held in PubMed without time limit. Text words, keywords and descriptors used in the research were: soccer AND (relative age effect). Inclusion criteria were studies published in English that included young soccer players in their sample. Repeated publications for the same studies were excluded. In the presence of any doubt about study inclusion, a final consensus decision was taken after the full text was jointly reviewed. The references of the selected studies were analysed to obtain other relevant studies.

Overall, 37 potentially relevant studies were identified by electronic database and the manual search of reference lists identified other four. A total of 12 studies met all inclusion criteria for this review. One trial (meta-analysis) was included after the eligibility process. Overall, 77,675 young soccer players from 11 different countries were analysed. In all studies, a significance level of .05 was set for the type I error.

RELATIVE AGE EFFECT AMONG PROFESSIONAL TEAMS

The demographic study[23] with professional teams affiliated in European Football Associations (UEFA) in thirty-one first-division championships stressed that players born in the first quarter (Q1) of each year are overrepresented (Q1 = 30% and Q4 = 19%) compared to those born in the last quarter (Q4). According to the above results[9], professional soccer players born from 1935 to 2007 in Germany also showed significant differences among quartiles, with Q1 being overrepresented compared with the other quartiles. Only the group of players born from 1946 to 1950 showed similar distribution in the year of birth.

Professional soccer players of the second and third Belgian divisions[22] (1998/99 to 2002/03), were divided into 1A (old year selection, August) and 2A (new year selection, January). A strong association between quarter of birth and number of players in 1A group ($p<.05$) was demonstrated. Regardless of the selection criteria used, Q1 generated a greater number of players (1A, 28.8%; 2A, 31.5%), while the number of players born in Q4 was lower (1A, 19.9%; 2A, 19.5 %).

In the following decade, from 2000 to 2011, the distributions of professional players by date of birth were examined[12] in England, Portugal, Germany, Belgium, Netherlands, Spain, France, Italy, Denmark and Sweden. The comparative analysis of different ages revealed a significant increase in RAE from 2000-2001 to 2010-2011 ($p<.05$). While in the 2000-2001 season, 29.3% and 19.8% of athletes were born in Q1 and Q4, respectively, in 2010-2011, the relative frequencies were 31.9% and 18.4% respectively. In

2008[10], all forty clubs that participated in the Brazilian Soccer Championship divisions A and B identified a greater number of players born in Q1. There was the preference of clubs of both divisions for recruiting athletes born in the 1st half of the year (Q1 x Q4, p≤.001; Q2 x Q4, p=.001).

RELATIVE AGE EFFECT IN YOUNG SOCCER PLAYERS

The meta-analysis[1] of RAE in sport had its sample divided according to chronological age: <11 years, 11-14 years, 15-18 years and >18 years, and a progressive increase in RAE <11 years up to 15-18 years was observed. Comparison between Q1 and Q4 showed a small-moderate effect for individuals aged 15-18 years and decline in those >18 years. The same was observed in Japan[24], when analysing young soccer players recruited between 1997 and 2000. At ages 10-15 years, 37.9-58.8% of players were born in Q1. Moreover, 3.2-13.5% were born in Q4. These results indicate a significant change in the distribution of month of birth among adolescent elite soccer players compared with the general population (p<.001).

Young Belgian soccer players from eighteen clubs in the first and second division[2] are in agreement with previously published studies. Of young players aged 14-16 years (1996-1997 period), 44.8% were born in Q1 and only 12.5% in Q4. In the 1997-1998 season (14-16 years), again, 29.6% were born in Q1 and only 21.9% in Q4. For players aged 16-18 years, the distributions were similar for both 1996-1997 and 1997-1998 seasons, and most players were born in Q1 (40.2% and 36.1%, respectively). Similarly, only 17.9% (1996-1997) and 18.4% (1997-1998) were born in Q4.

The Swiss system of talent identification[25] is based on three levels of performance. The 1st called 'Jugend und Sport' ('J+S'), which involves all children interested in participation and involvement in a specific sport. The 2nd level of performance is the program for the detection of national talents. National junior teams (U15 to U21) represent the 3rd level of performance. With the exception of 'J+S' (p>.05), and U20 (p>.05) group, all the other groups showed significant differences among quartiles (national talent (Q1 = 37.8% and Q4 = 13.9%, p<.001); U15 (Q1 = 52.7% and Q4 = 9.8%, p<.001); U16 (Q1 = 45.7% and Q4 = 11.7%, p<.001); U17 (Q1 = 52.4% and Q4 = 13.1%, p<.001); U18 (Q1 = 42.6% and Q4 = 8.9%, p<.001); U19 (Q1 = 39.5% and Q4 = 14.8%, p<.01); U21 (Q1 = 39.8% and Q4 = 19.4%, p<.001). The same results were found[16] in young Belgian elite soccer players (U10 to U19), that overall, 37.6% (33-43.3%) of players were born in Q1, while only 13.2% (12.2-13.9%) of players were born in Q4.

Once again, significant effects were found[6] for Belgium (Q1 = 37.37%, Q4 = 10:10%, p<.01) Denmark (Q1 = 36.67%, Q4 = 8.89%, p<.01) England (Q1 = 50%, Q4 = 17:02%, p<.01) France (Q1 = 43.90%, Q4 = 14.63%, p<.01), Germany (Q1 = 50.49%, Q4 = 3.89%, p<.01) Italy (Q1 = 46.75%, Q4 = 3.90%, p<.01) Netherlands (Q1 = 36.84%, Q4 = 15.79%, p<.05), Portugal (Q1 = 45.83%, Q4 = 6.94, p<.01) Spain (Q1 = 36%, Q4 = 10%, p<.01), and Sweden (Q1 = 47.22%, Q4 = 2.78%, p<.05). Considering all the players

belonging to the ten national teams[6] U15, U16, U17 and U18 participants in the 1999-2000 season of UEFA competitions, 43.38% were born in Q1 and 9.31% in Q4 (p<0:01).

Strengthening RAE in young Belgian[16] elite soccer players, the distribution among quartiles of the date of birth of players significantly differed from the "Flemish" population (U15, p<.001; U17, p<.001; U19, <.001). The date of birth of all French male players[11] affiliated to the French Football Federation during the 2006-2007 season from the database Federation revealed significant differences in age categories: U13 (p<.0001), U15 (p<.0001), U18 (p=.0001). A previous study[14] on German U17 soccer players belonging to forty teams in the premier league found a strong trend of selecting players born in Q1. Statistical tests were significant (p<.05) in twenty two of the forty teams (53.7%).

For the entire group of players[17], about 40% were born in Q1. In contrast, only 16% of players were born in Q4. The same RAE was identified (p<.05) when analysing intra regions (Africa, Asia and Oceania, Europe, North America and Central and South America), in FIFA U17 World Cup competitions (1997 to 2007)[18].

RELATIVE AGE EFFECT AND COMPETITIVE LEVEL IN YOUNG SOCCER PLAYERS

Box 1 shows the characteristic of eight studies that examined relative age effect and competitive level in young soccer players.

Box 1. Characteristic of studies that examined RAE and competitive level

Studies	Country	Categories (years)	Competitive Level	Main Results
Carling et al.[21]	French	14-16	Elite	Elite soccer players demonstrated a bias towards Q1.
Cobley et al.[1]	-	-	-	Meta-analysis (review) of RAE in sport.
Del Campo et al.[15]	Spanish	U11 to U18	Elite Amateur	Elite groups significantly differed from the Amador group in relation to quartiles.
Helsen et al.[6]	*10 countries	U12 to U21	Elite	Elite players born in Q1 were overrepresented in all national teams.
Hirose[24]	Japan	U10 to U15	Elite	Approximately 50% of all elite soccer players born in Q1 in all categories.
Jimenez & Pain[13]	Spanish	14-26	Professional Elite	RAE in Spanish soccer is evident in all phases (professionals and youth).
Romann & Fuchslocher[25]	Swiss	10-20	-	Players in categories U15 to U19 and U21 were significantly overrepresented in Q1.
Mujika[3]	Spanish	U11 to U18	Professional Elite Regional	Elite players born in Q1 are overrepresented in relation to senior, regional and school players.

*Belgium; Denmark; England; France; Germany; Italy; Spain; Sweden; Netherlands; Portugal.

Young elite soccer players[21] born in France (14-16 years old) were evaluated over eleven years (1994-2005). Players born in Q1 were the most represented, showing a decrease of the number of players born in subse-

quent quarters (p<.01). Professional (p<.01) and non-professional (p<.01) players showed a greater number of soccer players born in Q1. Analyses in the upper levels[13] (U17 and U21) showed that young players from the first and second Spanish league have identical dates of birth in relation to soccer players from the U17 to U21 national team (p=.61), but are very different from those observed in professional players (p<.001). However, for young players, differences in distribution are not significant for this category (p=.64).

The meta-analysis[1] showed that RAE is more evident in the representative group (regional and national representation, Q1 vs Q4 = OR:2.77). Interestingly, results suggest that RAE is lower among elite players (senior, OR:1.42). The analysis of Spanish[3] soccer players showed that the percentage of players born in the first quarter was 43.9% in senior (p<.001), 46.6% in youth elite (p<.001), 28.6% in youth regional representation (p<.001) and 27.1% in school players (p<.001). Players born in Q4 accounted for 12.2, 10, 21.2 and 22.9% respectively for the 1985/1986 to 2005/2006 seasons. On the other hand[26], young soccer players from northern Portugal aged 11-17 years who participated in regional competitions showed similar distribution of birth date among quartiles (Q1 = 27%, Q2 = 25%, Q3 = 23%, Q4 = 25%).

The percentages in the distribution[24] for young elite players were: 13 years Q1 = 57.6% and Q4 = 3.2%; 14 years Q1 = 53.2% and Q4 = 6.4%; 15 years Q1 = 48.8% and Q4 = 7.3%. The distribution of players (U11 to U18) grouped into three groups was also analyzed[15], showing considerable variation in each of the three groups studied by quartile (Elite 2005-2006, p<.001; Elite 2008-2009, p<.001, Amateurs, p<.001). The comparison of Elite groups with Amateur groups revealed that the distribution of births in 2005-2006 and 2008-2009 in Elite groups significantly differed from the distribution of births in Amateur groups. Similar results[6] were found for category U16 (Q1 = 48.96%, Q4 = 7.64%, p≤.01), when analyzing the distribution of birth dates of national teams U16, U18 and U21 participants in the 1999-2000 season of UEFA competitions.

In the Swiss[25] system, no significant differences were observed for the distribution of the Swiss population and 'J+S' (p≥.05). In all the selected teams (except for U20), Q1 for elite players were significantly overrepresented and Q4 underrepresented compared to 'J+S' (p<.01). Teams (national talent) showed a distribution of more than 35% in Q1, and less than 15% in Q4, which significantly differed from the distribution of 'J+S' (p<.001).

RELATIVE AGE EFFECT AND SPECIFIC POSITION IN YOUNG SOCCER PLAYERS

Box 2 shows the characteristic of the three studies that examined relative age effect and specific position in young soccer players.

Box 2. Characteristic of studies that examined RAE and specific position.

Studies	Country	Categories (years)	Competitive Level	Main Results
Del Campo[15]	Spanish	U11 to U18	Elite Amateur	No significant differences in specific position among quartiles were observed.
Jiménez & Pain[13]	Spanish	14-26	Elite	
Romann & Fuchslocher[25]	Swiss	10-20	-	In categories U15 to U21, players in Q1 were significantly overrepresented.

According to some authors[13, 15] differences in the distribution of birth dates for specific position do not seem to be evident in young soccer players. However[25], significant differences (U15 to U21) among goalkeepers, defenders, midfielders and forwarders were identified. Defenders, midfielders and forwarders were overrepresented at the beginning of the selection year and, in each case; there was a decrease in the number of players who were born in subsequent quarters. Defenders were significantly ($p<.05$) overrepresented in the first semester (79%) compared with forwards (57%). The other comparisons were not significant.

RELATIVE AGE EFFECT AND ANTHROPOMETRICS CHARACTERISTICS IN YOUNG SOCCER PLAYERS

Box 3 shows the characteristics of the five studies that examined relative age affect and anthropometric characteristics in young soccer players.

Analysing soccer players 13-14 years old belonging to Portuguese clubs[27] at regional level and local, it was found that regional soccer players, on average, were more experienced in soccer ($p<.05$), had advanced skeletal maturation ($p<.01$), were heavier ($p<.01$) and higher ($p<.01$) than those competing locally. It was also shown that soccer players for regional level and at specific positions were advanced in maturation [defenders: $p<.01$, midfielders: $p<.01$, forwarders: $p<.05$], were higher [defenders: $p<.01$; midfielders: $p<.01$, forwarders: $p<.05$] and heavier [defenders: $p<.01$; midfielders: $p<.01$, forwarders: $p<.01$] than players who compete at a local level.

Portuguese soccer players[28] belonging to eleven U19 teams were evaluated (5 elite, 6 non-elite).No significant interaction between competitive level and specific position on the field and anthropometric characteristics and training ($p>.05$) were observed. However, elite goalkeepers and cen-

Box 3. Characteristics of studies that examined RAE and anthropometric characteristics

Studies	Country	Categories (years)	Competitive Level	Main Results
Carling et al.[21]	French	14-16	Elite	Significant differences in height and weight were observed among quartiles.
Coelho et al.[27]	Portugal	13-14	Regional Local	The regional group was heavier and taller than the local group.
Deprez et al.[16]	Belgian	9-18	Elite	No significant differences were observed in anthropometric variables among quartiles.
Hirose[24]	Japan	U10 to U15	Elite	Significant differences were observed among quartiles for height.
Rebelo et al.[28]	Portugal	U19	Elite Regional	Players differ in anthropometric measures according to specific position.

tral defenders tend to be larger and heavier than non-elite players in their respective positions. Elite midfielders showed moderate differences in body mass, but not when compared to non-elite players. Small differences in height and weight were observed between defenders and forwarders. A study carried out is Spain[19] with non-elite players aged 12-19 years showed that central defenders were taller and heavier in relation to external defenders, central midfielders, external midfielders and forwarders (p<.01).

There was a significant difference[24] between Q1 and Q4 for height only for players aged 12 years (p<.01) and 14 years (p<.05). The height of Q3 for players aged 12 years (p<.01), and Q4 for players aged 14 years (p<.01) were significantly lower than those of Q1 and Q2. In addition to these results, there was also a statistical difference in height for players aged 11 to 13 years when the maturational difference was statistically controlled, Q3 for players aged 13 years (p<.01), Q4 for players aged 11 years (p<.01) and 14 years (p<.05) were significantly lower than that those in Q1. A significant difference[21] was observed in height (Q4 vs Q1, p<.001) and weight (Q3 vs Q4, p=.049). In addition, the number of players born in Q1 was significantly higher (p<.05), indicating that the maturity offset in Q1 was lower in young soccer players in northern Spain[29]. On the other hand[16], no significant effect on anthropometric variables was observed (height and weight) among quartiles within all age categories: U15, U17 and U19.

RELATIVE AGE EFFECT AND PHYSICAL FITNESS AND TECHNICAL SKILLS IN YOUTH SOCCER PLAYERS

Box 4 shows the characteristic of the five studies that examined relative age effect and physical fitness components and technical skills in young soccer players.

In 30-m sprint, central defenders were faster than the other groups[19]. In squat jump (SJ) and countermovement jump (CMJ) tests, goalkeepers showed the best results, and the lowest values were found for external midfielders. Differences were not statistically significant. Better performance was observed[27] in the functional characteristics [SJ (p<.01), sprint (p<.01), sum of seven sprints (p<.01)], but in only one technical skill [juggling

Box 4. Characteristic of studies that examined RAE and physical fitness components and technical skills

Studies	Country	Categories (years)	Competitive Level	Main Results
Carling et al.[21]	French	14-16	Elite	Significant differences in VO2, anaerobic power and concentric strength were observed among quartiles.
Coelho et al.[27]	Portugal	13-14	Regional Local	The regional group had better performance in explosive power and juggling than the local group. There were no differences between groups in competitive agility, YYIR1 and dribbling.
Deprez et al.[30]	Belgian	10–16	Elite	There was no significant difference in physical fitness (anaerobic power and muscular strength) among quartiles.
Rebelo et al.[28]	Portugal	U19	Elite Regional	Players differed in physical fitness and technical skills in competitive level and specific position.

(p<.05)] at regional level. Local and regional participants did not differ in agility, aerobic endurance, speed dribbling, precision shooting and passing. It was also observed[27] that regional players showed better results on SJ [defenders: p<.01, forwards: p<.05] and 30-m sprint tests [defenders: p<.01, midfielders: p<.01] than players who compete at local level. In contrast, no significant differences were observed among positions in relation to agility trials, YYIR1, and technical skills (except for juggling, p<.05). Significant differences were found[21] in the year quarters for VO2max (Q4 vs Q1, p=.007), maximal anaerobic power (Q1 vs Q4, p=.039) and maximal concentric force (Q1 vs Q4, p<.001).

There was no[28] effect of the interaction between competitive level and specific position in any of the tests or functional ability (p<.05). Elite goalkeepers tend to perform better than non-elite goalkeepers on all tests. Differences in SJ, YYIR2, juggling and CMJ were observed. Moderate differences were also observed for the performance of 5 - and 30-m sprint and agility. Elite defenders tend to be different from non-elite defenders in SJ and juggling, while differences in agility and YYIR2 were moderate. Elite midfielders showed moderate differences in 5 - and 30-m sprint, agility, juggling and YYIR2 compared with non-elite. Elite forwarders showed moderate differences in agility and YIR2 compared with non-elite forwarders.

When young soccer players from northern Spain[29] were analyzed, older players showed better performance in 15 - (p<.01) and 30-m sprint (p<.01) and agility tests for 15 - (p<.01) and 30-m (p<.05). In general, players who were born in the first quartile showed significantly better performance than those who were born in the last quartile. Older players also showed better performance on YYIR1 and CMJ, although not statistically significant. On the other hand[30], significant benefits for physical fitness components (muscular strength and anaerobic power) in soccer players (U14 to U17) born in the first quarter compared to players born in all other quarters were not evident.

FINAL CONSIDERATIONS

In soccer competitions, players are usually grouped according to their chronological age. This study review: (1) the prevalence of RAE in soccer players, (a) considering competitive level (b) and specific position and (2) association between RAE (a) and anthropometric characteristics, (b) physical fitness components and technical skills.

There is a consensus the presence of a RAE in men's soccer: Players born after the cut-off dates are overrepresented (professional, amateur, elite, regional or local level). The reason for this selection behaviour is justified by the thought of immediate success and avoids the long-term goals of promoting and developing talent. While the coaches' of the young soccer players judge according to the probable performance advantage of those born at the beginning of the year selection for your success present, this bias may worsen, with prejudice to the sport and the young soccer players.

Some authors have shown that the percentage of players born in the first quarter of the selection year is high for professionals, but peak values were found for the youth elite and along the regional and school representation, a large decrease is evident. When compared to non-elite, the elite group (young players), it was observed that the distribution of births significantly differed. Given the relevance of the RAE and its potential to introduce a bias in the talent identification process, new studies correlating RAE and competitive level are needed for a better understanding of this issue, given that there are few studies focusing this theme.

The relationship between RAE and the specific position is controversial, according to few studies. While some authors show that there are no clear differences in the distribution of birth dates for specific position, others found that defenders, midfielders and forwarders were overrepresented at the beginning of the selection year. Some results have shown that young players with potential are neglected and that the subject is poorly documented, so further studies should be carried out in order to identify the possible spread and development of RAE. Thus, RAE and its relation to specific position is a gap to be filled.

It is likely that players born in the first quarter of the selection year differ in a variety of anthropometric characteristics and physical fitness components compared with peers born in the second half. Given this gap in literature and the lack of consistency in expected results on anthropometric variables, physical fitness components and technical skills, further studies should be carried out to better understand this selection bias, detection and development of 'talents'.

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Corresponding author

Augusto Pedretti
Faculty of Sport, University of Porto, Portugal,
Rua Dr. Plácido Costa, 91,
4200 450 Porto, Portugal.
E-mail: pedrettiaugusto@gmail.com