

Relative Age Effect In Amateur Football: Evidence From Iğdır Province And The Role Of Non-Elite Selection Dynamics

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ABSTRACT

Purpose: The aim of this study was to examine the presence of the Relative Age Effect (RAE) among amateur football players in Iğdır province and to evaluate its distribution across birth months and quarterly periods.

Method: The study was conducted using a cross-sectional design. A total of 311 licensed football players competing in the 2024–2025 amateur league season were included. Data were obtained from the official website of the Turkish Football Federation, and players' birthdates were categorized by months and quarterly periods. The presence of RAE was analyzed using chi-square tests.

Results: The results indicated no statistically significant differences in the distribution of birth months ($\chi^2=17.09$, $p=0.105$). Similarly, no significant differences were found across birth quarters ($\chi^2=0.936$, $p=0.817$). These findings suggest that there is no systematic advantage based on birthdate among amateur football players.

Conclusion: The findings indicate that the Relative Age Effect is not evident at the amateur football level. This may reflect the reduced influence of selection bias observed in elite contexts and suggest that athlete selection processes at the amateur level are shaped by less competitive dynamics.

Keywords: Relative Age Effect, Amateur Football, Birthdate, Quarterly Periods

ÖZET

Amatör Futbolda Bağlı Yaş Etkisi: Iğdır İli Örneği Ve Elit Dışı Seçim Dinamiklerinin Rolü

Amaç: Bu çalışmanın amacı, Iğdır ili amatör futbolcuları arasında bağlı yaş etkisinin (Relative Age Effect, RAE) varlığını incelemek ve bu etkinin doğum ayları ile çeyrek dilimlere göre dağılımını değerlendirmektir.

Yöntem: Araştırma, kesitsel bir tasarım ile yürütülmüştür. Çalışmaya, 2024–2025 sezonunda Iğdır Amatör Liglerinde mücadele eden 311 lisanslı futbolcu dâhil edilmiştir. Veriler, Türkiye Futbol Federasyonu'nun resmi web sitesinden elde edilmiş ve sporcuların doğum tarihleri ay ve çeyrek dilimlere göre sınıflandırılmıştır. Bağlı yaş etkisinin varlığı Ki-kare testi kullanılarak analiz edilmiştir.

Bulgular: Analiz sonuçları, futbolcuların doğum aylarına göre dağılımlarında istatistiksel olarak anlamlı bir farklılık olmadığını göstermiştir ($\chi^2=17.09$, $p=0.105$). Benzer şekilde, doğum çeyreklerine göre yapılan analizde de anlamlı bir fark bulunmamıştır ($\chi^2=0.936$, $p=0.817$). Bu bulgular, amatör futbolcular arasında doğum tarihine bağlı sistematik bir avantajın bulunmadığını ortaya koymaktadır.

Sonuç: Elde edilen sonuçlar, bağlı yaş etkisinin amatör futbol düzeyinde belirgin olmadığını göstermektedir. Bu durum, elit düzeyde gözlemlenen seçim yanlılığının amatör seviyede zayıfladığını ve sporcu seçim süreçlerinin daha az rekabetçi dinamiklerle şekillendiğini düşündürmektedir.

Anahtar Kelimeler: Bağlı Yaş Etkisi, Amatör Futbol, Doğum Tarihi, Çeyrek Dilimler

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INTRODUCTION

Age-group-based classifications are widely used to evaluate athletes' performance and to support their development. However, such classifications may lead to advantages or disadvantages depending on individuals' birthdates. This phenomenon is referred to as the "Relative Age Effect" (RAE) and suggests that athletes born in the earlier months of the selection year may possess physical and psychological advantages compared to those born later in the same year (Barnsley et al., 1992; Cogley et al., 2009). RAE has been extensively documented across various sports, including football, basketball, and hockey (Helsen et al., 2005; Lovell et al., 2015).

The existence of RAE is based on the assumption that early physical development and accumulated experience in youth athletes can translate into higher performance levels. For instance, athletes born in the first quarter of the year are often overrepresented in selective academies and have greater access to training opportunities (González-Víllora et al., 2015; Brustio et al., 2018). However, it has been suggested that these selection advantages are not limited to physical maturity but also extend to psychological resilience and social skills (Cumming et al., 2018; Sweeney et al., 2023).

Biological maturation should be considered as an independent factor from RAE. It refers to the rate of development relative to an individual's chronological age and may provide physically early-maturing athletes with a performance advantage (Malina et al., 2015; Johnson et al., 2017). The influence of biological maturation on selection processes is particularly evident in physically demanding sports such as football (Hill et al., 2020). However, it has also been reported that early-maturing athletes may face long-term disadvantages, as their initial performance advantages may diminish over time when other athletes reach similar levels of development (Cumming et al., 2017).

In this context, talent development systems have proposed strategies such as "bio-banding," which takes biological maturation into account. This approach aims to create more balanced competitive environments by grouping athletes according to their biological maturity levels (Bradley et al., 2019; Cumming et al., 2018). Bio-banding allows less physically and psychologically developed athletes to improve within appropriate conditions, while also providing more challenging environments for early-maturing athletes (Sweeney et al., 2023).

Previous research has shown that early selection does not guarantee long-term success and that initial advantages observed in youth do not necessarily translate into elite performance (Güllich, 2014; McCarthy et al., 2016). This highlights the importance of adopting a more holistic approach in talent development systems, taking into account not only physical performance but also individual psychosocial factors (MacNamara et al., 2022; Kelly et al., 2020). Furthermore, the importance of structures that support athletes' individual development beyond biological maturation and relative age has been emphasized, particularly those that equip athletes with the ability to cope with challenges (Collins et al., 2018; Towlson et al., 2022).

The aim of this study is to examine the presence of the Relative Age Effect among amateur football players in Iğdır province and to evaluate how this effect varies according to birth months and quarterly periods. It is hypothesized that the Relative Age Effect, frequently reported in previous studies, may not manifest in the same way across all contexts and may be shaped by local dynamics. In this regard, the findings are expected to provide both theoretical and practical contributions to talent development programs.

METHODS

Research Design

This study was designed to examine the presence of the Relative Age Effect (RAE) based on the birthdates of football players competing in the amateur leagues of Iğdır province during the 2024–2025 season. The research was conducted using a cross-sectional design, and players' birthdates were analyzed to statistically evaluate differences across predefined categories.

Participants

Within the scope of the study, birthdate data of 327 licensed football players actively competing in the Iğdır Amateur Leagues during the 2024–2025 season were collected from the official website of the Turkish Football Federation (TFF). However, to ensure the reliability of the results, 16 players whose birthdates were recorded as January 1 were excluded from the study. This decision was based on the assumption that such entries may reflect intentional misreporting to indicate a younger age. Consequently, a total of 311 players were included in the final analyses.

Data Collection

The data were manually collected from the official website of the TFF. Players' birthdates were recorded and categorized as follows:

Birth Months: The specific month of birth for each player was recorded.

Quarterly Periods: Birthdates were grouped into four quarters of the year:

- a. First quarter: January – March
- b. Second quarter: April – June
- c. Third quarter: July – September
- d. Fourth quarter: October – December

Ethical Approval

This study was approved by the Scientific Research and Publication Ethics Committee of Iğdır University. Since the data were obtained from a publicly accessible source, the confidentiality of individuals was preserved. The study was conducted in accordance with the Declaration of Helsinki.

Data Analysis

The collected data were analyzed by calculating frequencies and percentages according to birth months and quarterly periods. To test the presence of the Relative Age Effect, two separate chi-square tests were performed:

- **Distribution by Birth Months:** A chi-square test was used to examine whether there were significant differences among birth months.
- **Distribution by Quarterly Periods:** A chi-square test was also applied to determine whether there were significant differences across the four quarters of the year.

In both analyses, the level of significance was set at $p < 0.05$. All statistical analyses were conducted using SPSS (Statistical Package for the Social Sciences). The results were interpreted to determine whether the Relative Age Effect was present among amateur football players in Iğdır province.

RESULTS

In this study, the presence of the Relative Age Effect (RAE) among amateur football players in Iğdır province was analyzed based on their birthdates. The collected data were visualized and statistically examined to evaluate the distribution of players according to birth months and quarterly periods.

The distribution of birth months among the 311 football players included in the study is presented in Figure 1. The graph illustrates how births are distributed across different months of the year (Figure 1). To determine whether this distribution was statistically significant, a chi-square test was conducted. The results of this analysis are presented in Table 1. According to the findings, no statistically significant difference was found among birth months ($p = 0.105$) (Table 1).

These results indicate that, although the distribution of birth months among players was not perfectly equal, the observed differences were not statistically significant.

Distribution of Amateur Football Players in Iğdır Province by Birth Months

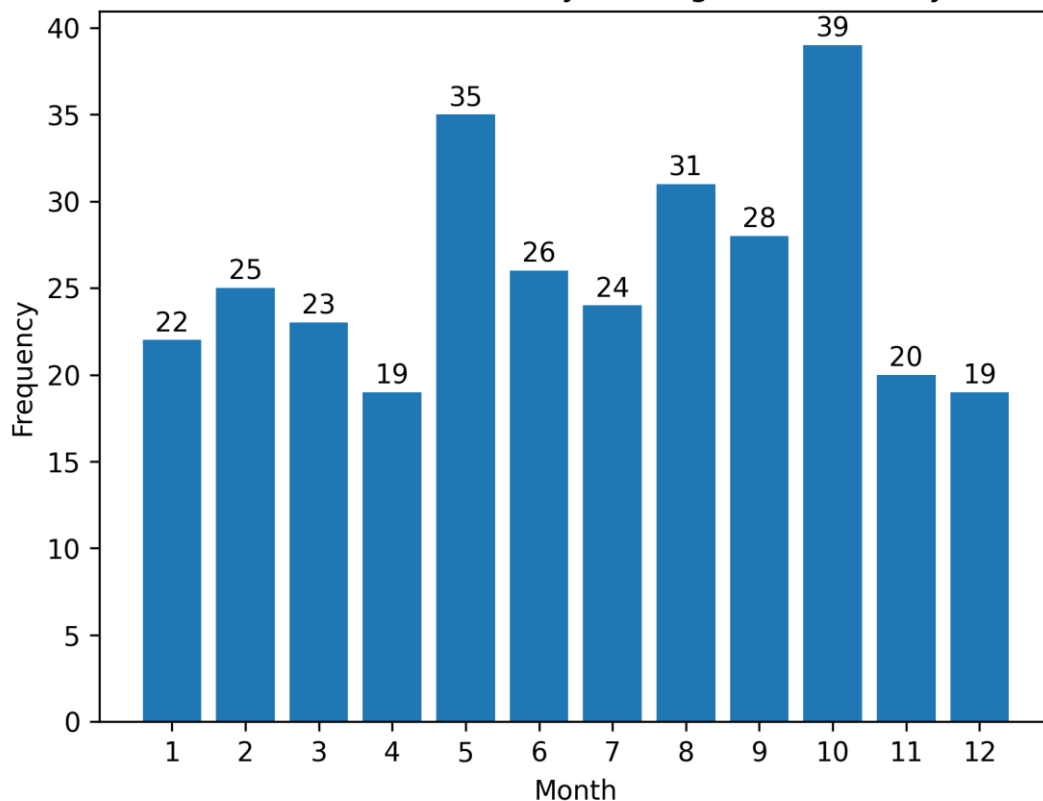


Figure 1. Distribution of amateur football players in Iğdır province according to birth months. The line in the graph represents the expected frequency for each month (25.9).

Table 1. Chi-square test results for the distribution of football players according to birth months.

Test	Value
Chi-square (χ^2)	17.09
Degrees of freedom (df)	11
P	0.105

The distribution of football players according to birth quarters is presented in Figure 2. The graph illustrates how players' birthdates are distributed across the four quarters of the year (Figure 2). To determine whether the differences between quarters were statistically significant, a chi-square test was conducted. The results of this analysis are summarized in Table 2.

The analysis revealed no statistically significant differences among birth quarters ($p = 0.817$) (Table 2). This finding indicates that the distribution of players' birthdates is relatively balanced across the four quarters of the year.

Distribution of Amateur Football Players in Iğdır Province by Birth Quarters

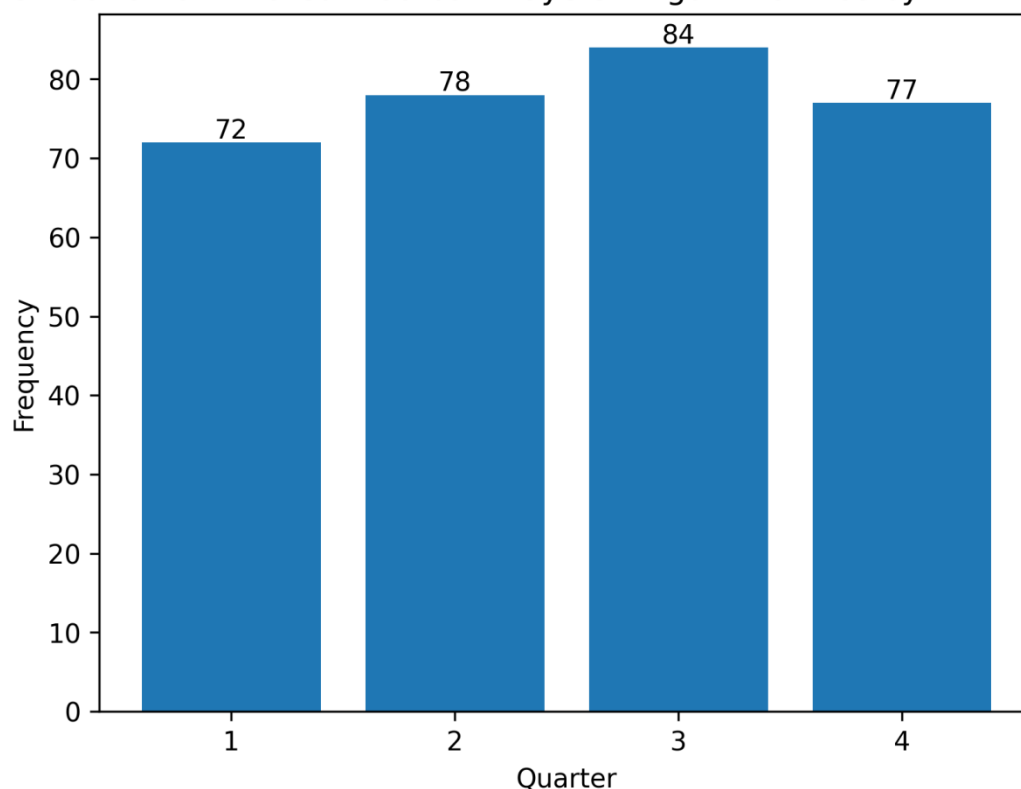


Figure 2. Distribution of amateur football players in Iğdır province according to birth quarters. The line in the graph represents the expected frequency for each quarter (77.8).

Table 2. Chi-square analysis of the distribution of football players by birth quarters.

Test	Value
Chi-square (χ^2)	0.936
Degrees of freedom (df)	3
P	0.817

Overall, the analyses conducted do not provide statistical evidence supporting the presence of the Relative Age Effect among amateur football players in Iğdır province. No statistically significant differences were observed in the distributions based on either birth months or quarterly periods.

These findings suggest that the Relative Age Effect may not be evident at the amateur level or that its presence may vary depending on regional dynamics.

DISCUSSION

In this study, the presence of the Relative Age Effect (RAE) was examined among amateur football players in Iğdır province, and no significant differences were found according to birth months or quarterly periods. These findings indicate that the Relative Age Effect, frequently reported in the literature, may not be evident at the amateur level. While the results of this study are consistent with some previous research, they also raise new questions regarding the nature of the Relative Age Effect, particularly in comparison to elite-level sports.

The Relative Age Effect has been reported to be more pronounced in elite sports, especially in professional football academies and international competitions (Helsen et al., 2005; Cobley et al., 2009). One of the main reasons for this is that talent selection at the elite level is often based on physical and cognitive maturity. Athletes born in the earlier months of the selection year are typically more physically developed than their peers and are therefore more likely to be selected by coaches at younger ages (Barnsley et al., 1992; González-Víllora et al., 2015). However, the profile of athletes competing in amateur clubs differs in this context.

Amateur clubs generally consist of athletes who have not been selected at the elite level or who are beyond a certain age threshold (Lovell et al., 2015; Brustio et al., 2018). These athletes typically compete at the local level regardless of their physical or cognitive advantages. This may explain why the Relative Age Effect does not produce significant

differences in amateur settings. In other words, the selection bias observed at the elite level may diminish or disappear at the amateur level. Similarly, it can be argued that athletes born in the later quarters of the year who did not reach professional levels may have been influenced by both the Relative Age Effect and individual performance-related factors (MacNamara et al., 2022; Sweeney et al., 2023).

The Relative Age Effect is generally associated with an advantage for athletes born in the early months of the selection year in gaining entry to professional academies. However, this advantage does not necessarily translate into long-term success. While early-born athletes may demonstrate superior performance initially due to advanced physical maturity, this advantage may diminish over time as other athletes catch up in their development (Malina et al., 2015; Cumming et al., 2018). Consequently, athletes who fail to progress to elite levels may continue their careers in amateur leagues. In contrast, the presence of athletes born in the later quarters of the year in amateur clubs can be explained by more complex factors. These individuals may have been overlooked during early selection processes due to the Relative Age Effect and may also have been unable to reach elite levels due to performance-related factors (Hill et al., 2020; Towlson et al., 2022).

These findings may help explain why no significant differences were observed in the distribution of amateur football players across quarterly periods. Despite the initial physical advantages of early-born athletes, their inability to reach elite levels, combined with the presence of later-born athletes who remain in amateur leagues due to both Relative Age Effect and performance-related factors, may contribute to a more balanced distribution across quarters (Kelly et al., 2020).

The effects of the Relative Age Effect on young athletes have been widely documented. This phenomenon is typically associated with physical and psychological maturity, which increases the likelihood of selection at younger ages (Baker et al., 2010; Cumming et al., 2017). However, the absence of a clear Relative Age Effect in the present study suggests that the selection processes in amateur sport may be less competitive in nature. Amateur clubs often have access to a broader pool of players, and therefore selection criteria may rely less on physical superiority and more on factors such as participation and commitment (Bradley et al., 2019).

These results indicate that the Relative Age Effect is not solely a bias based on athletes' birthdates but is also closely related to talent development systems and the nature of competition. As highlighted in the literature, the Relative Age Effect may be less pronounced

or even disappear in contexts where competitive pressure and selective intensity are lower (Güllich, 2014; Johnson et al., 2017).

The findings of this study contribute to the literature by demonstrating that the Relative Age Effect is less evident at the amateur level. The examination of player selection and development processes in amateur leagues provides different insights when compared to talent management policies at the elite level. In this context, future research should investigate larger and more diverse samples to better understand the nature of the Relative Age Effect across different competitive levels (Sweeney et al., 2023; Towlson et al., 2022).

Furthermore, it is important to focus on the individual development of amateur athletes and to explore the psychosocial effects of the Relative Age Effect in greater depth (Collins et al., 2018; MacNamara et al., 2022). Talent development strategies should not only emphasize physical performance but also adopt approaches that support athletes' long-term development.

CONCLUSION

This study investigated the presence of the Relative Age Effect among amateur football players in Iğdır province and revealed no statistically significant differences in analyses based on both birth months and quarterly periods. These findings indicate that the Relative Age Effect is less pronounced at the amateur level compared to elite athletes. It can be inferred that the Relative Age Effect, frequently reported at the elite level in the literature, may not be observed in the selection processes and competitive structures of amateur sports.

Amateur clubs generally consist of athletes who have not been selected at the elite level or who come from diverse age groups. This may contribute to the diminished influence of the Relative Age Effect in amateur sports. Furthermore, the presence of athletes born in the first quarter of the year who were unable to reach elite levels due to performance-related factors suggests that the Relative Age Effect does not represent an absolute advantage. Similarly, athletes born in the later quarters of the year may experience both reduced selection opportunities and performance-related limitations, which may collectively contribute to the disappearance of any birthdate-related advantage or disadvantage at the amateur level.

These results emphasize that the Relative Age Effect is less evident in local contexts and at the amateur level, providing important insights for future research. In addition, conducting similar studies across different regions may contribute to a better understanding of how this effect varies across local and regional contexts, thereby enriching the literature and

enabling more generalizable conclusions. It is recommended that athlete selection processes adopt more holistic approaches that consider not only physical performance but also psychosocial factors. A more detailed examination of the dynamics specific to amateur sports may further contribute to understanding the nature of the Relative Age Effect across different levels of competition.

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