Original Article (short paper)

The relative age effect on Brazilian Elite Futsal: Men and Women Scenarios

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Abstract — Aims: The relative age effect (RAE) has been a research subject in several fields of society. RAE is present in different sports, influencing the young athlete's opportunities of participation. The aim of this study was to analyze the occurrence of RAE in Brazilian elite men and women futsal. **Methods**: Birthdate of 376 athletes from Brazilian Men National Futsal League (LNF)/2013 and 227 from Brazilian Women National Futsal League/2014 were collected on leagues' homepages and divided into four quarters (Q1:January-March, Q2:April-June, Q3:July-September and Q4:October-December) and two semesters (S1:January-June, S2:July-December). In men case, results were compared with Penna and Moraes (2010) data on LNF/2009. Chi-square test was used to analyze differences between distributions of birthdates by quarters and semesters. The significance level was set at $\alpha<0.05$, with Bonferroni correction when necessary. **Results:** there is RAE in men futsal, predominantly on athletes born in first semester. In women futsal, there is no evidence of RAE. **Conclusions:** On men futsal, there is a need for offering similar opportunities to young players, while on women, the small amount of athletes in Brazil must be regarded as an alert to the culture of futsal as a men social space, which deters the entry of new practitioners.

Keywords: futsal, chronological age, relative age effect, Brazilian futsal, gender.

Introduction

Youth futsal championships are usually organized on divisions by age groups. In Brazil, it is common that tournaments are organized in order to start and finish within the same chronological year. As in other countries, Brazilian tournaments respect specific intervals of birthdate as a criterion for distribution of players on age groups (normally in each two years). For example, in the same group there are participants born between January 1st of a certain year and December 31st of the following year.

In Brazil, there are official futsal tournaments from the Under-7 (U7) up to the senior level. Although in some Brazilian states the age groups of 12 years old and youngers allow the participation of boys and girls, it is common to find boys participating in all age groups, while girls tend to participate only from U13, when there is a division between genders.

This type of competitive structure aims to provide greater balance in disputes, making them theoretically fairer, looking to distribute children and adolescents with similar levels of physical and cognitive maturity[1]. Although these competitions are based on the principle of equality of chances, they are insensitive to subtle differences of age within the established age groups, because in the same group is possible to have a difference of almost two years between the oldest and the youngest player.

These differences are associated with the Relative Age Effect (RAE), of immediate and long-term action, and they may lead to at least two basic situations[2]. The first one is that the favored children become elite, or are still involved with sports until adulthood, because they were privileged with more time and opportunities for access to training and competitions. The second one is the abandonment of the practice and the creation of a possible barrier to sport or even aversion to physical activity in adulthood, from the lack of stimulus and few opportunities of involvement[3,4]. Studies on RAE start from the assumption that a practitioner born at the beginning of the year is relatively older than those born at the end of the same year[5].

The literature regarding RAE is characterized by the investigation on the proportion of elite athletes born in quarters (or another value) that make up the competitive calendar year of a determined sport or country. There is a tendency, especially in relation to men sports, that the number of athletes born in the first months of the year is higher compared to their peers, born later. A commonly used explanation for this effect is that these older children end up being classified as gifted or talented and thus are able to practice more, i.e., they have greater opportunities to develop their sports skills. They can also gain access to places where practice is better structured and can develop their sport expertise. This scenario repeats itself in different sports in several countries, even in the school context[2,6,7,8,9,10,11].

Brazilian men elite futsal seems to be susceptible to the prevalence of RAE. Penna and Moraes[12] have assessed 370 men athletes, from twenty clubs participating in the 2009 Brazilian Men National Futsal League, and have found significant differences between the first two quarters of the year, always having a greater number of representatives, when compared to those born in the later quarters (1st- 29.46%, 2nd- 31.62%, 3rd- 19.46% and 4th-19.46%). However, the literature on RAE for women's sports is relatively sparse, and no such studies were found on futsal. Some studies with football indicate that RAE seems to not be so recurrent among women[8,13].

Given this scenario, the aim of this study was to analyze the occurrence of RAE in the Brazilian elite men and women futsal.

On men, the intent was to perform an update and verification on the possible prevalence of this effect, in comparison, through the same research methods, with the work of Penna and Moraes[12]. As for women futsal, we aimed to investigate, for the first time, the occurrence of this phenomenon. The hypothesis of this study were that men scenario remains the same of four years before[12], with the possibility of small, and not significant, changes on distribution of players by quarters or semesters, especially because the high amount of men futsal players in Brazil, and the current pedagogical procedures observed on futsal stakeholders to select, and offer oportunities for young players to train and compete. For women, is that do not exist RAE, based on assumptions of other studies on football, which suggests that RAE is more susceptible in sports with a high number of practitioners, what is not the case of Brazilian women futsal.

This study is justified by: a) a lack of investigations about RAE in Brazilian senior futsal[12]; b) the necessity of updating men scenario, because the high number of players involved within futsal context in Brazil and the hard concurrence for opportunities to play in elite level within this field, what influences on the offers of practice to young players[14]; c) the necessity to investigate RAE on women, because the negative influence of this effect on the opportunities of practice, especially because the small number of women futsal practitioners in Brazil[15]; d) the lack of studies on sociocultural and pedagogical aspects of futsal and the necessity of descriptions about features of its participants, so as better understanding on the implications of this sport in society[16], including Brazil[17]; e) the lack of studies on futsal in English language, considering that the most of studies about this sport has been published in Portuguese or Spanish languages[16,18]; f) the relation between RAE and pedagogical procedures involving sports and their influence on opportunities of sport participation mainly for children and young players[12].

Methods

All participants were players that participated in Men or Women Brazilian National Futsal Leagues. Each league is/was the main futsal championship in Brazil, for men and women. Unfortunately, for economic reasons, the last edition of the women league has happened in 2014. However, men league is working on present days. The men's sample was composed by 376 futsal athletes, within a total of 380 athletes from all the 19 clubs that participated in the National Men Futsal League 2013, amounting to 98.94% of the total number. Four players have been eliminated from sample because inconsistent data caused by lack of information about their birthdate. The women's sample was composed of all 227 futsal athletes from the 15 clubs that participated in the National Women Futsal League 2014. No one player was eliminated from sample. For both groups, were performed sample calculations, with 95% confidence level, which indicated the required minimum sample of 191 individuals in the men group and 143 individuals for the women. Santos[19] sample calculator was used for both data calculations.

The athletes' birthdate was obtained from the official website of both Brazilian National Futsal Leagues. For data analysis, we used the chi-square test to check differences between distributions, as Costa, Cardoso and Garganta[20] proposed in an investigation with RAE in Brazilian elite men football. The data were divided into four quarters (Q1: January-March, Q2: April-June, Q3: July-September and Q4: October-December), and it was assumed 25% as the expected frequency for each quarter, as proposed by Côté et al.[21], especially because official statistics data related to month of birth (analysis suggested by Delorme, Boiché and Raspaud[22] to reference the expected distribution) in Brazil are available only from the year of 2003[23], date that does not correspond to the mean of birth year to men sample (1987) and women sample (1992) of this study.

The analysis through quarters resulted on inconclusive data in the men's group, because at the same time that Q1 and Q2 are statistically similar to Q3 and significantly different from Q4, there is no difference between Q3 and Q4. This result did not permit a conclusive perspective about RAE related to Q3 and Q4. Considering this scenario, we carried out a new analysis, taking into consideration the semesters (1st Sem.: January-June and 2nd Sem.: July-December), in which we assumed 50% as the expected distribution in each one. The same analysis has done on women data, for reasons of a depth investigation (by quarters and semesters) as did on men. For the analysis that required multiple comparisons, the Bonferroni correction was adopted for the adequacy of the significance level, indicating it as $p<0.0083$.

Another analysis was related to the possibility of change in the occurrence of RAE in the elite men futsal in Brazil. We compared the data of our study with the results presented by Penna and Moraes[12], concerning the birthdates of the players from LNF/2009. To do this, we applied the chi-square test on the current data, but with expected frequency according to the percentages presented by the previous study. We considered both the data separated by quarter and by semester.

All statistical procedures used the significance level of $\alpha<0.05$, when the Bonferroni correction was not necessary. We used the software SPSS (Statistical Package for Social Science) for Windows®, version 20.0.

This investigation was approved by the Ethics Committee of the first author´s University (CAAE number: 48217915.8.0000.5659).

Results

Men Futsal

Table 1 indicates the absolute number and percentage of players born in each quarter. Table 2 presents the values of significance of the calculations of the relationship between the quarters analyzed.

As shown in Table 2, only the fourth quarter (Q4) showed significant difference in relation to Q1 and Q2 ($p<0.001$), being smaller in both cases, with no difference between Q1 x Q3 ($p=0.205$), Q2 x Q3 ($p=0.205$) or Q3 x Q4 p=0,025.

These results proved to be inconclusive, because Q4 showed differences with Q1 and Q2 and, at the same time, it did not present the same relation with Q3. In the following analyses, taking into consideration the semesters of the year, we could observe a significant difference between the first semester (S1) and the second one (S2) ($p<0.001$), being the group of players born in S2 less numerous than the one born in S1.

Table 1 – Absolute values for the birthdates of men futsal athletes.

Quarters	Athletes	Percentage
Q1	110	29.26%
Q2	110	29.26%
Q3	92	24.47%
Q4	64	17.02%
S1	220	58.52%
S2	156	41.48%

Table 2 – Values of Chi-square and significance level for comparisons related to birthdates

Comparisons	x^2	P
Q1 x Q2	0.000	1.000
Q1 x Q3	1.604	0.205
Q1 x Q4	12.161	<0.001*
Q2 x Q3	1.604	0.205
Q2 x Q4	12.161	<0.001*
Q3 x Q4	5.026	0.025
S1 x S2	10.894	<0.001*

Significance level considered p<0.0083, for the quarterly analyses, and p<0.05 for the semester analysis.

The relative age effect is present in the Brazilian men elite futsal. However, its occurrence can be seen between the semesters, i.e. there are more Brazilian men futsal players in elite level born in first semester than the second.

Considering the comparison, through the same research methods, with Penna and Moraes[12] previous study, Table 3 evidences that RAE remained between 2009 and 2013, according the analysis of the players' distribution between quarters (p=0.083) and semesters (p=0.307).

Table 3 – Comparison between results from Penna and Moraes (2010) and the present study.

Quarters	Athletes / Percentage	
	Penna & Moraes (2010)	Present study
Q1	109 / 29,46%	110 / 29,26%
Q2	117 / 31,62%	110 / 29,26%
Q3	72 / 19,46%	92 / 24,47%
Q4	72 / 19,46%	64 / 17,02%
Total	370	376

Women Futsal

The results of the distribution of birthdates of the women athletes showed that there is not RAE in the Brazilian elite women futsal. No differences emerged in the comparisons using either quarters or semesters as reference.

Table 4 indicates the absolute and percentage distribution of the number of players born in each quarter and semester.

Table 4 – Absolute values for the birthdates of women futsal athletes.

Quarters	Athletes	Percentage
Q1	70	30.84%
Q2	50	22.03%
Q3	63	27.75%
Q4	44	19.38%
S1	120	52.87%
S2	107	47,13%

Table 5 shows that this distributions did not have statistical significant difference, both on quarters (p=0.059) or semesters (p=0.068).

Table 5 – Values of chi-square and p for comparisons related to birthdates.

Comparisons	x^2	P
Q1 x Q2	3.333	0.068
Q1 x Q3	0.368	0.544
Q1 x Q4	33.907	0.015
Q2 x Q3	1.496	0.221
Q2 x Q4	17.515	0.536
Q3 x Q4	3.374	0.066
S1 x S2	0.744	0.068

Significance level considered p<0.0083, for the quarterly analyses, and p<0.05 for the semiannual analysis.

Discussion

The aim of this study was to analyze the occurrence of RAE in Brazilian men and women elite futsal. Our findings evidences that RAE remained during the four years period analyzed on men futsal, but there is no significant evidence on women futsal. On the same way as it was presented in the results section, the discussion will take place at two different subsection, first with the men followed by the women futsal.

Men Futsal

Brazilian men futsal elite players who were born in the first half of the year have a greater chance to rise on elite level, when compared with their peers who were born in the second semester. These data suggests that RAE can affect the opportunities of access to this level of competition. These results of our study corroborate the literature about RAE on Brazilian elite men futsal[12], as well as elite men football[20,24].

One of these sports is football, that best resembles futsal in how it is organized and practiced, particularly for younger groups. This sport has been presenting RAE in many countries and conditions[20,22,24,25,26,27]. In Brazil, Costa, Cardoso and Garganta[20] have studied senior football players and found that those born in the last quarter of the year have a lower chance to rise on elite level. Between several approaches, literature justifies RAE through maturational issues[26]. In other words, because the earlier maturational transformation lived by players that born first, they are named as more talented than youngers, receiving more and better opportunities to develop their sport abilities[12].

However, is also possible to justify the incidence of RAE through pedagogical and psychosocial aspects. Firstly, due organizational models of competition and priority on victories in early ages, commons within youth sport[11,14,20]. These favored opportunities to young players considered as talented happen because a stakeholders' exacerbated concern on results and the consequent choose for older and named as more 'competent' players[11]. Secondly, the re-enforcement of self-confidence and opportunities to learn and improvement of athletic abilities through more chances to train and play, also praises and investments from parents and coaches[4]. Hancock, Adler and Côté[4] suggest a number of effects (Matthew, Pygmalion and Galatea), such as processes of psychosocial re-enforcement, with origins in the actions and expectations of coaches, parents and athletes themselves, which would be related to RAE.

These processes can be the reflection of exaggerated chargers to win imposed by agents within youth sport (club, directors, coaches, parents). This approach can leaving coaches prone to choose, guide and offer opportunities to players that have a more developed and maturated body and abilities, which at that stage can increase the chances of victory in youth sport[20,28], reinforcing the RAE between men through more opportunities to develop sport skills for those that were born earlier.

This scenario is illustrative given the main problem that involves and sustains the RAE: the early search for great competitive results in youth sports before puberty[29]. This scenario would lead the search for talented players who would offer better conditions of victory still in childhood, meeting an immediate demand that can foster early specialization processes and decrease the opportunities of sports practice offer to children seen as untalented[30].

Women Futsal

Most of the studies that describe the occurrence of RAE are focused on men sports. On the other hand, studies with women sports have a larger variation of results, confirming, denying or presenting not-so-strong evidence on that[2,7,8,9,10,11,31].

The results obtained in this study, that indicate the non-occurrence of RAE in Brazilian elite women futsal, corroborate some of the previous findings on the literature for other women sports[2,7,8,9,10].

The non-occurrence of RAE in the Brazilian women elite futsal stimulates the discussion under different perspectives both on maturational and sociocultural approaches. The first one is similar to proposed by Helsen, Winckel and Williams[8] for football. The authors have not found RAE in the women U18 group, and based their discussion on the maturational approach. According to the authors, at 18 years old, girls have already completed the maturity process, decreasing the relative age differences. According to Malina[32], it is known that girls mature earlier than boys.

Maturity criteria based on anthropometric or physical performance analyses for the selection of athletes in the youth categories seems to be a factor of intensification of the RAE. Sedano, Vaeyens and Redondo[31] have studied the existence of RAE among 4,035 football athletes of the five age groups in Spain. These authors argue that maturation is the primary cause for the existence of RAE on the process of identifying talents. In addition to favoring older athletes, ultimately prevents younger athletes from developing their motor skills in order to achieve excellent elite levels. Because of the great emphasis given to the abilities that suffer influence of the maturity process, such as strength and speed, the technical and tactical aspects of the sport are left aside, resulting in a decrease in the quality and the level of competitions[31].

However, the maturational approach justification observed in other sports is still unable to explain the non-occurrence of RAE in women futsal. Therefore, it is possible to point out some issues of cultural and social origin that may explain that.

Santana and Reis[15], in a study with 43 women futsal players in the State of Paraná, in Brazil, show certain relevant traits of this practice in this country that are still perpetuated today. One of them is the lack of futsal competitions in the youth ages (below U13). On this way, girls normally play official tournaments only on adolescence, being less exposed to processes of precocious talent selection, what tends to decrease the effect of inequality between who were born in different months within the same year. Such data reinforce the assertion of Cobley et al.[33], which differences in the organization of the sport can interfere with the prevalence of RAE. In turn, men futsal has official competitions in Brazil since U7 or U8 groups. Although girls are accepted in some of these competitions, the vast majority of participants are boys, what can be a relevant factor of difference between men and women youth practice of futsal in Brazil, influencing differently on RAE.

Sociocultural evidence is given by the fact that in Brazil is estimated approximately 267,000 registered futsal athletes, with around 5,000 women[34]. This unbalanced situation between men and women practitioners does not make the birthdate as a determinant factor on the selection and choice process of women athletes, precisely because there is less competition among them, in comparison with men[15].

Musch and Grondin[35] argue that a great number of participants interested in a particular sport, at any level of competition,

increase the chance of a RAE presence. On this same perspective, Delorme, Boiché and Raspaud[36] say that when the number of practitioners is higher than the number of places in the teams, there is an environment that is conducive to the emergence of RAE. Within this scenario, agents responsible for the organization of these spaces give priority to players who have great performance immediately, who are usually those born at the beginning of the competitive year, so that they are benefited from a superficial perception of being talented in the eyes of coaches, compared with those born later.

Another sociocultural aspect that may help to understand the non-existence of RAE on Brazilian women elite futsal is the scenario of outdated professionalization in this country[37]. As an example, we have the episode in which the participation of the women Brazilian national team in the 2014 Futsal World Cup, in Costa Rica, was under risk. The Brazilian Futsal Confederation (CBFS) announced that participation was under financial unviability, however it went back extending the deadline so that the athletes themselves could obtain the money needed (approximately R$180.000 or US$ 76.202 in money conversion on January 2014 – source: <http://fxtop.com/pt/conversao-no-passado.php>) to pay the costs for the trip. Thanks to a campaign initiated by some Brazilian men national team players, with cash donations, and the search for a sponsorship, the Brazilian women team was able to get the required value, thus ensuring their participation and winning the fifth title for Brazil in five editions held until that date[37].

Another example of this situation of under professionalization within women futsal in Brazil was presented by Santana and Reis[15]. Authors denounced the gap of the women futsal on payment of wages to athletes in relation to men. An aggravating factor in relation to the study[15] is that in the year of its completion, 2002, those Brazilian women futsal players had high expectations and ambitions to take a big step towards professionalization, mostly in view of the possibility of creation of a permanent Brazilian senior national team, which would allow the promotion of national championships and an increasing in number of sponsors, which would lead to an growth in the number of professional athletes. However, it is known that such expectation was not fully materialized[38] until now, especially because to the end of Brazilian Women National League in 2014.

In addition, another contributing factor to the decline in the number of women children and adolescent athletes is the fact that, in Brazil, futsal is historically and culturally considered like an exclusive men sport[38,39], based on gender prejudice and discrimination, making harder the women participation.

Conclusions

Due to the lack of similarity between results on RAE on men and women sports is possible to consider them as separated and different phenomena[31]. The results of this study about RAE on Brazilian men and women elite futsal corroborate this idea.

Based on variated approaches – maturational, psychosocial and sociocultural -, we conclude that, for the Brazilian men futsal, the birthdate seems to influence the opportunity for players rise to the elite level, especially for the players that born in the first half of the year. For the Brazilian women elite futsal, this same factor was not decisive for the scope of sport expertise, i.e., there is no RAE.

Maturational, psychosocial and sociocultural aspects may influence the occurrence or absence of RAE. These approaches seem to be interrelated. In men futsal, it is exposed on the high concern of futsal stakeholders on victories in youth sports, what produces effects on the selection, training and opportunities to compete for young players, added to the high number of practitioners of men futsal in Brazil, which elevate the chances of RAE.

By other side, the non-existence of RAE in women elite Brazilian futsal suggests a necessary reflection on how the futsal practices opportunities are offered to girls in Brazil. The small amount of women athletes, in comparison to men, must be regarded as an alert to the still existing futsal culture as a space that is exclusively for men, which deters the entry of new women practitioners. Despite it do not re-enforce RAE, also is a barrier for women to practice futsal. The absence of younger teams and championships specific to women futsal and the small participation of girls in youth teams seem to avoid the occurrence of both early sports specialization and RAE.

Although this gap on women futsal championships and practice participation prevents the RAE, it can be considered as a barrier to the growth of the number of practitioners and opportunities of professionalization in Brazil. We believe that the ideal scenario would be one in which there would be greater opportunity for the practice, especially on youth, however not based only on immediate results, but rather, on the main purpose of offer futsal as a pleasurable practice for girls, regardless of competitive results achieved before puberty. The same sense could be applied on men youth sports, as a mean to prevent RAE and all its bad consequences over a wider sport participation on the future.

It is known that sports expertise is favored by a large amount of experiences for players. However, more research is still required in the area, seeking to clarify how the processes of initiation and development of futsal athletes happen in Brazil.

The finding in men futsal reveals the need for attention of stakeholders involved on the practice. They need to know that great competitive results in childhood and youth are not a guarantee of success in adulthood and that their prioritization can encourage the dropout and withdrawal from the practice of several young individuals. Directors/managers and parents need to establish criteria for the assessment of coaches based not on competitive results obtained with youth teams, but rather, on educational procedures and prioritization of pleasure, opportunity for full participation and tactical-technical learning related to the practice of sports.

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