

Market Value and Transfer Fees in Youth Football: Determinants, Correlations, and the Role of the Relative Age Effect*

Gülhan Erdem SUBAK¹, Ahmet ATLI², Ahmet Buğra GÖZELLER³

ABSTRACT

Market Value and Transfer Fees in Youth Football: Determinants, Correlations, and the Role of the Relative Age Effect

Purpose: This article aims to examine the determinants influencing market value and transfer fees in youth football, assess the correlations between player characteristics and economic valuations, and elucidate how the Relative Age Effect (RAE) shapes these dynamics. By integrating findings from sports economics and developmental psychology, the study seeks to offer a comprehensive understanding of how intrinsic and extrinsic factors affect the financial dimensions of youth football.

Method: This study is a review article that aims to shed light on the subject by examining the relevant literature. Published studies were identified and evaluated through a systematic search using keywords and subject headings across academic databases including Google Scholar, PubMed and Web of Science.

Results: The findings of the study highlight the complexity of valuation processes in the football industry, where both quantifiable performance indicators and latent systemic biases such as the RAE jointly shape early career trajectories and economic outcomes. While relatively older players often benefit from early selection advantages, longitudinal data indicate that these advantages may not necessarily translate into long-term success. In contrast, relatively younger players who persevere despite early disadvantages frequently exhibit greater psychological resilience and more consistent long-term performance.

Conclusion: In conclusion, from a practical perspective, this review advocates for reforms in scouting and player development practices by promoting delayed selection, holistic player assessment, and dynamic feedback systems that consider individual developmental trajectories. These strategies have the potential to foster more equitable opportunities and minimize the misallocation of resources.

Keywords: Relative Age Effect, Youth Football Economics, Player Development and Scouting, Talent Valuation Biases

ÖZET

Gençlik Futbolunda Piyasa Değeri ve Transfer Ücretleri: Belirleyiciler, Korelasyonlar ve Bağlı Yaş Etkisinin Rolü

Amaç: Bu çalışma, gençlik futbolunda piyasa değeri ve transfer ücretlerini etkileyen belirleyicileri incelemeyi, oyuncu özellikleri ile ekonomik değerlemeler arasındaki korelasyonları değerlendirmeyi ve Bağlı Yaş Etkisi'nin (RAE) bu dinamikleri nasıl şekillendirdiğini açıklamayı amaçlamaktadır. Spor ekonomisi ve gelişim psikolojisinden elde edilen bulguları birleştirerek, çalışma içsel ve dışsal faktörlerin gençlik futbolunun finansal boyutlarını nasıl etkilediğine dair kapsamlı bir anlayış sunmayı hedeflemektedir.

Yöntem: Bu çalışma, konuyla ilgili literatürü inceleyerek konuya ışık tutmayı amaçlayan bir derleme makalesidir. Google Scholar, PubMed ve Web of Science gibi akademik veri

¹ Iğdır Üniversitesi, Spor Bilimleri Fakültesi, Iğdır/TÜRKİYE, gerdem.subak@igdir.edu.tr, ORCID ID: 0000-0003-1698-262X

² Iğdır Üniversitesi, Spor Bilimleri Fakültesi, Iğdır/TÜRKİYE, ahmet.atli@igdir.edu.tr, ORCID ID: 0000-0002-7516-2675

³ Iğdır Üniversitesi, Spor Bilimleri Fakültesi, Iğdır/TÜRKİYE, abugra.gozeller@igdir.edu.tr, ORCID ID: 0000-0003-0693-3269

tabanlarında anahtar kelimeler ve konu başlıkları kullanılarak yayımlanmış çalışmalar sistematik bir şekilde taranmış ve değerlendirilmiştir.

Bulgular: Çalışmanın bulguları, futbol endüstrisindeki değerlendirme süreçlerinin karmaşıklığını ortaya koymaktadır; burada hem ölçülebilir performans göstergeleri hem de RAE gibi gizli sistemsel önyargılar, erken kariyer yollarını ve ekonomik sonuçları birlikte şekillendirmektedir. Göreceli olarak daha yaşlı oyuncular genellikle erken seçim avantajlarından yararlanırken, uzunlamasına veriler bu avantajların mutlaka uzun vadeli başarıya dönüşmediğini göstermektedir. Buna karşılık, erken dönem dezavantajlarına rağmen sebat eden göreceli olarak daha genç oyuncular, sıklıkla daha yüksek psikolojik dayanıklılık ve daha istikrarlı uzun vadeli performans sergilemektedir.

Sonuç: Sonuç olarak, uygulama açısından bakıldığında, bu derleme geç seçimi teşvik eden, bütüncül oyuncu değerlendirmesini ve bireysel gelişimsel süreçleri dikkate alan dinamik geri bildirim sistemlerini savunarak gözlem ve oyuncu gelişim uygulamalarında reform çağrısında bulunmaktadır. Bu stratejiler, daha adil fırsatların teşvik edilmesini ve kaynakların yanlış tahsisinin en aza indirilmesini sağlayabilir.

Anahtar Kelimeler: Bağlı Yaş Etkisi, Gençlik Futbol Ekonomisi, Oyuncu Gelişimi ve Gözlem, Yetenek Değerleme Önyargıları

INTRODUCTION

The interplay between market value, transfer fees, and the Relative Age Effect (RAE) in youth football constitutes a multifaceted nexus influencing talent identification, player development, and economic dynamics within the sport. Market value and transfer fees are not solely reflective of a player's current performance but are also shaped by a confluence of factors including age, playing position, league competitiveness, and contractual conditions. Empirical studies have highlighted that attributes such as a player's age, on-field performance metrics, and the economic stature of their club significantly impact their market valuation and transfer costs (Metelski, 2021).

Concurrently, the RAE introduces a systemic bias favoring athletes born earlier in the selection year, thereby affecting talent identification and progression pathways. Research indicates that relatively older youth players are more likely to be scouted, selected, and provided with advanced training opportunities, leading to disproportionate representation at elite levels (Helsen et al., 2005). This phenomenon not only skews developmental trajectories but also has potential implications for market valuations and transfer negotiations, as early selection can lead to enhanced exposure and performance statistics.

This paper aims to dissect the determinants influencing market value and transfer fees in youth football, examine the correlations between player attributes and economic valuations, and elucidate the role of the RAE in shaping these dynamics. By integrating insights from sports economics and developmental psychology, the study seeks to provide a comprehensive

understanding of how intrinsic and extrinsic factors converge to influence the financial aspects of youth football.

Determinants of Market Value in Youth Football

Market value in youth football is shaped by a complex interaction between intrinsic and extrinsic determinants that span athletic ability, psychological characteristics, socio-economic context, and environmental exposure. Understanding these dimensions is critical for clubs, scouts, and policy-makers aiming to create more equitable and efficient talent development systems.

Intrinsic factors refer to a player's innate and developed capabilities, including technical proficiency, tactical intelligence, physical attributes, and psychological qualities such as self-confidence, resilience, and team orientation (Bolckmans et al., 2023). Several studies emphasize that youth players with stronger decision-making skills, positional versatility, and well-developed motor coordination tend to exhibit higher market valuations due to their adaptability and long-term potential (Poza, 2020; Sánchez et al., 2022).

In addition to athletic traits, psychological and cognitive attributes are increasingly considered in valuation models. These include leadership tendencies, coachability, emotional regulation, and even social media presence as proxies for marketability (Aguiar do Monte and Lopes Filho, 2023). For instance, a player's perceived mental maturity and professionalism can significantly impact both short-term interest from clubs and long-term transfer value potential.

Extrinsic factors encompass elements outside of the athlete's direct control. Age and birth month, as markers of the RAE, are well-established biases that influence early selection and developmental opportunities (Romann et al., 2021; Bezuglov et al., 2023). Players born in the first quartile of the calendar year are statistically more likely to be selected into elite academies, thus receiving better coaching and exposure, which in turn enhances their perceived market value regardless of actual ability.

Further extrinsic influences include club reputation, league visibility, international appearances, and nationality status. A 2022 study found that players affiliated with Premier League or La Liga youth academies had significantly higher market values, even when performance was held constant, due to institutional branding and global scouting reach (Sánchez et al., 2022). Similarly, foreign players or those who have participated in

international youth tournaments often command higher valuations due to added prestige and assumed competitive experience.

Moreover, modern evaluation models are incorporating multi-criteria decision frameworks such as the Analytic Hierarchy Process (AHP), which allows for a systematic weighting of variables including contract duration, injury history, and team success (Poza, 2020). These methods emphasize that while performance metrics are vital, intangibles and contextual factors collectively define a player's market worth.

In conclusion, market value in youth football emerges from a nuanced confluence of personal ability and external environment. Ignoring either domain leads to an incomplete and potentially biased assessment of player potential.

Relative Age Effect (RAE) and Market Value

The RAE, which refers to the systematic bias favoring players born earlier in the year, significantly influences market value. Players born in the first quarter (Q1) of the year are often perceived as more mature and skilled, leading to higher market valuations compared to their relatively younger counterparts (Furley et al., 2016; Romann et al., 2021). This bias is particularly pronounced in younger age groups, such as U18 and U19 players, where physical maturity can mask technical and tactical abilities (Romann et al., 2021; Bozděch et al., 2023).

However, studies suggest that this initial overvaluation of Q1 players may not persist into adulthood. By the U21 to U23 age categories, relatively younger players (Q4) often catch up in terms of market value, as their technical and psychological skills become more apparent (Romann et al., 2021; Biermann et al., 2024).

Correlations Between Transfer Fees and Player Attributes

Transfer fees in youth football are multifactorial in nature, reflecting a dynamic interplay between player attributes, club strategies, and market economics. Clubs invest heavily in young talent not only based on current performance, but also on predictive indicators of future success.

Technical and Tactical Skills

Highly developed technical abilities such as dribbling, precise passing, positional awareness, and rapid decision-making are considered core determinants of a player's value. Players exhibiting advanced tactical maturity at younger ages are more likely to attract higher transfer fees, particularly if they demonstrate high football IQ and adaptability to different

systems (Metelski, 2023; Bolckmans et al., 2023). A conceptual model developed by Poza (2020) ranks sports performance as the most influential attribute in market valuation.

Physical Attributes

In youth football, physical precocity often leads to early success in competitive environments. Players who are more physically mature stronger, faster, or taller tend to dominate at youth levels and receive inflated valuations, particularly in the absence of long-term tracking mechanisms (Toselli et al., 2022; Sweeney and Lundberg, 2024). This trend reflects an institutional bias where short-term readiness is prioritized over long-term potential.

Psychological Traits

Attributes such as resilience, emotional stability, leadership, and coachability are powerful predictors of long-term elite performance. Clubs are increasingly recognizing these “intangibles” in their valuation frameworks. Players with strong mental fortitude are seen as more likely to handle pressure, recover from setbacks, and integrate into team Dynamics justifying higher fees (Bolckmans et al., 2023; Biermann et al., 2024).

The Role of RAE in Transfer Fees

The RAE continues to play a prominent role in shaping the market dynamics of youth football. Players born in the first quarter of the selection year (Q1) tend to receive greater early opportunities, which skew exposure, performance statistics, and ultimately transfer valuations (Romann et al., 2021; Tohoff and Mechtel, 2023).

A large-scale study by Romann et al. (2021) examining over 11,000 players found that Q1 players were significantly overrepresented and associated with higher transfer values up to the U19 level. However, by U21–U23, an inverse RAE was noted, where Q4 players previously undervalued began to show higher market values, suggesting that early bias may lead to long-term inefficiencies and talent loss.

This indicates not only a misalignment between actual potential and perceived value, but also a financial inefficiency in youth transfers, where clubs may overpay for maturity rather than ability (Romann et al., 2021) (Table 1).

Table 1. Relative Age Effect Across Different Contexts

Context	Key Findings	Citation
Youth Market Value	RAE leads to higher market values for Q1 players in younger age groups.	(Romann et al., 2021)
Transfer Fees	Q1 players command higher transfer fees due to perceived readiness.	(Tohoff & Mechtel, 2023)
Long-Term Success	Q4 players achieve greater career success due to psychological traits.	(Bolckmans et al., 2023)
Elite Leagues	RAE persists in professional leagues but does not affect market value.	(Bezuglov et al., 2023)
Ownership Models	RAE is more pronounced in privately owned clubs.	(Pérez-González et al., 2023)
National Teams	RAE is present in youth national teams but diminishes in senior teams.	(García-Rubio et al., 2022)
Biological Maturity	Early maturing players are overrepresented in elite youth teams.	(Toselli et al., 2022)
Competitive Level	RAE is stronger in higher competitive levels.	(Sweeney & Lundberg, 2024)
Gender Differences	RAE is stronger in male players and persists into senior tournaments.	(Pedersen et al., 2022)

The Role of the Relative Age Effect in Youth Football

The RAE refers to the overrepresentation of athletes born earlier in a selection year, particularly within youth football academies and national teams. This systemic bias results from grouping athletes by chronological age, leading to significant maturity differences between the oldest (Q1) and youngest (Q4) in each cohort. These disparities often influence early talent identification, long-term development opportunities, and ultimately, market valuation.

Mechanisms Driving the RAE

RAE is primarily driven by the annual age-group categorization, which creates asymmetries in physical, cognitive, and emotional maturity. Players born in Q1 tend to exhibit superior height, strength, and coordination during critical developmental phases. These temporary advantages often lead to preferential treatment, including more playing time,

access to elite coaching, and higher exposure (Furley et al., 2016; Bozd  ch et al., 2023). Over time, such benefits compound, reinforcing initial selection biases.

Cross-sectional and longitudinal studies confirm that these effects become more pronounced in competitive environments and higher age groups, though the magnitude of RAE may decline with age (Votteler and H  ner, 2017). Nonetheless, this early boost can significantly shape a player’s development path and valuation in youth markets.

Biases in Talent Identification

Coaches and scouts often unconsciously conflate early physical development with long-term potential. As a result, Q1 players are consistently overrepresented in elite youth academies and national squads (Tohoff and Mechtel, 2023; Garc  a-Rubio et al., 2022). This misperception is particularly detrimental to Q4 players, whose physical lag is often mistaken for a lack of ability rather than developmental timing.

Talent pool studies also show that when selection pressure increases such as in countries with larger youth football populations the bias toward early-born players becomes more severe (Bennett et al., 2023).

Psychological and Social Factors

Despite their initial disadvantage, relatively younger players often develop superior psychological attributes, including grit, resilience, adaptability, and self-regulation, as a means of compensating for physical inferiority (Bolckmans et al., 2023; Biermann et al., 2024). This phenomenon is sometimes referred to as the “underdog hypothesis”, suggesting that the challenges faced by Q4 players foster psychological strengths that later translate into professional success.

Recent findings support this theory: Q4 players are more likely to persist in the sport and achieve professional contracts than their Q1 counterparts. In a longitudinal study, relatively younger players scored higher in self-confidence and long-term career attainment despite being underrepresented during youth selection (Bolckmans et al., 2023; Frontiers in Sports and Active Living, 2023).

Consequences of the RAE

The RAE has far-reaching consequences in youth football, extending beyond early selection biases to affect talent distribution, financial efficiency, and long-term career

development. These outcomes raise critical questions about the sustainability and fairness of current talent identification systems.

Inefficient Talent Allocation: The overrepresentation of Q1 players those born in the first quarter of the selection year can distort talent evaluation. This often results in an overvaluation of early-maturing players and a systematic undervaluation of Q4 players, many of whom may possess equivalent or superior long-term potential. As such, clubs risk misallocating developmental resources and losing access to late-blooming talent (Romann et al., 2021; Tohoff and Mechtel, 2023).

This inefficiency is not merely hypothetical. Romann and colleagues (2021) demonstrated that Q4 players tend to achieve higher market values in their early 20s, after overcoming initial selection disadvantages, highlighting the long-term consequences of early-stage misjudgment.

Waste of Financial and Developmental Resources: The RAE fosters investment biases clubs often allocate greater financial and coaching resources to relatively older players under the assumption that they are more talented or ready. However, this leads to economic inefficiencies, as players selected due to maturity rather than merit may plateau earlier or fail to meet expectations (Tohoff and Mechtel, 2023; Bozděch et al., 2023).

Schorer et al. (2017) found that Q4 players from U17 World Cup squads ultimately reached higher market valuations than their Q1 counterparts. These findings reinforce the notion that current selection systems may not only misidentify talent but waste money on players whose early advantages are ephemeral.

Long-Term Career Implications: Despite facing early disadvantages, relatively younger players often experience superior long-term career success. Their initial underdog status may cultivate psychological resilience, technical precision, and motivation traits essential for elite performance (Bolckmans et al., 2023; Biermann et al., 2024).

In a recent longitudinal analysis, Q4 players who remained in elite development systems were more likely to secure professional contracts and accumulate more minutes in top-tier leagues (Biermann et al., 2024). This inversion of the RAE effect in adulthood challenges the validity of early-age selection criteria and calls for reform in talent pathways.

Implications for Clubs and Policymakers

Mitigating the RAE in youth football requires a coordinated, evidence-based strategy from both clubs and policymakers. As the RAE leads to systemic biases in player development, talent identification, and investment, institutions must shift from rigid age-based systems to more dynamic, equitable frameworks.

Delayed Selection: One of the most widely supported interventions is postponing the age of talent selection. Early selection (often at U10–U12) tends to disproportionately benefit relatively older players. By delaying formal selection to U14 or later, the physical and psychological gap between Q1 and Q4 players narrows, giving younger athletes a better chance to demonstrate their abilities (García-Rubio et al., 2022; Sweeney et al., 2022).

Longitudinal evidence from German and Australian football programs supports this practice, indicating that delayed selection correlates with a more balanced distribution of birth quartiles and improved long-term performance outcomes (Votteler and Höner, 2017; Bennett et al., 2023).

Holistic Evaluation: Traditional scouting tends to favor players with physical dominance at early ages, often overlooking critical psychological and tactical dimensions. A shift toward holistic evaluation frameworks incorporating emotional maturity, decision-making, tactical flexibility, and cognitive function can help clubs avoid premature exclusion of late developers (Bolckmans et al., 2023; Toselli et al., 2022).

Training scouts to recognize potential beyond immediate performance, such as adaptability, leadership, and learning potential, is critical. Mann (2020) emphasizes the importance of recalibrating observer biases through structured training and protocol-based assessments.

Monitoring and Feedback: Establishing dynamic tracking systems that monitor player growth, psychological development, and technical progress over time is essential for recognizing late-blooming talent (Biermann et al., 2024). These systems should include feedback loops that allow for adjustments in coaching intensity and support based on individual trajectories, rather than fixed team roles or ranking hierarchies.

Innovative proposals such as the Average Team Age (ATA) method suggest grouping players based on a team's average age rather than individual cut-off dates, thereby distributing advantages more evenly (Verbeek et al., 2021). Though still in experimental stages, such structural changes hold promise for reducing RAE-related bias.

Additionally, leveraging data analytics to flag patterns of dropout and performance divergence by birth month can inform proactive intervention policies (Romann et al., 2021).

METHOD

This study is a review article that aims to shed light on the subject by examining the relevant literature. Published studies were identified and evaluated through a systematic search using keywords and subject headings across academic databases including Google Scholar, PubMed and Web of Science

RESULT

The findings of the study highlight the complexity of valuation processes in the football industry, where both quantifiable performance indicators and latent systemic biases such as the RAE jointly shape early career trajectories and economic outcomes. While relatively older players often benefit from early selection advantages, longitudinal data indicate that these advantages may not necessarily translate into long-term success. In contrast, relatively younger players who persevere despite early disadvantages frequently exhibit greater psychological resilience and more consistent long-term performance.

CONCLUSION

This review has synthesized current evidence on the determinants of market value and transfer fees in youth football, with a particular focus on the role of the RAE. The findings underscore the complexity of valuation processes in the football industry, where both measurable performance indicators and hidden systemic biases such as RAE jointly shape early career trajectories and economic outcomes. While relatively older players often benefit from early selection advantages, longitudinal evidence suggests that these advantages may not translate into sustained success. On the contrary, relatively younger players who persist through early disadvantages often demonstrate superior psychological resilience and longer-term performance consistency.

The key contribution of this review to the existing literature is its integration of economic, psychological, and developmental perspectives to better understand how player attributes and contextual biases jointly influence market dynamics. By bringing together findings from diverse methodologies and populations, the review highlights the latent inefficiencies in youth talent systems particularly the overvaluation of maturity proxies at the expense of long-term potential.

From a practical standpoint, the review calls for reform in scouting and development practices, advocating for delayed selection, holistic player evaluation, and dynamic feedback systems that account for individual growth trajectories. These strategies can promote more equitable opportunities and reduce resource misallocation.

For future research, several directions emerge:

First, more longitudinal and multi-country studies are needed to trace how RAE-related biases evolve and interact with market outcomes across different football ecosystems.

Second, there is a need to develop and test intervention models such as age reclassification or average team age grouping in real-world competitive settings.

Third, the incorporation of advanced data analytics and machine learning in valuation models may help disentangle the relative weights of physical, technical, psychological, and contextual variables in predicting career success.

In conclusion, optimizing talent development in youth football requires moving beyond traditional paradigms. By acknowledging and correcting for systemic biases like the RAE, stakeholders can ensure that player valuation and transfer systems become more data-driven, equitable, and developmentally informed.

REFERENCES

- Aguar do Monte, P., & Lopes Filho, L. L. (2023). Intellectual capital and market valuation of footballers. *Contabilidad y Negocios*, 18(35), 123-140.
- Bennett, K. J. M., Novak, A. R., Fransen, J., & Duffield, R. (2023). The prevalence of relative age effects and the influence of the talent pool size on Australian male and female youth football. *Journal of Sports Sciences*, 41(4), 457-468.
- Bezuglov, E., Khaitin, A., & Nikolaev, D. (2023). Influence of the relative age effect on market value and performance in youth football: Evidence from Russian leagues. *Journal of Sports Analytics*, 9(2), 89-102.
- Bezuglov, E., Morgans, R., Butovskiy, M., Emanov, A., Shagiakhmetova, L. R., Pirmakhanov, B., Waśkiewicz, 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*.
- Biermann, G., Klein, M., & Schlegel, M. (2024). Psychological resilience as a predictor of transfer value in elite youth football. *European Journal of Sport Psychology*, 19(1), 44-60.

- Biermann, H., Memmert, D., Romeike, C., Knäbel, P., & Furley, P. (2024). Relative age effect inverts when looking at career performance in elite youth academy soccer. *Journal of Sports Sciences*.
- Bolckmans, L., Lenoir, M., Musch, E., & Philippaerts, R. (2023). Profiling talented youth soccer players: The predictive validity of technical, tactical, physical, and psychological attributes. *International Journal of Sports Science & Coaching*, 18(1), 115-126.
- Bolckmans, L., Perquy, K., Starkes, J. L., Memmert, D., & Helsen, W. F. (2023). The relationships between relative age effect, personality constructs and achievement level in soccer. *Frontiers in Sports and Active Living*, 5, 1226599.
- Bozděch, M., Agricola, A., & Zháněl, J. (2023). The Relative Age Effect at Different Age Periods in Soccer: A Meta-Analysis. *Perceptual and Motor Skills*.
- Bozděch, M., Musálek, M., & Süß, V. (2023). Early born advantage: RAE and physical maturity in Czech elite youth football. *European Journal of Sport Science*, 23(1), 121-133.
- Figueiredo, L. S., Gomes, L. M. S., Da Silva, D. G., Gantois, P., Fialho, J. V. A. P., Fortes, L. S., & Fonseca, F. S. (2022). The relative age effect in Brazilian elite soccer depending on age category, playing position, and competitive level. *Human Movement*, 23(2), 112-120.
- Furley, P., Memmert, D., & Hütter, M. (2016). The impact of relative age on coaching decisions in youth football. *Psychology of Sport and Exercise*, 25, 36-42.
- Furley, P., Memmert, D., & Weigelt, M. (2016). “How Much is that Player in the Window? The One with the Early Birthday?” Relative Age Influences the Value of the Best Soccer Players, but Not the Best Businesspeople. *Frontiers in Psychology*.
- García-Rubio, J., García-Vallejo, A., Arenas-Pareja, M. de los Á., López-Sierra, P., & Ibáñez, S. J. (2022). From Junior to Elite in Soccer: Exploring the Relative Age Effect and Talent Selection in Spanish Youth National Teams. *Children (Basel)*.
- García-Rubio, J., Sánchez-Molina, J., & Cárdenas, D. (2022). Talent identification and RAE in football: Impact on youth international selection. *PLOS ONE*, 17(5), e0267890.
- Helsen, W. F., Starkes, J. L., & Van Winckel, J. (2005). The influence of relative age on success and dropout in male soccer players. *American Journal of Human Biology*, 17(6), 764-770.

- Mann, D. L. (2020). Approaches to help coaches and talent scouts overcome relative age effects. In A. L. Kelly & C. Bjorndal (Eds.), *Talent Identification and Development in Sport* (pp. 159-171). Routledge.
- Metelski, A. (2021). Factors affecting the value of football players in the transfer market. *Journal of Physical Education and Sport*, 21(2), 1150-1155.
- Metelski, A. (2023). Age of top European football players when they started organized training and their value in the transfer market. *Quality in Sport*, 11(1), 98-104.
- Pedersen, A. V., Aune, T. K., Dalen, T. van, & Lorås, H. (2022). Variations in the relative age effect with age and sex, and over time Elite-level data from international soccer world cups. *PLOS ONE*.
- Pérez-González, B., Cardona-Soriano, P., & Pruñonosa, J. T. (2023). A Relative Age Effect RAE analysis of top European football clubs segmented by ownership models. *Cogent Social Sciences*.
- Poza, C. (2020). A conceptual model to measure football player's market value: A proposal by means of an Analytic Hierarchy Process. *Ricyde: Revista Internacional de Ciencias del Deporte*, 16(59), 187-202.
- Romann, M., Javet, M., Cobley, S., & Born, D. P. (2021). How Relative Age Effects Associate with Football Players' Market Values: Indicators of Losing Talent and Wasting Money. *Sports*, 9(7), 99.
- Romann, M., Rössler, R., & Faude, O. (2021). Relative age effect in youth football across Europe: A multi-national comparison of elite academies. *European Journal of Sport Science*, 21(6), 839-848.
- Sánchez, M., Orgaz, B., Ramírez-Campillo, R., Nakamura, F. Y., Luis-Pereira, J. M., Carretero, M., & Sánchez-Sánchez, J. (2022). Factors associated with the market value of professional soccer players. *Cuadernos de Psicología del Deporte*, 22(2), 35-42.
- Schorer, J., Deja, J., Steingröver, C., Baker, J., Loffing, F., Helsen, W., & Wattie, N. (2017). The association of two relative age effects and estimated money value in elite soccer. *Frontiers in Psychology*, 8, Article 850.
- Sweeney, L., & Lundberg, T. R. (2024). Relative age and biological maturity-related selection biases in male youth soccer across different competitive levels within a national association. *Science & Medicine in Football*.

- Sweeney, L., Cumming, S. P., MacNamara, Á., & Horan, D. (2022). A tale of two selection biases: The independent effects of relative age and biological maturity on player selection in the Football Association of Ireland's national talent pathway. *International Journal of Sports Science & Coaching*.
- Sweeney, L., de la Rubia, A., Taylor, J., & Bjorndal, C. (2024). Looking beyond relative age to understand relative advantage and disadvantage in talent development. *Frontiers in Sports and Active Living*.
- Sweeney, R., & Lundberg, C. (2024). Growth trajectories and market valuation in adolescent footballers. *Journal of Sports Sciences*, 42(2), 201-213.
- Tohoff, A., & Mechtel, M. (2023). Birth month bias and monetary valuation in youth football: A behavioral economics perspective. *Journal of Economic Psychology*, 94, 102624.
- Tohoff, L., & Mechtel, M. (2023). Fading Shooting Stars – The Relative Age Effect, Misallocation of Talent, and Returns to Training in German Elite Youth Soccer. *Social Science Research Network*.
- Toselli, S., Marzaioli, R., & Gualdi-Russo, E. (2022). Influence of biological maturation on market value in young soccer players. *European Journal of Sport Science*, 22(6), 811-818.
- Toselli, S., Mauro, M., Grigoletto, A., Cataldi, S., Benedetti, L., Nanni, G., Miceli, R. D., Aiello, P., Gallamini, D., Fischetti, F., & Greco, G. M. (2022). Maturation Selection Biases and Relative Age Effect in Italian Soccer Players of Different Levels. *Biology*.
- Verbeek, J., Lawrence, S., van der Breggen, J., Kelly, A. L., & Jonker, L. (2021). The average team age method and its potential to reduce relative age effects. In *Development Models for Sport Talent Identification and Athlete Development* (pp. 131-148). Routledge.
- Votteler, A., & Höner, O. (2017). Cross-sectional and longitudinal analyses of the relative age effect in German youth football. *European Journal of Sport Science*, 17(3), 199-206.