INPLASY

INPLASY202510110

doi: 10.37766/inplasy2025.1.0110

Received: 25 January 2025

Published: 25 January 2025

What is the impact of the Relative Age Effect on Talent Identification in Football?

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202510110

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 January 2025 and was last updated on 25 January 2025.

INTRODUCTION

Review question / Objective To systematically evaluate the influence of the Relative Age Effect on talent identification, selection, and career outcomes in professional football, this study aims to examine its implications for fairness, inclusivity, and long-term performance at the elite levels of the sport. How can understanding and addressing RAE contribute to more equitable talent identification and optimal player development?

Rationale While the Relative Age Effect (RAE) is often cited as a significant factor influencing talent identification and selection in football, its actual impact at the professional level remains a subject of debate. Is the RAE as influential in professional football as widely believed, or do other factors, such as maturation and late specialization, mitigate its effects?

This systematic review seeks to critically examine the evidence surrounding the RAE in professional football to determine whether it significantly biases talent identification processes and career outcomes. By adopting a skeptical perspective, this review aims to explore whether the prevalence and impact of RAE have been overstated, and to identify contexts or conditions where its influence might be less pronounced.
Exploring these questions will challenge assumptions about the RAE, providing a clearer understanding of its actual relevance and guiding more evidence-based approaches to talent development and selection in professional football.

Condition being studied The Relative Age Effect (RAE), a phenomenon where athletes born earlier in a selection year have developmental advantages over their relatively younger peers, and its impact on talent identification and career progression in professional football. This study examines whether RAE influences the fairness and efficacy of talent

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selection processes and the long-term success of players at the highest levels of competition.

METHODS

Search strategy The literature search was conducted in the following databases: Scopus, Web of Science, CINAHL, PubMed, and Medline, selected for their relevance in the fields of health, sports, and social sciences.
To maximize the accuracy and comprehensiveness of the results, the following combination of keywords and Boolean operators was applied across all databases:
("relative age effect" OR "RAE") AND ("impact*" OR "influence*" OR "effect*") AND ("talent identification" OR "talent* scout*" OR "player* recruit*" OR "player* selection") AND ("football" OR "soccer") AND ("youth player*" OR "young athlete*").

Participant or population The population of interest includes male professional football players and, where applicable, male youth players in elite academies transitioning to professional levels. Studies focusing on players from various professional leagues, competitive tiers, and geographical regions will be included, provided they address the impact of the Relative Age Effect (RAE) on talent identification, player selection, or career progression.

Intervention The intervention refers to the Relative Age Effect (RAE), analyzed as the influence of a player's birth month or relative age within a selection year on talent identification, recruitment, or career progression in professional male football. The focus is on examining how RAE impacts selection biases and developmental pathways.

Comparator Players not affected by RAE or studies comparing groups with varying degrees of RAE influence (e.g., players born early versus late in the selection year). Additionally, comparisons may include players across different contexts, such as leagues, geographic regions, or age categories, to assess the variability and relevance of RAE.

Study designs to be included This systematic review will include randomized controlled trials (RCTs), longitudinal studies and observational studies.

Eligibility criteria The eligibility criteria for this study include: studies focusing on male professional football players or male youth players transitioning to professional levels, examining the Relative Age Effect (RAE) and its impact on talent identification, player selection, or career progression. Eligible study designs include observational studies (cross-sectional, cohort, case-control), qualitative studies, systematic reviews, and meta-analyses, published in English or Portuguese between 2010 and 2024, and conducted in professional football environments or elite football academies. Exclusion criteria comprise studies focusing on sports other than football (soccer), those involving only female players or mixed-gender samples without separate analyses for males, theoretical articles, opinion pieces, or reviews without empirical data, studies published before 2010 or in languages other than English or Portuguese, and studies focusing exclusively on amateur or recreational football contexts.

Information sources Electronic Databases (Scopus, Web of Science, CINAHL, PubMed, and Medline) were searched for relevant publications.

Main outcome(s) The prevalence of the Relative Age Effect (RAE) is assessed by analyzing the proportion of players born in each quarter of the selection year, highlighting potential biases in birthdate distribution. This is typically measured as the percentage of players in each birth quartile or half-year relative to the general population, revealing disparities that suggest an advantage for relatively older players within a selection cohort. The impact of RAE on talent identification and selection is evidenced by its influence on scouting, recruitment, and selection practices in professional football. Studies often report effect measures such as odds ratios or proportions of selected players based on relative age, demonstrating that players born earlier in the selection year are more likely to be scouted, recruited, or selected, potentially skewing opportunities for relatively younger players within the same cohort.

Additional outcome(s) The Relative Age Effect (RAE) can demonstrate geographical and cultural variations, with differences in its prevalence and impact observed across regions and football leagues. These variations can highlight the need for mitigation strategies, such as changes in selection processes or adjustments to age group classifications, which can help reduce the effects of RAE. Furthermore, the phenomenon can raise important equity and diversity implications, as it may affect fairness and inclusivity in professional football, particularly among underrepresented groups or in less-resourced settings. Comparisons across competitive levels may also suggest that the influence of RAE can vary between top-tier

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leagues, lower divisions, and national teams, emphasizing the importance of tailored approaches to address this issue in different contexts of the sport.

Data management The quality of the primary studies included in this review will be assessed using the Downs and Black Checklist for Clinical Trial Quality Assessment, a validated tool designed to evaluate the methodological quality of both randomized and non-randomized studies. This checklist evaluates several domains: reporting, which examines whether the study clearly describes its objectives, hypotheses, methods, and main findings; external validity, assessing the generalizability of results to the wider population or target context; internal validity (bias), identifying biases related to participant selection, outcome measurements, and study execution; internal validity (confounding), examining whether confounding variables were identified and controlled in the study design or analysis; and power, determining whether the study had sufficient statistical power to detect meaningful differences or effects. Each study will be scored based on these criteria, resulting in an overall quality score to classify studies as high, moderate, or low quality. High-quality studies will be prioritized in the synthesis of evidence, while the impact of lower-quality studies on overall conclusions will be carefully considered. The results of the quality assessment will be tabulated and discussed to ensure transparency and rigor in evaluating the methodological robustness of the included studies.

Strategy of data synthesis The data collected from the included studies will be synthesized through a combination of narrative synthesis and, where possible, quantitative meta-analysis, depending on the nature of the extracted data and the heterogeneity of the studies. A structured narrative synthesis will summarize key findings, focusing on main outcomes such as the prevalence of the Relative Age Effect (RAE), its impact on talent identification and career progression, and contextual factors influencing these effects. Studies will be grouped by themes like geographical region, competitive level, or career stage to identify patterns and trends. If sufficient homogeneity is found across studies—such as similar outcome measures and populations—a meta-analysis will be conducted using statistical software, calculating effect sizes (e.g., odds ratios, relative risks) to quantify the influence of RAE on primary outcomes. Heterogeneity will be assessed using the I^2 statistic, with random-effects models applied if significant heterogeneity is present. Subgroup analyses will explore variations in RAE impact based on factors like geographical region, age category, and league level, while sensitivity analyses will assess the robustness of findings by excluding lower-quality studies or those with high risk of bias. Results will be presented in tables and figures summarizing key study characteristics, effect sizes, and identified patterns or trends, accompanied by a narrative explanation to contextualize findings and address the review objectives. This mixed approach ensures a comprehensive synthesis of evidence, providing both qualitative insights and quantitative estimates of the RAE's impact on professional male football.

Subgroup analysis Subgroup analyses will examine the variability of the Relative Age Effect (RAE) based on geographical region, competitive level, age categories, performance metrics, mitigation strategies, time periods, and player positions to identify contextual and moderating factors influencing its impact.

Sensitivity analysis Sensitivity analyses will be conducted to assess the robustness of the review findings by Excluding studies with low-quality scores or high risk of bias (based on the Downs and Black Checklist), Comparing results when using different statistical models (e.g., fixed-effects vs. random-effects) in the meta-analysis, Removing outlier studies that significantly deviate from the overall trend to evaluate their impact on the pooled results and Assessing the influence of excluding studies with small sample sizes or incomplete data.

Language restriction English and Portuguese.

Country(ies) involved Portugal.

Keywords physical maturation; relative age bias; player development; selection bias.

Contributions of each author

Author 1 - Ricardo Fernandes - Lead the project, wrote and revised the original manuscript and analyzed and interpreted the data, wrote the statistical report and revised the original manuscript.
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Author 2 - Paulo Malico-Sousa - Run the data search, performed the methodological assessment, conducted the data extraction, wrote and revised the original manuscript.
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