INFLUÊNCIA DO EFEITO DA IDADE RELATIVA NA PARTICIPAÇÃO DE JOGADORES DE FUTEBOL NA LIGA INGLESA

INFLUENCE OF RELATIVE AGE EFFECT ON THE PARTICIPATION OF SOCCER PLAYERS IN THE PREMIER LEAGUE

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RESUMO

Introdução: O sucesso esportivo é resultado de uma combinação multifatorial, incluindo fatores como as características ambientais e características individuais. Entre as características individuais, a data de nascimento é um fator amplamente pesquisado, devido às diferenças do desenvolvimento físico e maturacional que ocorrem nos atletas nascidos nos primeiros meses do ano em comparação aos nascidos nos últimos meses, denominado Efeito da Idade Relativa.

Objetivo: Este estudo teve como objetivo verificar a influência do Efeito Idade Relativa (EIR) na participação de jogadores de futebol de diferentes posições em jogos da Liga Inglesa de 2019.

Metodologia: A amostra foi composta por 3.162 jogadores de futebol profissional dos 20 clubes que competiram na Liga Inglesa de 2019 (224 goleiros, 1379 defensores, 884 meio-campistas e 675 atacantes).

Resultados: Os resultados indicaram a presença do EIR nesta amostra. Em relação ao tempo de jogo, não houve diferenças significativas entre jogadores dos diferentes quartis, embora exista uma tendência indicando que os jogadores do último quartil (Q4) jogam mais tempo do que os outros. Finalmente, ao analisar os três intervalos de tempo (T1 = 0-1000min) / (T2 = 1001-2000min) / (T3 = 2001min), nota-se que para todos os quartis as diferenças tendem a permanecer semelhantes, independentemente da posição.

Conclusão: Portanto, podemos concluir que as vantagens do EIR não continuam influenciando no nível profissional. Os resultados encontrados neste estudo são relevantes para reforçar as sugestões de melhoria nos processos de identificação e seleção de talentos, permitindo igualdade de possibilidades para jogadores nascidos em diferentes épocas do ano.

Palavras-chave: Desempenho esportivo; quartil; futebol; talento.

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ABSTRACT

Introduction: Sports success is the result of a multifactorial combination, including factors such as environmental characteristics and individual characteristics. Among the individual characteristics, date of birth is a widely researched factor, due to differences in physical and maturational development that occur in athletes born in the first months of the year compared to those born in the last months, called the Relative Age Effect.

Objective: This study aimed to verify the influence of the Relative Age Effect (RAE) on the participation of soccer players of different positional roles in matches of the 2019 English Premier League.

Methodology: The sample consisted of 3162 professional soccer players from the 20 clubs that competed in the 2019 English Premier League (224 Goalkeepers, 1379 Defenders, 884 Midfielders, and 675 Forwards).

Results: The results indicated the presence of the RAE in this sample. Regarding the playing time, there were no significant differences between players from different quartiles, even though there is a trend indicating that players in the last quartile (Q4) play longer than the others. Finally, when analyzing the three-time intervals (T1= >0-1000min)/(T2= 1001-2000min)/(T3= >2001min), it is noted that for all quartiles the differences tend to remain similar, regardless of positional roles.

Conclusion: Therefore, we can conclude that the benefits from RAE do not continue at the professional level. The results found in this study are relevant to reinforce the suggestions for an improvement in the processes of talent identification and selection, allowing equal possibilities for players born at different times of the year.

Keywords: Quartile; soccer; sports performance; talent.

1. INTRODUCTION

In soccer, sporting success is the result of a multifactorial combination, which includes factors such as environmental characteristics and individual characteristics[1,2]. Environmental characteristics are related to the environment in which athletes were born and raised [1,3,4]. Individual characteristics, on the other hand, refer to unique aspects of each person. Among them, the birthdate is an important factor that has been widely studied [1,3–5]. The impact of this variable is so relevant that to maintain a balanced competitive level and provide equal opportunities for success to all athletes, players are separated by age groups in the youth categories [6]. This separation is based on the player's birth year and has been adopted by FIFA in youth category competitions since 1997 [7].

Despite efforts to achieve this balance, differences have been observed over several decades. These differences can result in advantages of players born at the beginning of the competitive year over those born later [[8–10]. This set of possible advantages is known as the Relative Age Effect (RAE) and may be related to aspects such as the difference in physical and maturational development [9,11], in addition to a longer practice time for those athletes born at the beginning of the year [12].

Studies carried out with different age groups and at different competitive levels prove the presence of classic RAE in these contexts, that is a greater presence of players born in the first months of the year when compared to those born at the end of the year [4,9,13,14]. As a result of this fact, there is also a greater probability that athletes born in the early months of the year reach professional soccer more often [1,4]

Some hypotheses in the literature try to explain the presence of this phenomenon in soccer [3,9]. Among them, the main hypothesis is related to the physical and maturational development of athletes [9,11]. In general, older athletes have a more advanced state of biological maturation, which usually results in better performance in the physical dimension (strength, power, and speed activities) and also in better developed anthropometric characteristics [15]. Another aspect that can help explain the RAE is the longer time spent practicing sports [12]. Chronologically older players possess better motor, cognitive and affective development, achieved through the deliberate practice of the sport and also free practice from adult interference, which can contribute to them being able to play soccer at higher levels than chronologically younger players [2,3].

Most of the studies on this topic are related to the processes of talent identification and selection, which concerns the recognition of players who are potential talents and providing them with an environment adequate to reach their potential [16]. These

studies aim to understand both its causes and the effects of the relationship between talent identification and selection processes and the RAE [12,13,17]. In this sense, the evidence indicates that the RAE interferes mainly before the end of the maturation period of the athletes and also in the chances of these athletes reaching professional sports [1,15]. Some studies aim to understand a possible relationship between this effect and the players' positional roles [18]. Overall, the results of these works indicate the presence of the RAE for all positions with greater prominence for goalkeepers and defenders [6,19]. However, few studies are dedicated to studying whether the effects of RAE continue or not to be beneficial in athletes who have already reached the professional level in soccer, and also, if these advantages would occur differently according to the positions of the soccer game.

Studies that seek to verify whether the well-known advantages of the RAE are also manifested at the professional level of soccer, through factors such as participation in official matches and playing time during the season, would be extremely relevant. They can contribute by bringing a new brand perspective on the grouping of players in youth categories, and its developments in professional soccer. In this sense, a study by Barbosa et al. [20]carried out with youth soccer players in Brazil, verified that players born in the last quartile had a greater number of participation in official matches. This occurred despite the number of players born in the first months of the year being higher in the squad. These results show that other aspects in addition to physical and anthropometric capabilities must be taken into account in the talent identification and selection processes since tactical and cognitive aspects are extremely important in the soccer game [7,8,10]. Although this was a pioneer study on the subject, it was carried out in a context outside of high performance and with a relatively small sample. It would be important to verify whether the same findings apply to larger samples and in different competitive levels.

Therefore, the RAE may provide advantages to players at earlier stages of the talent identification and development processes, but it is not as relevant at stages closer to the high level of performance 6. Since chronologically younger players do not have the same physical and anthropometric abilities as older ones, they develop better cognitively and tactically [1,14,21]. That can lead these players to have a better performance, and consequently, greater participation in their team's games [7]. To bring additional information to the understanding of this theme in soccer, this study aims to verify the influence of the RAE on participation in official matches and playing time during the season of soccer players of different positional roles in matches of the 2019 English Premier League.

2. MATERIALS AND METHODS

a. Sample:

Only players who were registered since the beginning of the championship and entered at least 1 (one) game during the competition were considered for the sample. A total of 4657 players were registered for the 2019 English Premier League. If the above characteristics were not met, the player was excluded from the sample. Considering the inclusion criteria, the sample consisted of 3162 professional soccer players from the 20 clubs that competed in the 2019 English Premier League: 224 Goalkeepers, 1379 Defenders, 884 Midfielders, and 675 Forwards were counted. Data were collected considering the 38 games in which each team played in the 2019 English Premier League.

b. Data collectioninstrumentsand procedures

Data regarding birthdate and playing time in the championship (in minutes) were collected from the WhoScored website (www.whoscored.com). The collected data were extracted and recorded in an ad hoc Windows Excel 2016® spreadsheet. In the spreadsheet, data referring to the birthdate, the quartile of birth, the positional role, and the playing time, in minutes, referring to the 38 rounds of the English Championship were registered.

The birthdate considered the day, month, and year in which the player was born. Based on this data, players were organized into four quartiles, in which the following distribution was considered: Q1 - January, February, and March; Q2 - April, May, and June; Q3 - July, August, and September; Q4 - October, November, and December. This distribution follows the date range corresponding to January 1st to December 31st used by Fédération Internationale de Soccer Association (FIFA) for all international competitions (https://www.fifa.com/).

For more detailed data the players were divided according to their positional roles, for that, we considered four possibilities: Goalkeepers, Defenders, Midfielders, and Forwards. Regarding playing time, the total value in minutes during the 38 rounds of the English Championship was considered. Due to website limitations, the minutes played in the additional time (additions) were not examined. For more careful analysis, playing time was divided into three intervals [(T1= >0-1000min)/(T2= 1001-2000min)/(T3= >2001min)].

c. Statistical procedures;

Descriptive statistics were used to verify the relative and absolute frequencies, the mean and standard deviation of birth quartiles, and playing time per position. Data distribution was verified by the Kolmogorov-Smirnov test, indicating a normal distribution. The chi-square test (χ^2) was used for 1) comparison of the players' birth frequency between the quartiles by position, 2) comparison between the three playing time intervals [T1-T2-T3] of the players between the different quartiles by position. For more careful analysis, the playing time was observed. Anova One Way was used to compare the average playing time of players between the four quartiles, while Tukey's post hoc was used to verify between which quartiles the significant differences occurred. For data analysis, the SPSS for Windows® version 24.0 software was used. The significance level used in the study was $p < 0.05$.

3. RESULTS

Table 1 shows the distribution of players by position concerning their birth quartiles. Table 2 shows the results of the chi-square test comparing the distribution of players between quartiles. Significant differences were observed for all positional roles. For Goalkeepers, there are differences in the comparisons between Q1xQ3, Q2xQ3, Q2xQ4, Q3xQ4, and General. For Defenders, it is possible to notice differences in the comparisons between Q1xQ2, Q1xQ4, Q2xQ3, Q2xQ4, Q3xQ4, and General. For Midfielders, it is possible to notice differences in the comparisons between Q1xQ3, Q2xQ3, Q3xQ4, and General. Finally, for Attackers, it is possible to notice differences in the comparisons between Q1xQ2, Q1xQ3, and General. In the comparisons between all players without division by positional roles, statistical differences were observed between Q1xQ2, Q1xQ3, Q1xQ4, and General.

Table 3 of the results shows the mean playing time per position considering the positional roles and birth quartiles. Significant differences were not found, however, a progression of playing time is observed as the birth quartiles increase. Thus, players in the fourth quartile have greater absolute playing time when compared to players in the first quartile.

Table 4 shows the relationship between playing time stratified between the three intervals (T1, T2, and T3). By comparing the number of players per position born in each quartile with the three intervals related to playing time, it is possible to infer that the birth quartile may be a factor that does not affect the participation of players in games since the distributions of players between intervals appear to be heterogeneous in all quartiles.

Table 1. Frequency of birth of players by quartile

Positions	Q1		Q2		Q3		Q4		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Goalkeepers	70	7,6	83	11,3	22	3,0	49	6,3	224	7,1
Defenders	401	43,7	271	37,0	382	51,8	325	42,0	1379	43,6
Midfielders	247	26,9	228	31,1	179	24,3	230	29,7	884	28,0
Forwards	199	21,7	151	20,6	155	21,0	170	22,0	675	21,3
Total	917	100,0	733	100,0	738	100,0	774	100,0	3162	100,0

Table 2. Chi-Square test results for general data and according to players' positional roles concerning birth quartiles

Comparison between Quartiles	Goalkeepers		Defenders		Midfielders		Forwards		Total	
	χ^2	p	χ^2	p	χ^2	p	χ^2	p	χ^2	p
1º Q x 2º Q	1,105	.293	25,149	<.001	,760	.383	6,583	.010	20,519	<.001
1º Q x 3º Q	25,043	<.001	,461	.497	10,854	,001	5,469	.019	19,360	<.001
1º Q x 4º Q	3,706	.054	7,956	.005	,606	.436	2,279	.131	12,093	.001
2º Q x 3º Q	35,438	<.001	18,868	<.001	5,899	.015	,052	.819	,017	.896
2º Q x 4º Q	8,758	.003	4,893	.027	,009	.926	1,125	.289	1,115	.291
3º Q x 4º Q	10,268	.001	4,595	.032	6,359	.012	,692	.405	,857	.355
General	8,419	.038	30,111	<.001	38,036	<.001	11,629	.009	28,257	<.001

Table 3. Average playing time by position considering birth quartiles.

Playing Time	Q1		Q2		Q3		Q4		F	p
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Goalkeepers	2486,73	807,31	2735,84	785,00	2125,09	1138,05	2657,80	698,56	1,234	.296
Defenders	2067,69	776,00	2142,06	795,14	2177,56	751,85	2229,27	788,22	0,714	.398
Midfielders	1923,73	765,78	1988,04	707,95	1949,45	768,06	1903,81	823,65	0,919	.338
Forwards	1676,83	807,61	1614,77	843,72	1660,49	881,01	1619,02	770,14	1,392	.249
Total	1976,08	808,90	2052,77	836,82	2012,54	821,59	2025,65	839,59	0,987	.321

Table 4. Comparison between the playing time considering the intervals (T1, T2, and T3) by position in each of the birth quartiles.

Quartil	Posição	Time (min) > 0-1000		Time (min) 1001 - 2000		Time (min) >2001		χ^2	p
		Frequency	%	Frequency	%	Frequency	%		
Q1	Goalkeeper	6	42,9	12	31,6	52	30,2	53,600	<.001
	Defender	33	32,0	151	34,1	217	26,1	130,015	<.001
	Midfielder	29	29,0	99	28,0	119	27,6	54,251	<.001
	Forward	41	25,2	89	33,2	69	28,3	17,528	<.001
Q2	Goalkeeper	3	21,4	14	36,8	66	38,4	81,855	<.001
	Defender	24	23,3	78	17,6	169	20,3	118,900	<.001
	Midfielder	20	20,0	94	26,6	114	26,5	64,526	<.001
	Forward	42	25,8	51	19,0	58	23,8	2,556	.279
Q3	Goalkeeper	4	28,6	5	13,2	13	7,6	6,636	.036
	Defender	26	25,2	113	25,5	243	29,2	187,325	<.001
	Midfielder	21	21,0	68	19,3	90	20,9	41,642	<.001
	Forward	37	22,7	60	22,4	58	23,8	6,284	.043
Q4	Goalkeeper	1	7,1	7	18,4	41	23,8	56,980	<.001
	Defender	20	19,4	101	22,8	204	24,5	157,003	<.001
	Midfielder	30	30,0	92	26,1	108	25,1	44,278	<.001
	Forward	43	26,4	68	25,4	59	24,2	5,659	.059

4. DISCUSSION

This study aimed to verify the influence of the RAE on participation in official matches and playing time during the season of soccer players of different positional roles in matches of the 2019 English Premier League. In general, it is observed that the RAE is related to the participation of players of different positional roles in the 2019 English Premier League, however, this effect does not seem to be directly associated with the playing time players have throughout the competition.

The results indicate that there are significant differences in the distribution of players between the quartiles of the year, with a greater absolute presence of players born in the first quartile. About playing time, it is possible to observe that, in general, there are no differences in this variable between players from different quartiles, even though there is a trend indicating that players in the last quartile (Q4) play longer than the others, except when compared to Q2 players. Finally, when analyzing the three-time intervals (T1/T2/T3), it is noted that for all quartiles the differences tend to remain similar, regardless of positional roles.

Regarding the frequency of birth of players, the results of this study corroborate the results often found in the literature, highlighting the advantages for players born in the first months of the year [3,13,22]. The RAE proved to be present regardless of positional roles, which is contrary to studies that suggest a greater prominence of this effect for goalkeepers and defenders [6,19]. As observed, these advantages regarding older players chronologically have been related to a longer practice time and maturational aspects [10]. Therefore, the importance of monitoring and evaluating the maturation process of these young players is evident, as well as greater control over their game and training times [7]. This information can help to better understand how these factors are associated with the gain or loss of performance in these age groups[15]. In addition, it is possible to better adapt the stimuli of the training process to enhance the development of individuals depending on the maturational stages in which they are and better adjust the time of training and games of players [23]. Offering adequate game and training times to players at different stages.

It is important to highlight that while the parameters for identifying talent are predominantly subjective and focused on physical (i.e.: strength, speed, agility, endurance, etc.) and anthropometric (i.e.: height, weight, etc.) capacities, the RAE will continue to exist and to be potentiated [12,24]. This implies the loss of potential talents

that do not fit these criteria, especially at the initial ages (11-12 years). In addition, scientific evidence has shown that in the older categories (U-17) and at a higher competitive level (regional and national championships), when comparing the number of squads/participations in games, players born in the last quartile of the year have advantages even being outnumbered. Thus, it would be ideal for clubs to use this information to optimize the processes of talent identification and selection, minimizing the emphasis of these processes in physical and anthropometric criteria, through an evaluation of the athletes' maturational stage. In addition, it would also be important to assess other aspects relevant to the soccer game, such as cognition and tactics [7,8,10].

Regarding playing time in each quartile, the results of this article corroborate the results found by Barbosa et al. [20], in which, despite not verifying significant differences, regardless of positional roles, we observed a tendency to increase playing time as the quartiles progressed. Thus, players born in the last quartile of the year were the ones who had the greatest relative playing time (relating the number of players in each quartile and playing time) during the season. These results reinforce the evidence that these players need to have something different from their old chronological peers to compensate for the anthropometrical and physical imbalances. So, for younger players to stand out in the sport, they must outperform older players in other aspects, such as technical and tactical skills, cognitive skill levels, and a high resilience capacity [4,21,24]. This probably makes it possible for these players, when they are already at the highest level, to have a greater prominence and, consequently, greater participation in their team's games.

The results of the chi-square test also indicate that there are no significant differences as the participation (playing time) of players increases. However, although players born in the fourth quartile (Q4) have, a lower frequency in absolute numbers than those born in the other quartiles; they are more present among players who play for longer (T3). These data allow us to infer that chronologically younger players have some characteristics that differentiate them from others, allowing them to play longer in high-level games even coming from a disadvantageous context in the youth categories. This can be explained by a better development of creativity on the part of these players, which allows them to play during a good part of their training against players with better-developed physical and anthropometric abilities. In addition to a possible better technical-tactical intelligence, which can also be of great value to help them in this disadvantaged scenario.

Thus, the results found in this study are relevant to reinforce the suggestions for an improvement in the processes of talent identification and selection, allowing equal possibilities for players born at different times of the year. The improvement of these processes will allow that, already in the initial phases, all athletes can similarly experience training, regardless of their birthdate. This consequently will contribute to them becoming more apt to play at a high level, and it can also, during the initial years of training, increase everyone's performance level, as chronologically older athletes will not be able to stand out from the younger players using only their physical and anthropometric advantages. Thus, these players will be able to better develop other attributes of their game.

Finally, it is noteworthy that this work evaluated a small-time frame and sample and that these factors may have influenced the results found. Suggestions for future research include considering, in addition to the date of birth and playing time, some environmental characteristics relevant to the process of identifying and training players, such as the Human Development Index and the demographic rate of the city of birth [2,4].

5. PRACTICAL APPLICATIONS

Based on the results obtained in this study, we can suggest a practical application concerning the processes of talent identification and selection, which should undergo some important changes. Among these changes, a better assessment of tactical and cognitive skills, especially those related to decision making, is something of great relevance and very well accepted today [25]. Additionally, better use of objective parameters is also paramount. These measures would allow better use of those athletes who, regardless of chronological age, have a good potential to reach a high level.

6. CONCLUSIONS

The results of the present study allow us to conclude that the effects of relative age do not continue to benefit soccer players at the professional level, since even with the overrepresentation of players born in the first semester, there are no significant differences in the time played by players born in different quartiles.

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8. CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interests to declare.

9. AUTHOR CONTRIBUTIONS

Conceived and designed experiments: AANJ, ITC, FSLC. Performed experiments: AANJ. Analyzed data: AANJ, VRM,RDA, FSLC. Contributed with reagents/materials/analysis tools: AANJ, FSLC. Wrote the paper: AANJ, ITC, VRM,RDA,FSLC.

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