

The effect of relative age in the under-17, under-20 and adult categories of the 2023 Brazilian Women's Soccer Championship

O efeito da idade relativa nas categorias sub-17, sub-20 e adulta do Campeonato Brasileiro de Futebol Feminino 2023

El efecto de la edad relativa em las categorías sub-17, sub-20 y adulta del Campeonato Brasileño de Fútbol Femenino 2023

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Keywords:

Soccer;
Women;
Physical education
and training;
Team sports.

ABSTRACT

The aim of this study was to examine the effect of relative age in the U17, U20 and adult categories of the 2023 Brazilian Women's Soccer Championship. Data from 1698 players were collected, with birthdates categorized according to age group and quartiles. For statistical analysis frequency of occurrence, Pearson's chi-square test and Cramér's V test were employed, using a significance level of 5%. The main results indicate the absence of RAE in the U17, U20 and adult categories of Brazilian women's soccer. In this context, it becomes relevant to reflect on the importance of creating younger categories in Brazil, with specific planning based on the particularities of each stage of maturation.

Palavras-chave:

Futebol;
Mulheres;
Educação física e
treinamento;
Esportes coletivos.

RESUMO

O objetivo deste trabalho foi verificar o efeito da idade relativa nas categorias Sub17, Sub20 e adulta do Campeonato Brasileiro de Futebol Feminino 2023. Foram coletadas as datas de nascimento de 1698 jogadoras de acordo com categoria e quartis. Para análise estatística utilizou-se a frequência de ocorrência, o teste de qui-quadrado de Pearson e o teste V de Cramer adotando nível de significância de 5%. Os principais resultados apontam para ausência do EIR em todas as categorias analisadas. Nesse sentido, torna-se relevante a reflexão sobre a importância da criação de categorias mais jovens no Brasil, com planejamento específico a partir das particularidades de cada estágio de maturação.

Palabras clave:

Fútbol;
Mujeres;
Educación física y
entrenamiento;
Deportes de equipo.

RESUMEN

El objetivo de este trabajo fue verificar el efecto de la edad relativa en las categorías Sub17, Sub20 y adulta del Campeonato Brasileño de Fútbol Femenino 2023. Se recolectaron las fechas de nacimiento de 1698 jugadoras según categoría y cuartiles. Para el estadística se utilizó la frecuencia de ocurrencia, la prueba de chi-cuadrado y V de Cramer, adoptando nivel de significancia del 5%. Los principales resultados indican la ausencia de la EIR en las categorías verificadas. En este sentido, resulta relevante la reflexión sobre la importancia de la creación de categorías más jóvenes en Brasil, con una planificación específica a partir de las particularidades de cada etapa de maduración.

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INTRODUCTION

In youth categories, commonly referred to as “base categories”, FIFA uses January 1st as a cutoff date to group players according to biennial age brackets (FIFA, 2024). By grouping players born in the same year, sports organizations aim to promote more balanced competitions (Ribeiro et al., 2024). However, research surrounding women's sports shows that a year of biological development, especially in terms of maturation indicators, can influence body composition, biomotor abilities, and athletic performance in young athletes (Smith et al., 2018). That is, players within the same category may have anthropometric, physiological, and psychosocial differences of up to twelve months. This difference is referred to as relative age, and its effect can negatively influence the selection process, as there is often a preference for athletes born in the first months of the year, and the subsequent initiation of an adequate and systematic training process (Brustio et al., 2023). Therefore, examining the effect of relative age (RAE) in women's soccer can help to understand the factors potentially related to player performance in different categories.

Previous studies with female soccer players from Europe (Delorme et al., 2010; Sedano et al., 2015; Campos, 2019) have shown the presence of RAE in youth categories. In contrast, van den Honert (2012), when analyzing young Australian players, reported the absence of RAE in the U17 and U-15 categories. RAE was also not found in national teams participating in the Olympic Games (Barreira et al., 2021). All authors point to the need for more investigations on the topic. In line with this, Smith et al. (2018) emphasize that the presence of RAE remains inconclusive in women's sports.

More recently, Brustio et al. (2023) analyzed the youth and professional categories of the Italian women's national soccer team, indicating that RAE appears in only 17% of players. They emphasize the need for structures and organizational environments different from those in men's soccer, where RAE is widely consistent and prevalent, especially in early categories.

Specifically in Brazil, women and girls were prohibited from playing soccer from 1941 to 1979 (Goellner, 2005). Even after the ban was lifted, female players faced a lack of investment and support to develop in the sport. The consolidation of soccer as a professional career only gained momentum in 2019 after the South American Soccer Confederation mandated that male teams must have a women's team to compete in international competitions (FIFA, 2024). Since then, there has been a continuous evolution in Brazilian women's soccer. In this regard, some authors highlight the recent increase in the number of players at the national level but also emphasize the challenges related to the scarcity of scientific information on Brazilian athletes, making it difficult to establish parameters that can support sports

preparation (Souza, 2024; Barreira et al., 2022) at different performance levels.

Currently the national women's soccer competition calendar consists of the Brazilian Championship, the Copa do Brasil, and the Super Cup, with the Brazilian Championship being considered the most relevant and the one that includes the existing youth categories (U20 and U17) in Brazilian women's soccer. According to Nunes (2023), the inclusion of these categories in the Brazilian Championship only occurred in 2019, and since then, some platforms have begun to share information about the players and clubs.

Therefore, understanding the factors related to RAE in the different categories of the Brazilian Women's Soccer Championship can contribute to expanding knowledge about the sport on a national level and, additionally, assist in identifying potential errors in the selection and evaluation of players across different performance levels. Thus, the objective of this research was to verify a possible attendance the effect of relative age in the U17, U20, and adult (A1) categories of the Brazilian Women's Soccer Championship.

METHODOLOGY

This is a descriptive study with a quantitative approach and a cross-sectional design (Gil, 2002). The birth dates of athletes who competed in the U17, U20, and adult (A1) categories of the 2023 Brazilian Women's Soccer Championship, the most recent edition of the competition at the time of this research, were collected.

Initially, the information was obtained from the official website of the Brazilian Soccer Confederation (CBF, 2024a, b, c), which is publicly available, and then stored in a Microsoft Excel® spreadsheet. Subsequently, the data were divided according to the U17 (n=449), U20 (n=728), and adult (n=521) categories, and then subdivided into quartiles based on the month of birth: i) Quartile 1 (Q1) - born in January, February and March; ii) Quartile 2 (Q2) - born in April, May and June; iii) Quartile 3 (Q3) - born in July, August and September; and finally, iv) Quartile 4 (Q4) - born in October, November and December.

From the data collected on athlete's birth dates, descriptive analysis was initially conducted using frequency of occurrence (absolute and relative) by categories and quartiles. Pearson's chi-square test was used to assess whether the distribution of athletes' birth dates across the four quartiles differed significantly within each competitive category (A1, U20, and U17). In practical terms, this test evaluates whether birth dates are evenly distributed or whether certain quartiles present a disproportionately higher or lower number of athletes compared to what would be expected. Cramér's V was calculated as an effect size measure to quantify the strength of the association between birth quartile and competitive category. While the chi-square test indicates whether an association exists, Cramér's

V indicates the magnitude of this association. The results were interpreted as follows: $0.06 < \text{small} \leq 0.17$; $0.18 < \text{moderate} \leq 0.29$; $\text{large} \geq 0.30$ (Cohen, 1988). Additionally, the standardized residual was calculated to identify which specific quartiles showed significantly higher or lower frequencies than expected under the null hypothesis of equal distribution, considering $z > |2.0|$ (Sharpe, 2015). The significance level adopted was 5%. All analyses were conducted using the SPSS® statistical software.

RESULTS

Table 1 presents the number of players in each quartile (Q1, Q2, Q3, and Q4) and category (A1, U20, and U17). No association was found between the players birth quartile and the categories U17, U20, and adult (A1).

DISCUSSION

The present study aimed to examine the effect of relative age in the U17, U20, and adult (A1) categories of the 2023 Brazilian Women's Soccer Championship. Based on the proposed objective and the results obtained, it was possible to observe a similar distribution of the number of athletes across the four quartiles analyzed. Thus, it can be stated that there was an absence of the relative age effect (RAE) in all categories of the 2023 Brazilian Women's Soccer Championship.

In this regard, the findings of this study differ from some previous research on women's soccer worldwide. For example, Ribeiro et al. (2024), when analyzing the U17 and U20 World Championships held in 2018 and the adult competition in 2019, found the presence of RAE in both the U17 and U20 categories, with a higher representation of players born in the first quarter (Q1).

In the same context, Campos (2019) examined the U17 and adult categories of the Women's European Soccer Championship and reported the presence of RAE only in the U17 category, with over-representation of players born in the months corresponding to Q1.

Sedano et al. (2015) presented similar results when identifying RAE in the youth categories of the three divisions in Spanish women's soccer. The authors concluded that RAE was likely due to the early talent identification processes present in the current structure of European women's soccer.

In contrast, van den Honert (2012) examined the birth dates of 268 Australian players (U17 and U-15) and found the absence of RAE in both categories. The author hypothesized that this might be because the competition for spots in the women's game is less intense compared to the men's game, which could explain the findings of this study as well.

Another issue to consider in the discussion about RAE in female sports is the process of female maturation. Helsen et al. (2005) mention that women typically exhibit maturational effects earlier than men and are generally physically mature by around 17 years of age. This scenario, in turn, contributes to the reduced likelihood of observing RAE in female competitions across different sports.

Gomes (2008) and Benézét and Hasler (2017) state that a sports career in soccer is composed of five main stages: preliminary (between 6 and 12 years), initial specialization (between 12 and 15 years), deep specialization (between 16 and 18 years), high-level results (between 19 and 24 years), and performance maintenance. According to these authors, most players are expected to be in the consolidation stages of maturation during the deep specialization phase.

In this regard, Malina et al. (2021) conducted a narrative review on the growth and maturation status of young female soccer players and noted that, according to the studies they reviewed, the average age of menarche occurs around 12 years, and this is the most commonly used indicator to determine the critical point in the female maturation process. This occurs after the peak growth velocity, during which the most significant gains

Table 1. Distribution of birth dates by quartile (Q) of athletes who competed in the Brazilian Women's Soccer Championship 2023, by category.

CATEGORY		QUARTIS				TOTAL	χ^2	P-value	V
		Q1	Q2	Q3	Q4				
A1	Athletes N(%)	114(21.9)	150(28.8)	133(25.5)	124(32.2)	521(100)	2,148	0.542	0.04
	Std. Res	-0.6	0.7	0.1	1.4				
U20	Athletes N(%)	198(27.2)	194(26.6)	172(23.6)	164(22.5)	728(100.0)	0.720	0.868	0.02
	Std. Res	0.4	0.3	-0.3	-0.5				
U17	Athletes N(%)	134(29.8)	117(26.1)	99(22.0)	99(22.0)	449(100.0)	1,760	0.623	0.03
	Std. Res	0.9	0.2	-0.6	-0.6				
TOTAL	Athletes N(%)	446(26.3)	461(27.1)	404(23.8)	387(22.8)	1698(100.0)	0.400	0.940	<0.01
	Std. Res	0.2	0.4	-0.2	-0.4				

Legend: χ^2 = Chi-square analysis; Q1 = born in january, february and march; Q2 = born in april, may and june; Q3 = born in july, august and september; Q4 = born in october, november and december; V = magnitude of the effect size the Cramer's V.

Source: Prepared by the authors; Std. res. = standard deviation; Statistical significance was set at $p < 0.05$.

in growth and athletic performance for women have already taken place (Malina, 2014).

It is important to note that by the time of this study, the U17 and U20 categories were the youngest competing in the Brazilian Women's Soccer Championship. This leads to the understanding that the majority of the players analyzed were likely already physically mature.

Given this, it is possible to affirm that the scenario of Brazilian women's football contradicts the findings that consolidate the consensus regarding the phenomenon of the relative age effect in women's sport worldwide. Based on the analysis of this context, coupled with the observation of the current reality of the sport in some countries that contributed to the construction of this consensus, the importance and urgency of creating intervention proposals that improve the opportunities, selection, training, and professionalization of Brazilian athletes is highlighted. This would enable the development of national women's football in a solid, structured way, supported by scientific knowledge, in order to improve the appropriate preparation process for players from early ages to high performance levels.

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CONFLICTS OF INTEREST

The authors have declared that no competing interests exist.

DATA AVAILABILITY

The dataset analyzed during this study is available at the links provided in the article's methodology and is not publicly available and can be obtained by request from the corresponding author.

REFERENCES

- Barreira J, Bueno B, Chiminazzo JG. Relative age effect and age of peak performance: an analysis of women's. *Motriz*. 2021;27:e1021006921. <https://doi.org/10.1590/s1980-65742021006921>.
- Barreira J, Gonçalves MC, Medeiros DC, Galatti LR. Produção acadêmica em futebol e futsal feminino: estado da arte dos artigos científicos nacionais na área da Educação Física. *Movimento*. 2022;24(2):607.
- Benézét JM, Hasler H. Fútbol juvenil [Internet]. FIFA; 1 abr. 2017 [cited 2024 Oct 25]. Available from: <https://www.fifa.com/pt/pt%3E>
- Brustio PR, Modena R, Boccia G, Vogliazzo M, Kelly AL. Youth-to-adult transitions in women's and girls soccer: towards a better understanding of relative age effects and gender-specific considerations. *PLoS One*. 2023;18(5):e0283781. <https://doi.org/10.1371/journal.pone.0283781>. PMID:37141307.
- Campos MS. The effect of relative age in women's football: a study with footballers participating in the European adult and under-17 championships [dissertation]. Coimbra: Faculty of Sports Sciences and Physical Education, University of Coimbra; 2019.
- CBF: Confederação Brasileira de Futebol. Atletas – campeonato brasileiro – Feminino A1 [Internet]. 2024a [cited 2024 Oct 25]. Available from: <https://www.cbf.com.br/futebol-brasileiro/atletas/campeonato-brasileiro/feminino-a1/2025>
- CBF: Confederação Brasileira de Futebol. Atletas – campeonato brasileiro – Feminino Sub-20 [Internet]. 2024b [cited 2024 Oct 25]. Available from: <https://www.cbf.com.br/futebol-brasileiro/atletas/campeonato-brasileiro/feminino-sub-20/2025>
- CBF: Confederação Brasileira de Futebol. Atletas – campeonato brasileiro – Feminino Sub-17 [Internet]. 2024c [cited 2024 Oct 25]. Available from: <https://www.cbf.com.br/futebol-brasileiro/atletas/campeonato-brasileiro/feminino-sub-17/2025>
- Cohen J. Statistical power analysis for the behavioral sciences. New York: Hilldales; 1988.
- Delorme N, Boiché J, Raspaud M. Relative age effect in female sport: a diachronic examination of soccer players. *Scand J Med Sci Sports*. 2010;20(3):509-15. <https://doi.org/10.1111/j.1600-0838.2009.00979.x>. PMID:19602186.
- FIFA: Fédération Internationale de Football Association. The home of soccer [Internet]. 2024 [cited 2024 Sep 20]. Available from: <https://www.fifa.com/pt/pt%3E>
- Gil AC. How to develop research projects. São Paulo: Atlas; 2002.
- Goellner SV. Women and football in Brazil: between shadows and visibility. *Brazilian Journal of Physical Education and Sport*, 2005; doi:10.1590/S1807-55092005000200005
- Gomes AC. Football: high-performance sports training. Porto Alegre: Artmed; 2008
- Helsen WF, van Winckel J, Williams AM. The relative age effect in youth soccer across. *Eur J Sport Sci*. 2005;23(6):629-36. <https://doi.org/10.1080/02640410400021310>. PMID:16195011.
- Malina RM. Top 10 research questions related to growth and maturation of relevance to physical activity, performance and fitness. *Res Q Exerc Sport*. 2014;85(2):157-73. <https://doi.org/10.1080/02701367.2014.897592>. PMID:25098012.
- Malina RM, Valente dos Santos J, Coelho e Silva MJ, Koziel SM. Growth and maturity of female soccer players: a narrative review. *Int J Environ Res Public Health*. 2021;18(4):1448. <https://doi.org/10.3390/ijerph18041448>. PMID:33557121.
- Nunes M. What has changed in women's football in Brazil since the last World Cup? [Internet]. Dibradoras; 2023 [cited 2024 Jun 8]. Available from: <https://dibradoras.com.br/2023/03/22/o-que-mudou-no-futebol-feminino-do-brasil-desde-a-ultima-copa>
- Ribeiro E, Barreira J, Carraco D, Galatti L, Gotze M, Abad CC. The relative age effect in under-17, under-20 and adult elite female soccer players. *Sci Med Footb*. 2024;8(2):153-60. <https://doi.org/10.1080/24733938.2022.2164608>. PMID:36592346.

- Sedano S, Vaeyens R, Redondo JC. The relative age effect in spanish female soccer players: influence of the competitive level and a playing position. *J Hum Kinet.* 2015;46(1):129-37. <https://doi.org/10.1515/hukin-2015-0041>. PMID:26240656.
- Sharpe D. Your chi-square test is statistically significant: now what? *Pract Assess Res Eval.* 2015;20:8.
- Smith KL, Weir PL, Till K, Romann M, Copley S. Relative age effects across and within female sport contexts: a systematic review and meta-analysis. *Sports Med.* 2018;48(6):1451-78. <https://doi.org/10.1007/s40279-018-0890-8>. PMID:29536262.
- Souza AM. Predição de resultados de jogos do Campeonato Brasileiro de Futebol Feminino [monografia]. Ouro Preto: Instituto de Ciências Exatas e Biológicas, Universidade Federal de Ouro Preto; 2024.
- van den Honert R. Evidence of the relative age effect in soccer in Australia. *J Sports Sci.* 2012;30(13):1365-74. <https://doi.org/10.1080/02640414.2012.707329>. PMID:22876740.