

ORIGINAL SCIENTIFIC PAPER

Relative Age Effects in The Selection of Representative Athletes of Kosovo National Team in Handball, Football, Basketball, Volleyball - Post Puberty Age

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Abstract

Taking into account the role that the selection of athletes has in the success of clubs as well as in the sports life of young people, this research aims to highlight the impact of the Relative Age Effects (RAE) in the selection of athletes for representative teams of Kosovo in collective sports and the difference between the respective groups. The study was designed as an observational cross-sectional study. The total sample of persons in this research was $n=237$ (118 male and 119 female) athletes of the Kosovo National Team of team sports. The athletes were divided into 4 main groups: Q1 (January-March), Q2 (April-June), Q3 (July-September) and Q4 (October-December) with a special emphasis on the Q1 and Q4 group (for all sports the birth dates of the age post-puberty were collected). The analysis of the data clearly indicates that young athletes born in Q1 and Q2 were significantly more selected for representative teams compared to those in the other two groups. The results demonstrate a significant relative age effect on athlete selection based on gender for the Kosovo National Team. Specifically, athletes from Q1 and Q2 were favored. Based on these findings, it is strongly recommended that the respective federations, sports trainers, and relevant sports authorities take proactive measures to prevent the "discrimination" experienced by young athletes.

Keywords: team sports, dynamic of relative age, selection, quartile, success, potential

Introduction

Talent identification and physical ability assessment is a common process in the selection of team sports athletes. The selection of these talents depends on and is influenced by physical and bio-psychological abilities such as speed, strength, coordination, power, aerobic and anaerobic capacity, but based on numerous researches, the date of birth of individuals turns out to be a determining factor for their sports "fate" (Jakobsson, Julin, Persson, & Malm, 2021). For the first time, RAE (Relative Age Effect) was mentioned in 1982 in the context of sports performance in the publication "Unknown Exclusion in Sports" published by "Athletics"

(Jakobsson, Julin, Persson, & Malm, 2021). In the adolescent years, significant alterations occur in the anthropometric and physiological traits of both males and females (Arrieta, Unda, & Gil, 2016). Consequently, sports participants who are relatively older may experience an advantage in terms of being chosen for elite teams. This advantage grants them improved access to coaching and facilities, ultimately aiding in their skill development compared to their relatively younger counterparts (Smith et al., 2022). As the selection process intensifies, the focus on the distribution criterion diminishes, and the Relative Age Effect (RAE) is most pronounced during the final selection stage overseen by regional team



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coaches (Lagestad, Steen, & Dalen, 2018). Despite technical abilities potentially providing an early indicator, many coaches tend to blend technical skills and potential with early accomplishments, which, once more, might result from physical advantages and similar factors (Fuhre, Øygaard, & Sæther, 2022). The durations of professional careers can be linked to numerous factors apart from the relative age effect (Nakata, 2017). In team sports, there is a tendency to favor younger athletes born towards the end of the year, as they could potentially be less developed and face disadvantages in terms of their physical attributes, physiology, and maturity compared to their peers born in the earlier months of the year (Villora, Vicedo, & Cordente, 2015; Wattie, Schorer, & Baker, 2015; Unda et al., 2016). Consequently, a considerable number of promising talents may go unnoticed due to the disadvantage associated with their relative age (Musch & Grondin, 2001). The extent of the relative age effect is influenced by interactions occurring at different developmental stages (Smith, Weir, Till, Romann, & Copley, 2018). Failure to address the relative age effect at a young age will lead to not only a selective and arbitrary choice of elite athletes but also have a detrimental impact on public health, as sport participation is linked to overall physical activity levels, both in the present and future (Jakobsson, Julin, Persson, & Malm, 2021). The findings indicate the presence of relative age effects (RAEs) in German elite adult male and female soccer. This notable RAE observed in the study arises from a higher representation of players born in the early months of the year (Götze & Hoppe, 2021). To be more precise, the impact was identified in swimming, which is an individual sport, as well as in team sports like basketball, soccer, and team handball (Lidor, Maayan, & Arnon, 2021). The primary motivation behind this study is the insufficient research on the influence of relative age effects in Kosovo across different sports. This research aims to highlight the impact of this phenomenon (RAE) in the selection of athletes for representative teams, recognition and reflection of this phenomenon in the selection of the representative teams of Kosovo in collective sports, and the difference between the respective groups.

Methods

Study Design and Participants

The study was designed as a cross-sectional observational study with a deductive approach, where the participants in this research were a total of $n=237$ (118 male and 119 female), selected from four representative teams (two teams for each gender) from the short list of players for each sport mentioned above: Handball 60 players (15 male and 15 female), Football 80 players (40 male and 40 female), Basketball 48 players (24 male and 24 female) and Volleyball 49 players (24 male and 25 female). The criterion for the selection of the players was the age of the players (post-puberty age) where the minimum required age was U16 and the maximum age was not to exceed U20, which means that senior teams were not included due to the age difference between players. It is worth noting that the age of the selected players is the same calendar year for each team. The team selection method was simple random sampling.

Data Collection

The method of collecting the data needed to do this research was through their collection in the field by visit-

ing the respective federations of each collective sport that this research affects. Some of the data were received in physical form by the responsible persons of the respective federations, while another part of the data collection was in electronic form via the Internet on the official websites of these federations. The data collected includes the birth dates of the participating athletes and they were categorized into yearly quarters, following a method similar to the approach used in the study by (Lemoine, Pelletier, Trudeau, & Grondin, 2021). The collection of this data lasted about 3 months (March, April, May - 2022). In this research there was no need for the usual procedure of testing individuals, this is for the sole reason that for the calculation of the necessary results, only the date of birth of the athlete selected by the respective representative was needed. The collection of this data was in full compliance with the Declaration of Helsinki and approved by the Physical Education Board of the Faculty of Physical Education and Sport, University of Pristina "Hasan Pristina" Nr. 1124, 27.12.2022.

Data analysis

The data were analyzed using the statistical package SPSS v23.0 (SPSS Inc., Chicago, IL, USA) whereas the data (tables) were stored in Microsoft Excel. The parameters treated in this research were the birth dates of the athletes. The collected data were of the "categorical" type and for the purpose of their analysis the transformation of the data was done, where the months January, February, and March (Q1) were defined with the value 1, the months April, May, and June (Q2) with the value 2, the months July, August and September (Q3) with value 3 and October, November and December (Q4) with value 4. Cross tabulations (contingency tables) were used to display the distribution of data between the "Sports, Gender and Quartile" variables, the Chi-square test of independence was used to determine whether there is a significant association between those variables, and the Chi-square goodness-of-fit test was used to compare observed data with expected data to determine if there is a significant difference between quartiles. The significance level was set at $p < 0.05$.

Results

As can be seen in the presented Table 1 and Table 2, the Chi-Square test results (with a p-value of 0.233) indicate that there is no statistically significant association between Quartiles (Q1, Q2, Q3, Q4) and Sports (Handball, Football, Basketball, Volleyball) in the representation of athletes in the Kosovo National Team. This means that there are no significant differences among sports regarding the effect of relative ages on athlete representation. Additionally, Cramer's V value (0.128) suggests a weak association, which further supports the notion that the effect of relative ages does not differ significantly across different sports. In Table 3 and Table 4, the Chi-Square test results (with a p-value of 0.006) indicate that there is a statistically significant association between Quartiles (Q1, Q2, Q3, Q4) and Gender (Male and Female) in the representation of athletes in the Kosovo National Team. This means that there are significant differences between genders regarding the effect of relative ages on athlete representation. Furthermore, both Phi (0.228) and Cramer's V (0.228) values show a moderate association between Quartiles and Gender, reinforcing the significant

Table 1. Distribution of data between the Sports and Quartile variables and the Chi-square test of independence

		Crosstab					Total
		Quartile					
		Q1	Q2	Q3	Q4		
Sport	Football	Count	28	21	20	11	80
		Expected Count	33.4	21.6	13.8	11.1	80.0
		% of Total	11.8%	8.9%	8.4%	4.6%	33.8%
	Basketball	Count	27	11	6	4	48
		Expected Count	20.1	13.0	8.3	6.7	48.0
		% of Total	11.4%	4.6%	2.5%	1.7%	20.3%
Sport	Volleyball	Count	21	13	5	10	49
		Expected Count	20.5	13.2	8.5	6.8	49.0
		% of Total	8.9%	5.5%	2.1%	4.2%	20.7%
	Handball	Count	23	19	10	8	60
		Expected Count	25.1	16.2	10.4	8.4	60.0
		% of Total	9.7%	8.0%	4.2%	3.4%	25.3%
Total	Count	99	64	41	33	237	
	Expected Count	99.0	64.0	41.0	33.0	237.0	
	% of Total	41.8%	27.0%	17.3%	13.9%	100.0%	

$$X^2(9, n=237)=11.666, p=0.233, \phi_c=0.128$$

Note: Q1 (January, February, and March), Q2 (April, May, and June), Q3 (July, August, and September), Q4 (October, November, and December), X^2 - Chi-square value, n - number, p - p-value, ϕ_c - Cramér's phi (Cramér's V)

relationship found. Table 5 and Table 6, representation of the Chi-Square goodness-of-fit test indicates a significant association between quartiles and the representation of athletes in the different quartiles, the p-value is extremely small (0.000). The observed distribution of athletes across

the quartiles (Q1, Q2, Q3, Q4) is significantly different from what would be expected if there were no relationship between the quartiles and athlete representation. Specifically, Q1 and Q2 are over-represented in the selection of athletes, while Q3 and Q4 are under-represented.

Table 2. Distribution of data between the Gender and Quartile variables and the Chi-square test of independence

		Crosstab				Total	
		Quartile					
		Q1	Q2	Q3	Q4		
Gender	Male	Count	62	25	15	16	118
		Expected Count	49.3	31.9	20.4	16.4	118.0
		% of Total	26.2%	10.5%	6.3%	6.8%	49.8%
	Female	Count	37	39	26	17	119
		Expected Count	49.7	32.1	20.6	16.6	119.0
		% of Total	15.6%	16.5%	11.0%	7.2%	50.2%
Total	Count	99	64	41	33	237	
	Expected Count	99.0	64.0	41.0	33.0	237.0	
	% of Total	41.8%	27.0%	17.3%	13.9%	100.0%	

$$X^2(3, n=237)=12.353, p=0.006, \phi_c=0.228$$

Note: Q1 (January, February, and March), Q2 (April, May, and June), Q3 (July, August, and September), Q4 (October, November, and December), X^2 - Chi-square value, n - number, p - p-value, ϕ_c - Cramér's phi (Cramér's V)

Table 3. The Chi-square goodness-of-fit test between “Quartiles”

	Quartile		
	Observed N	Expected N	Residual
Q1	99	59.3	39.8
Q2	64	59.3	4.8
Q3	41	59.3	-18.3
Q4	33	59.3	-26.3
Total	237		

$\chi^2(3, n=237)=44.300, p<0.000$

Note: Q1 (January, February and March), Q2 (April, May and June), Q3 (July, August, and September), Q4 (October, November, and December), χ^2 - Chi-square value, n - number, p - p-value.

Discussion

Based on the results of the data distribution of this research, the relatively large impact of the phenomenon (RAE) on Kosovo's representatives in the above-mentioned collective sports is clearly observed. The primary objective of this research was to examine the presence of RAE in the selection of players in the representative teams of the respective sports with special emphasis on the comparison of Q1 and Q4 groups. The secondary aim was to compare which gender is more affected and influenced by RAE. By analyzing the data, it was clearly seen that the young people born at the beginning of the year or Q1 and Q2 groups were definitely more selected in the representative teams than the young people of the other two groups, also in both sexes the young people of the Q1 group were the majority in the selection compared to group Q2 and Q4. The findings of our study affirm our hypothesis and are in agreement with previous studies that RAE is present in the selection process of young people in the respective representatives.

All representative teams in specific sports have not been affected at the same level by the phenomenon (RAE), but it is clearly observed that gr. Q1 (January-March) was significantly larger in the selection of players in the representative teams than gr. Q3 (July-September). Studies on Relative Age Effect (RAE) have indicated that athletes born in the earlier part of the year (i.e., the first semester) tend to possess an advantage in terms of anthropometric measurements, physiological attributes, technical skills, and tactical abilities (Gil et al., 2014; Arrieta, Unda, & Gil, 2016; Ibáñez, Mazo, Nascimento, & Rubio, 2018). Additionally, when considering the athletes who achieved medals in the competitions within the studied timeframe, it's noteworthy that over 50% of them were born in the initial quarter of the year, while there were no medalists born in the final quarter (Bezuglov et al., 2022). An interesting discovery is the limited impact of the Relative Age Effect (RAE) on both individual and team performance in youth levels, whereas its significance becomes more apparent in junior and senior categories (de la Rubia, Calvo, & Lorenzo, 2020). Moreover, it is clearly observed that the male gender is more affected by the phenomenon (RAE) than the female gender, wherein the crosstabulation and the chi-square test prove that. These findings corroborate those of other authors (Arrieta, Unda, & Gil, 2016) the results of which show that this effect was not found for female players. Furthermore, there is a common belief that the Relative Age Effect (RAE) tends to be less pronounced in female sports, primarily because of lower levels of competition among young girls (Delorme & Raspaud, 2009; Sedano, Vaeyens, & Redondo, 2015). These findings affirm the hypothesis that it was expected that the male gender is

more affected by the phenomenon (RAE) than the female gender during the selection for the National Team. Moreover, the results indicated that the Relative Age Effect (RAE) became more noticeable with higher levels of competition (Sedano et al., 2015). The main results indicated that Relative Age Effects (RAEs) were present in both males and females across the Regional Talent Hubs. However, they were statistically significant only in the case of males in the England National Youth Teams (Kelly et al., 2021). The most significant Relative Age Effect (RAE) is observed among highly accomplished young athletes. This implies that athletes born earlier in the year face fewer chances to join elite sports organizations and benefit from top coaching, increasing the likelihood of them leaving the sport prematurely during adolescence (Bezuglov et al., 2022). Additionally, although the specific risk pattern may differ when comparing various samples, Relative Age Effects (RAEs) are consistently observed and anticipated, particularly during the transitional adolescent years. This is a period when differences in maturation levels are most pronounced (Musch & Grondin, 2001; Malina, Bouchard, & Bar-Or, 2003). The selection process for the sports academy thus seems to favor athletes with chronological higher age, i.e., a so-called relative age effect is present (Ek et al., 2019). Maturity status should be considered not only during the selection process but also as a guiding factor in training, helping to address and reduce the disparities arising from varying maturity levels (Toselli et al., 2022). Neglecting to tackle the relative age concern and its underlying causes could lead to children disengaging from physical activities altogether, which could have lasting adverse effects on public health in the long run (Jakobsson et al., 2021). Continuous education of coaches and the promotion of awareness regarding RAEs in sports remain imperative. This is crucial in preventing athletes from leaving sports prematurely and ensuring that all players have equitable chances to showcase their talents across various levels of competition (Lemoine, Pelletier, Trudeau, & Grondin, 2021). One of the significant strengths of this study is its comprehensive analysis of a diverse sample of athletes, providing a well-rounded perspective on the phenomenon. Additionally, the study employed well-established statistical techniques to analyze the data, enhancing the reliability of the results. Furthermore, being one of the few research in this domain in Kosovo, this study fills a critical knowledge gap and serves as a foundational piece for future investigations into relative age effects. Despite its contributions, this study has some limitations that warrant consideration. The sub-sample used in this research, although carefully selected from representative teams, may still be relatively small for broader data generalization. While the results provide valuable insights into the specific context of the

Kosovo National Team, caution should be exercised when applying these findings to other regions or sports without further validation. One limitation is the potential for publication bias in the selected literature, as it may not encompass all relevant studies on the topic. Additionally, the scope of the research might not fully cover all team sports, and variations in relative age effects between different sports might not have been fully explored. This research lays the groundwork for future investigations in the field of relative age effects on athletes. To build upon this study, it is recommended that researchers conduct more longitudinal studies to better understand how relative age impacts athletes' long-term development and career trajectories in various team sports. Additionally, incorporating larger and more diverse samples from different sports and regions will enhance the generalizability of the findings.

Conclusions

Based on these findings, it can be concluded that the relative age effect appears to be distributed similarly across

Authors' affirmation of compliance

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Physical Education Management of the Faculty of Physical Education and Sport, University of Pristina "Hasan Pristina, December 2022. Nr. 1124, 27.12.2022

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Conflict of Interest

The author declares that there is no conflict of interest.

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different sports, and there is no strong evidence to suggest that one sport is more affected by relative ages than the others. The results reveal that the relative age effect has a significant impact on the selection of representative athletes for the Kosovo National Team based on gender. There are notable differences in the representation of athletes in different quartiles between males and females, indicating that gender plays a role in how relative age influences athlete selection, where the male gender is slightly more affected by the effect of relative age. Furthermore, Q1 and Q2 are over-represented in the selection of athletes, while Q3 and Q4 are under-represented. This suggests that the relative age effect plays a role in the selection of athletes, with more athletes being selected from the younger quartiles (Q1 and Q2) compared to the older ones (Q3 and Q4). Based on these findings, it is strongly recommended that the respective federations, sports trainers, and relevant sports authorities take proactive measures to prevent the “discrimination” experienced by young athletes.

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