



Science, Movement and Health, Vol. XXV, ISSUE 1, 2025
January 2025, 25 (1): 49-53
Original article

INTERRELATION BETWEEN RELATIVE AGE EFFECT AND GOAL SCORING IN BULGARIAN FOOTBALL

IVANOV DANAIL¹

Abstract

Aim. This study aims to investigate the impact of the relative age effect (RAE) on the performance of footballers, focusing on how birthdate grouping affects goal-scoring success at the highest level of competitive football.

Methods. Birth dates of the top five goal scorers from the three highest leagues in Bulgaria (First, Second and Third Division) over the last five years were collected and analyzed. A total of 139 scorers were included. Their dates of birth were categorized into four quarters of the year, and their scoring performances were compared to see if those born in the first quarters had a greater tendency to excel in Bulgarian football.

Results. The analysis revealed that 48% of the top scorers in the first division were born in the fourth quarter of the year. This suggests that players born in the first half of the year do not have a clear dominance in scoring at the highest competitive level.

Conclusions. The results challenge the conventional assumption that the relative age effect gives a significant advantage to players born earlier in the year. At the highest level of Bulgarian football, there is no clear superiority in goal-scoring for players born in the first half of the year.

Keywords: soccer; relative-age effect; goal scorers; Bulgarian leagues; soccer goals.

Introduction

In the game of football, as in many other sports, it is typical to group athletes by age (chronological age). This method of grouping aims to achieve maximum equalization of physical and cognitive differences between individuals participating in sports activities. In most of the countries in the world, as well as in Bulgaria, January 1st is considered as the starting date, and December 31st is the end date of the calendar year for determining the ages for football competitions. The relative age effect (RAE) shows up precisely when it comes to the differences between a child who was born in January and a child born in December.

In elite football, the selection process of football players is directly related to RAE. The popularity of the game and the large number of people involved group help, and select talented players born in a certain part of the year depending on the age grouping of the players in the respective country. In 2009, a study of German professional football players was conducted, in which a serious influence of RAE was observed on the selection of players who were born from 1950 to 1990 (Cobley, Baker, Wattie, & McKenna, 2009). This proves compliance with RAE in the identification of talent and selection of players in youth football. In another study, Da Costa et. Al., (2012) found that the effect of RAE was observed mainly after 1960 in Brazilian football because conditioning preparation entered the football game (Costa et al., 2012; Simeonov & Momchilova, 2008). The Turkish Super League also sees a significant presence of players born in the first quarter of the year (Mulazimoglu, 2014). A study by Musch & Hay (1999), examined the distribution of birth quarters in several countries from different continents excluding Africa. They conclude that in all the studied countries there is a frequency of football players born in the first two quarters of the year (Musch & Hay, 1999).

Age and sport realization are scientific interests from other sports as well (Gutev & Dimova, 2021). In recent years, every single detail of a professional football player's performance has been measured, monitored, and optimized in a detailed and systematic way. In recent years, every single detail of a professional football player's performance has been measured, monitored, and optimized in a detailed and systematic way. This purposefulness undoubtedly brings with it the prerequisite for a more qualitative and effective application of the technical, tactical, conditioning and psychological abilities of elite football players (Dimitrov, Lovkov, Dimov, Baharov, 2019; Ivanov & Gutev, 2024; Baharov, 2020; Baharov, 2024) and age as well as the study of birth date in the selection of players from the earliest childhood football age.

The performance in soccer is usually measured by evaluating collective results, such as determining a team's final position in a competition (McGarry, 2009), or by looking closely at individual statistical parameters (e.g. minutes played, goals scored, average performance indices) that comprehensively describe players participation, contribution, and performance in a competitive environment (De La Rubia, Lorenzo-Calvo & Lorenzo, 2020; Gadev et al., 2018; Gadev & Peev, 2020).

¹Department of „Football and Tennis“, National Sports Academy “Vassil Levski”. Sofia, Bulgaria; Corresponding author: danail.ivanov@nsa.bg .

During the development of a young footballer, it is possible to observe differences in his growth and maturity compared to his peers in the same age group (Malina, Eisenmann, Cumming, Ribeiro & Aroso, 2004). Football players in youth football with less pronounced physical immaturity are in an unequal position compared to football players of the same age group but matured biologically faster (Cobley et al. 2009). The age period at the beginning of puberty is always hard to conduct an adequate training process among young football players (Ivanov, Dimova, Gadjev & Stoilov, 2022). In this way, football scouts and coaches can more easily notice who is stronger, faster, bigger and dominates on the football field. Ashworth & Heyndels (2007) observe that RAE is more influential in the selection of goalkeepers and central defenders in modern football (Ashworth & Heyndels, 2007). Interrelation between the indices of physical and technical preparation, the character of links, and their dynamics give important information to the trainer regarding the organization and planning of the educational-training process (Stoilov, 2018).

When choosing a starting lineup in the U15 age group, the RAE effect is strongly emphasized, where players who were born in the second half of the year have a much smaller chance to start in the first eleven for official football matches (Silva, Lisboa, Medeiros & Melo, 2018).

These results reveal that RAE is observed in different parts of the world and teams of different levels and statuses – from youth teams to national teams.

Bulgarian football is divided into 5 divisions:

- “First League” – professional top league with 16 teams;
- “Second League” – professional second league with 18 teams;
- “Third League” – is an amateur league divided into 4 regions: Southwest (20 teams), Southeast (20teams), Northeast (16 teams), Northwest (15 teams);
- „A” regional group;
- “B” regional group.

The object of our research is the first three divisions of Bulgarian football, and the subjects are the goal scorers in the top three divisions.

In the present study, we aim to track whether there is a direct relationship between the quarter of the year a football player was born and his goalscoring abilities in Bulgaria.

Methods

The sample for our study represents the birth dates of 139 football players who became top scorers in the Bulgarian football leagues. According to the level at which they participated, they are First League (n = 25), Second League (n = 25), Third League (n = 89) – all are from senior football

All data was collected from the archives of the Bulgarian Football Union. The top 5 scorers of the First, Second and Third Leagues of the country in the seasons 2018/2019, 2019/2020, 2020/2021, 2021/2022 and 2022/2023 were registered. The goal scorer statistic was taken directly from the website www.bulgarian-football.com.

The goal scorers of the three leagues were grouped by the quarter of the year in which they were born. Those born from January to March – Q1 (early born), from April to June – Q2, from July to September - Q3, and from October to December - Q4 (late born).

The RAE effect is represented by a larger relative sample size of those born in the first quarter of a year compared to the other periods.

Most of the top scorers in the analyzed Bulgarian championships are natural strikers.

Results

The average age (X) of top goal scorers in all levels of Bulgarian football is 27.83 years old. The youngest goal scorer was 17 years old and the oldest was 40. These values are similar for the three leagues. There are no significant changes compared to the three leagues. The sample standard deviation (S) is 5,38. The total range (R) of the three levels of the championship is 23. In the first league, the range is 19, the second league is 21 and the third league is the biggest 23. The sample is approximately uniform (V%) with a coefficient of 19.35%.

Table 1. Age characteristics of the total sample

Age	N	R	Min.	Max.	X	S	V%
Total	139	23	17	40	27,83	5,38	19,35
First League	25	19	21	40	28,88	5,29	18,30
Second League	25	21	18	39	26,36	5,49	20,83
Third League	89	23	17	40	27,96	5,36	19,16

The frequency and percentage distribution of top scorers in Bulgarian football for the last 5 years is shown in Figure 1. In the Bulgarian championships, there is a large percentage of football players born in the first half of the year, which

establishes that RAE exists in the football of the country. A total of 62% of the top scorers in the top three leagues are born before June. We consider 38.8% of the top scorers born in Q1 as early born. And late-born (Q4) we observe in 18% of the top scorers in Bulgaria.

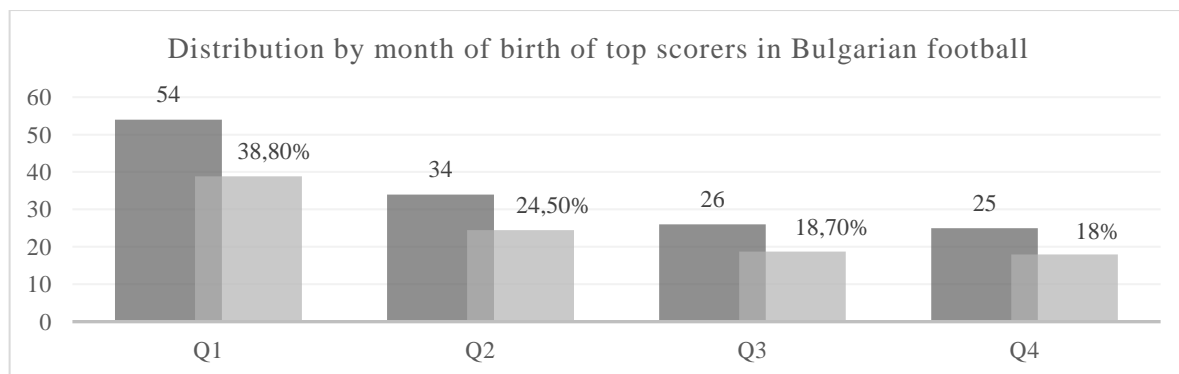


Figure 1. Frequency and percentage of all goal scorers in the last 5 years

In Figure 2 we see the distribution of births in the highest level of Bulgarian football. The highest number of top scorers were born in Q 4 – 48%. 40% of top scorers were born in the first half of the year, and 60% in the second half.

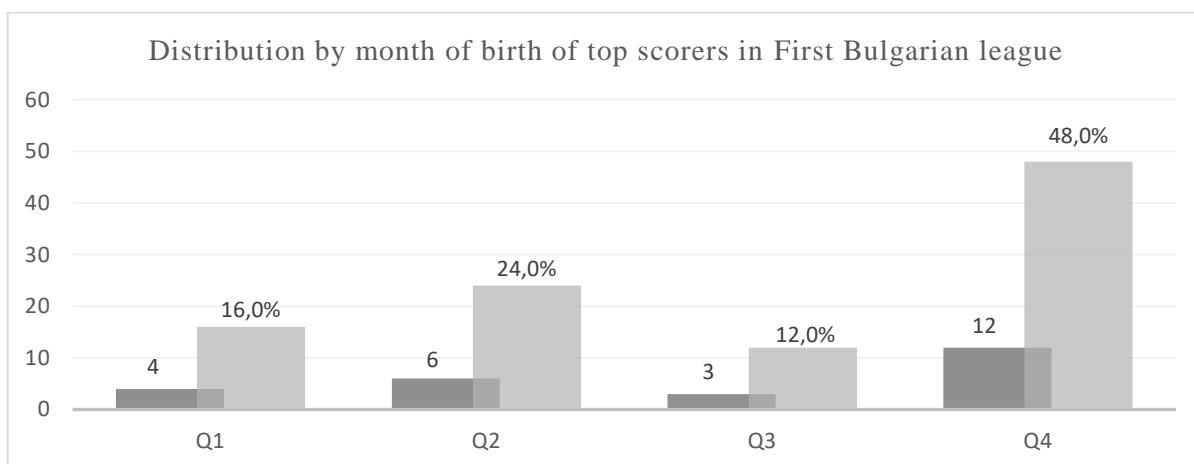


Figure 2. Frequency and percentage of goal scorers in First League

Figure 3 shows the distribution of the birth months of top scorers from the second league in Bulgaria. 60% of goal scorers were born in the first half of the year and 40% in the second. In Q3 are born 40% of top scorers and 16% in last Q4. In Q2 (20%) and Q3 (24%) were born 11 players.

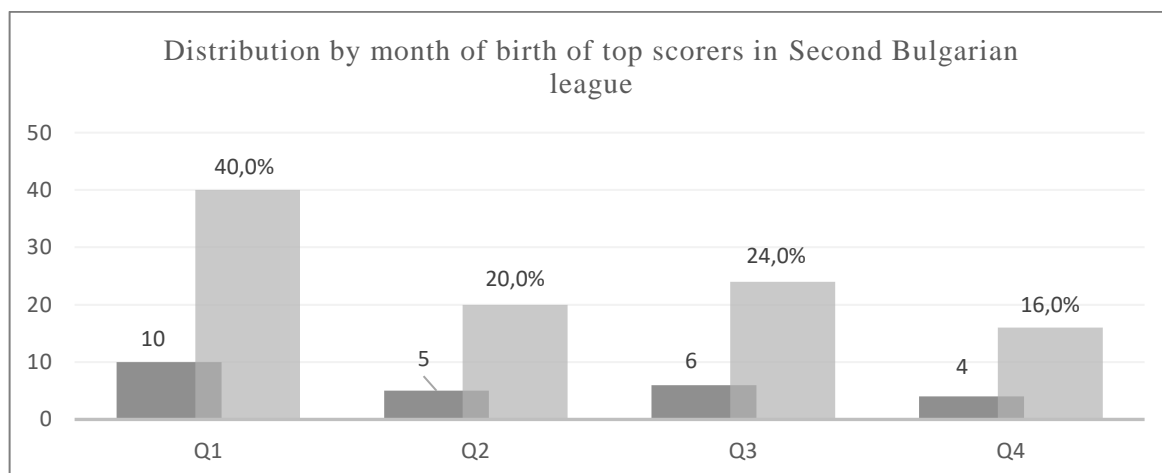


Figure 3. Frequency and percentage of goal scorers in Second League

Figure 4 reveals the distribution of top scorers in the Amateur Third League of Bulgaria. We observed 69.7% of players who were born in the first half of the year and 30% of top scorers born in the second. 44,9% football players are early born in Q1 and 25,8% in Q2, total 63 players. In Q3 are 19,1%, and in Q4 – 10,1%.

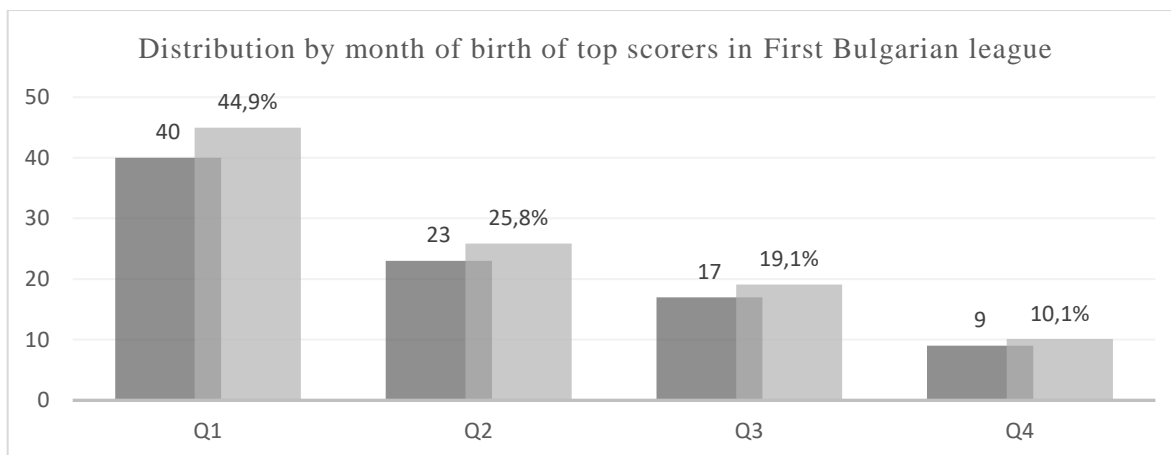


Figure 4. Frequency and percentage of goal scorers in Third League

Discussions

These claims indicate that footballers born at the end of the calendar year are very likely to have very few opportunities to appear in official matches, leading to a lower likelihood of reaching elite senior football later in their development.

According to a large-scale study by Bezuglov et. al. (2023), RAE is present in all countries of Europe, as well as in all playing positions in football, but the most expensive footballers are strikers born in Q4 of the year (Bezuglov, et al. 2023).

We see good practice in the Belgian Football Federation, which made "Future Teams", which are created by late-developing players. Thus, they make it possible for quality training from the national coaches, friendly matches with other countries with such teams and try to eliminate the discrimination of football players born at the end of the year.

We recommend that football coaches and scientists develop programs for monitoring biological maturation in players without strong selection bias from the RAE effect. The development of physiological, psychological, and sports-technical evaluations would allow us to objectively assess all young footballers regardless of whether they are late maturing.

Conclusions

We can summarize from our research that those born in the first quarter of the year are not the most dominant strikers in the Bulgarian top championship – First League. In Bulgaria's First Division, late-maturing players are preferred to be used as strikers and their goalscoring abilities are high. On the other hand, in the lower divisions, the RAE effect is strongly represented. As such, we attribute it to the league's lower level of footballing qualities and more reliance on strong, physical players.

The study concludes that in the early years of training young football players, we should not look only for increased anthropometric indicators and psychological maturation, but for the future potential of football players, not dependent on their temporary biological maturation.

Therefore, if the errors in the identification of future elite football players at initial selection are minimized, the more likely they are to reach a high level in football.

When developing programs for selecting players, they should be focused on their long-term development, not on momentary performance. This will avoid dropping out of football for children who were born at the end of the year, and accordingly, a clear signal will be given to those born early that they have not yet reached their goal and must follow their development path.

The authors declare that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript

Acknowledgment

None

Funding source

No financial support was received to conduct this study or prepare this manuscript.



Informed Consent Statement

Not applicable.

References

- Ashworth, J. & Heyndels, B. (2007). Selection Bias and Peer Effects in Team Sports: the Effect of Age Grouping on Earnings of German Soccer Players. *Journal of Sports Economics*, 8(4), 355-377.
- Baharov, V. (2020). Analysis of a survey for the preparation of a methodology for preparing 10-11 annual football players. *Sport and Nauka* (1) 2/2020. 38-45.
- Baharov, V. (2024). Implementing software technologies to improve the skills of football players. XII mezhdunarodna nauchna konferentsia (1) 2024. *NSA PRESS*, Sofia. 66-71. ISSN 1314-3093
- Bezuglov, E., Morgans, R., Butovskiy, M., Emanov, A., Shagiakhmetova, L., Pirmakhanov, B., Waškiewicz, Z. & Lazarev, A. (2023). The relative age effect is widespread among European adult professional soccer players but does not affect their market value. *Plos One*, 18(3), e0283390. <https://doi.org/10.1371/journal.pone.0283390>.
- Cobley, S., Baker, J., Wattie, N. & McKenna, J. (2009). Annual age-grouping and athlete development: a meta-analytical review of relative age effects in sport. *Sports medicine (Auckland, N.Z.)*, 39(3), 235–256. <https://doi.org/10.2165/00007256-200939030-00005>.
- Costa, I. T., Albuquerque, M. & Garganta, J. (2012). Relative age effect in Brazilian soccer players: A historical analysis. *International Journal of Performance Analysis in Sport*, 12(3), 563-570.
- De La Rubia, A., Lorenzo-Calvo, J. & Lorenzo, A. (2020). Does the Relative Age Effect Influence Short-Term Performance and Sport Career in Team Sports? A Qualitative Systematic Review. *Frontiers in Psychology; Sec. Movement Science*, Volume 11.
- Dimitrov, L., Lovkov, K., Dimov, D., Baharov, V. (2019). Izsledvane na antropometrichnite pokazateli pri sastezateli po futbol ot elitnata grupa u-17. Savremenni tendentsii na fizicheskoto vazpitanie i sporta. *Universitetsko izdatelstvo „Sv. Kliment Ohridski“* Sofia, 2019. 85-88.
- Gadev, M. & Peev, P. (2020). Monitoring varhu nyakoi osnovni somatotipni i konditsionni priznatsi pri visokokvalifitsirani futbolisti. *Leka atletika i nauka*, 1(20), 70-76.
- Gadev, M., Peev, P., Tsvetkov, S., Cholakov, M. & Ivanova, G. (2018). *Monitoring na dvigatelната mobilnost v igrova obstanovka pri 13-14 godishni futbolisti*. Sofia: NSA PRES.
- Gutev, G. & Dimova, I. (2021). Sport realization in age aspect of elite athletes in the discipline 100 m men. *Trakia Journal of Sciences*, 19(Suppl. 1), 552-556. doi:10.15547/tjs.2021.s.01.085.
- Ivanov, D., Dimova, I., Gadjev, M. & Stoilov, I. (2022). Body composition analysis of youth football players. *International scientific congress “applied sports sciences”*, 248 - 251.
- Ivanov, D., Gutev, G. (2024). Body composition of professional football players in Bulgarian first league. *Ovidius University Annals - Science, Movement and Health*, Vol. XXIV, ISSUE 2 Supplement, September 2024, 24 (2): 269-274.
- Malina, R. M., Eisenmann, J. C., Cumming, S. P., Ribeiro, B. & Aroso, J. (2004). Maturity-associated variation in the growth and functional capacities of youth football (soccer) players 13-15 years. *European Journal of Applied Physiology*, 91(5-6), 555-562.
- McGarry, T. (2009). Applied and theoretical perspectives of performance analysis in sport: Scientific issues and challenges. *International Journal of Performance Analysis in Sport*, 9(1), 128-140.
- Mulazimoglu, O. (2014). The Relative Age Effect (RAE) in Youth and Professional Soccer Players in Turkey. *The Anthropologist*, 18(2), 391-398.
- Musch, J. & Hay, R. (1999). The relative age effect in soccer: Cross-cultural evidence for a systematic discrimination against children born late in the competition year. *Sociol Sport J*, 16(1):54-64.
- Silva, W. R., Lisboa, T., Medeiros, T. & Melo, G. (2018). Does the relative age of young soccer players define who makes the team starting lineup? *Journal of Exercise Physiologyonline*, 139-149.
- Simeonov, K. & Momchilova, A. (2008). Osobenosti v razvitiето na skorostno-silovite kachestva na podrastvashti futbolisti. *Rusenski universitet "Angel Kanchev", Sbornik dokladi na SNS* (1), 54-57.
- Stoilov, I. (2018). Correlation Structures of Sport Preparation with Futsal Players from the University of National and World Economy. *In Conference Proceedings. The Future of Education 2018*.