



The Relative Age Effect in Soccer: an Analysis of the U-20 Libertadores Cup

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ABSTRACT

International Journal of Exercise Science 10(8): 1157-1164, 2017. The year of birth is used as a criterion for grouping the competitive categories in various sports. Young players that were born in the early months of the calendar can have a benefit during their formative process, since they have higher chronological age and, consequently, are more likely to be in more advanced stages of biological maturation. The aim of this study was to evaluate the Relative Age Effect (RAE) in the U-20 Libertadores Cup. The sample consisted of 228 young players belonging to 12 clubs (ten different countries) who vied for the championship in the year 2016. The players were distributed according to their playing position: n=24 goalkeepers, n=65 defenders, n=83 midfielders, and n=56 forwards. Data regarding the date of birth were collected and split into quartiles: Q1 (January to March), Q2 (April to June), Q3 (July to September), and Q4 (October to December), and semesters: S1 (January to June), and S2 (July to December). The results showed significant differences corresponding to intra-birth quartiles and playing positions, except for the goalkeeper position. Thus, it is possible to conclude based on the young soccer players participating in an important South American competition that there is a tendency towards the selection of players born in the early months of the relevant year.

KEY WORDS: Age grouping, player selection, U20 athletes, South American

INTRODUCTION

The sports training process can be decisive, affecting future talents in a sport, then it is important that studies provide guidance for this process. Considering that the specific involvement in one sport is a relevant aspect in the sports training process, the knowledge of the factors that influence performance and the consequent selection of individuals could significantly contribute to improve the training (4). The year of birth is used as a criterion for grouping the competitive categories in various sports, including soccer. The differences in age within annual cohorts result in performance discrepancies between children and youths and also bias the talent selection process in many sports (24).

Thus, young people that were born in the early months of the calendar can benefit, since they have a higher chronological age and, consequently, are more likely to be in more advanced stages of biological maturation. In sports, the inclusion of young males in training teams could be related to early physical maturation (18).

According to Musch and Grondin (19), young people with higher chronological age may present advantages in anthropometric characteristics, conditional abilities, cognitive knowledge, and psychological capacity. Thus, the relative age effect (RAE) is the difference in the development of physical, emotional, and intellectual aspects between the younger and older children in the same year of birth. This difference can generate physical, cognitive, motor, and emotional advantages or disadvantages, thus promoting significant differences in the athletic performance.

The RAE has been studied and highlighted in several individual and team sports, such as basketball (9), hockey (20), soccer (14), taekwondo (1), or volleyball (3). In soccer, Folgado et al. (12) stated that playing positions present differences when analyzing the RAE in different age-groups. It was observed that while defenders and midfielders demonstrate an RAE effect, the same not occurred for goalkeeper and forward players. Thus, there is a tendency for players in the former groups to have birth dates closest to the beginning of the selection year. Analyzing professional soccer, Salinero et al. (21) demonstrated that the RAE was present in three European soccer leagues (Italy, France, and Spain), but it was not observed in United Kingdom or Germany. There was also a greater number of players in British and German leagues who were born in the early months of the year, but the difference was not significant. According to the playing position, it was not possible to establish a pattern of asymmetry in the subjects analyzed. The advantage of relative age, mainly related to early physical maturation, seems to be linked to the success of players in the younger categories, especially in sports where there is a preference for individuals with different body characteristics (e.g., anthropometrics, somatotype, etc.). Particularly, in the case of soccer, this factor occurred for some players who play in specific playing positions (17).

An identification process for young players who present a potential talent that has some validity allows clubs to conduct a more efficient management of players' recruitment. This approach maintains the quality of the process when significant resources are invested in identifying and training the young players (25). The available researches, which studied the RAE with young soccer players, were focused on European countries (10, 21, 22). To our knowledge, no study has examined the RAE in young soccer players (clubs) who participate in South American competitions.

Thus, the aim of this study was to analyze the effects of relative age in U-20 Libertadores Cup and compare it according to the playing position of the soccer players. The first hypothesis is that there would be an effect of relative age in young soccer players, especially at the competitive level of the tournament. The second hypothesis is that there would be an RAE in all playing positions in youth soccer (e.g., goalkeepers, defenders, midfielders, and forwards).

METHODS

Participants

The sample consisted of 228 men's soccer young players from 12 clubs of 10 different countries (Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Paraguay, Peru, Uruguay, and Venezuela) that participated in the U20 Libertadores Cup in the year 2016. The players were distributed according to their playing position (n=24 goalkeepers, n=65 defenders, n=83 midfielders, and n=56 forwards). The U20 Libertadores Cup competition was elected for this study because it is considered an interclub competition with a high performance level in the South American continent.

Protocol

Statistical data for this study were extracted directly from the official website of the Sudamericana Football Confederation, available at <http://www.conmebol.com>. The website of the competition provides statistical data about each player's name, day and month of birth, as well as their teams/countries. The birth date deadline for this competition was January 01, 1995. Thus, the months of birth of the young players were classified in two ways: in four quarters: Q1 (January to March), Q2 (April to June), Q3 (July to September), and Q4 (October to December); and in two semesters: S1 (January to June), and S2 (July to December). Players younger than the target year of the competition were also analyzed according to the months of birth. This data analysis method has been used in previous studies (2, 15, 23). The study sample was composed of young players from different countries so that the expected values were calculated on the assumption of a uniform distribution of birth throughout each quarter of the year, as was established in the available research (15, 11).

Statistical Analysis

The RAE is identified when a difference is found between the expected theoretical number of players born per month or quarter and the observed number of players (19). A chi-square goodness-of-fit test was conducted in order to determine whether the observed distribution per quarter significantly differed from the expected theoretical distribution. Due to this aspect, currently published studies perform all analyses based on the theoretical assumption that birth dates are equally distributed across all quarters (i.e., 25 percent per quarter) (5). Data were analyzed using SPSS Statistics for Windows (Version 17.0. Chicago: SPSS Inc.). The significance level was set at $P < .05$.

RESULTS

Table 1 shows the distribution of young players by semesters of birth. It is noteworthy that there was a higher frequency of players born in the first half of the year and a lower frequency in the second half of the year. However, it is observed that, when this difference was separated according to playing positions, there was no statistically significant difference in the analysis for the goalkeeper playing position ($P > .05$).

Table 1. Distribution of players by position according to the semester of birth.

	1S	2S	χ^2	P
Goalkeeper	11 (45.8%)	13 (54.2%)	0.167	=0.683
Defender	50 (77.0%)	15 (23.0%)	18.846	<0.001
Midfielder	56 (67.4%)	27 (32.6%)	10.133	<0.01
Forward	44 (78.6%)	12 (21.4%)	18.286	<0.001
Total	161 (70.6%)	67 (29.4%)	38.754	<0.001

Table 2 shows the distribution by quarters of the players' dates of birth. The results revealed that the distributions were significantly different in all playing positions, except for the goalkeepers ($P>.05$).

Table 2. Distribution of players by position according to the quartile of birth.

	1Q	2Q	3Q	4Q	χ^2	P
Goalkeeper	4 (16.7%)	7 (29.2%)	7 (29.2%)	6 (25.0%)	1.00	.801
Defender	38 (58.5%)	12 (18.5%)	9 (13.8%)	6 (9.2%)	39.923	<0.001
Midfielder	30 (36.1%)	26 (31.3%)	13 (15.7%)	14 (16.9%)	10.542	<0.05
Forward	27 (48.2%)	17 (30.4%)	10 (17.9%)	2 (3.6%)	24.143	<0.001
Total	99 (43.4%)	62 (27.2%)	39 (17.1%)	28 (12.3%)	51.825	<0.001

For specific playing positions, significant differences were found in the distribution of defenders, midfielders, and forwards ($P<.05$). The results showed a tendency to select players that were born on earlier dates, at the beginning of the year of birth, thus 76.9% of the defenders, 67.5% of midfielders, and 78.6 % of forward players were born in the first two quarters of the year.

DISCUSSION

In this study, the asymmetric distribution of players' birth dates in the U-20 Libertadores Cup was observed. The largest number of young players was born in the early months of the year, which confirms the hypothesis of the presence of RAE in young soccer players in the under-20 category of the main South American interclub competition (70.6% of the sample of this study were born in the first half of the year). The results of this study corroborate the evidence of age effects (RAE) in the previous studies, analyzing the sport in accordance to playing positions (6).

The results support the presence of moderate RAEs in young soccer players. However, it should be noted that there was not RAE in the goalkeepers' position. Hence, analyzing the

playing positions, there were differences in most positions, except in the position of goalkeeper ($\chi^2 = 1.00$, $p = 0.801$). This could occur due to the number of subjects analyzed. In youth soccer, there are already differences in anthropometric and physiological predispositions among the playing positions. Goalkeepers and (central) defenders tend to be taller, heavier and to have a higher BMI compared to midfielders and forwards (16).

The selection of soccer players is influenced by physical appearance, which is due to greater physical development because of the relative age difference in the lower categories, and thus possible sports talents may be discarded (10). Overall, the present findings about club players were similar to the results of previous studies that analyzed players of national teams who participated in the Soccer World Cup in the same category (7). Early physical maturation and its effect on physical fitness are mainly related to height and the amount of muscle mass that may enhance a player's performance. There is a trend to recruit players who were born at the beginning of the year in relation of those born in the final six months during the selection of soccer players to form the teams.

There are some explanations in the literature regarding this fact. During the initial phase and improvement of a soccer player, physical, physiological, psychological, and motor characteristics are identified as key determinants in the selection and retention of a young player in a sport team. It is well known that even within the same year of birth there are maturational differences, which vary between the players who were born in the early months of the year and in the final months of the year (19). The RAE is usually explained based on physical maturity. Generally, players who were born in the early months tend to be taller, stronger, and faster. Also, they have higher cognitive and psychological development, and more experience. These characteristics may occur due to the increased practice time in their career (14, 19).

Among young players, any benefits associated with the relative age and/or rate of biological maturation fail to interfere directly in their performance. However, there is a tendency of young adults to maintain the advantages provided by these factors in previous ages. Hence, it is possible that there is an influence of relative age in adult tournaments as well (4). However, some studies do not conclude that the RAE observed in younger categories was also found in adult tournaments (3, 8). According to Williams and Reilly (25), clubs have a trend to select players who were born in the early months of the year. This is because these young players have a more advanced maturational level, compared to younger individuals (19).

However, competitions involving young players based on chronological age not only give advantage to early maturing individuals, but also to those who were born at the beginning of the competitive year with a larger time of practice in the sport, compared to individuals born at the end of the year - e.g., final quarter of the year (3). Exclusion or withdrawal of individuals who were born in the later months of the year during the early years of sports practice probably influences the sport formative process and consequently the composition of the players of the teams analyzed in this study.

Some authors speculate that the method of evaluating talent, which relies on individual selection by a coach, demonstrates biases towards biological and physical maturation (19) and towards success in youth championship matches (6). In fact, the coaches of initial training teams in soccer should carefully analyze these results as they have a central role in the sport system. This issue should be willing and able to explain to children, parents and coaches that: i) the physical deficits are temporary; ii) the gap will ultimately be filled with time/growth; and iii) that more controllable factors are important to succeed in sport (8). This effect can be considered as an impeding factor for a player sports development (i.e., children and young people), which affects the high performance sport as well as the promotion of physical activity in young individuals (19). Further research with a larger number of individuals is required to assess whether there is the RAE in this playing position or not (goalkeepers).

In summary, the results of this study confirm that RAE can act as a sport dropout factor in young soccer players. In youth soccer, the relatively older players have a higher chance of being selected, enjoy better support and attract more attention from coaches and associations. Unselected players show higher dropout rates and, in many cases, they drop out of the sport before the age of 16 (13). It was found that South American soccer recruited more players that were born in early quartiles (1st and 2nd) of the year. The relationship between the quarter of birth and the selection of players seems evident. It is considered necessary to review and change the selection of young South American soccer players, in order to not limit the potential of those players from the second half of the year (July to December). Then, some unobserved factors such as future performance analysis, growth analysis, history of dropouts in the sport, and effective participation in training should be incorporated in further studies.

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