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Inswing or Outswing Corner Kicks? A Meta-Analysis of Offensive Outcomes in Professional Soccer

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Abstract

Background: Although corner kicks are the most tactically analyzed set pieces in professional soccer, there is still no consensus on whether inswinging or outswinging deliveries are more effective, and no previous meta-analysis has systematically addressed this question.
Aims: The study aimed to compare the offensive effectiveness of inswinging and outswinging corner kicks, specifically concerning goal conversion and the creation of final attempts, while also examining differences between domestic and international competitions.
Methods: A meta-analysis was conducted using data from 12 eligible studies involving professional competitions. Binary outcomes (goal vs. no goal; final attempt vs. no attempt) were analyzed using log odds ratios under a random-effects model to account for heterogeneity. Subgroup analyses were performed based on competition type (domestic vs. international).
Result: The cumulative goal conversion rate from corners was 3.09%, while the rate for final attempts was 25.61%. No statistically significant difference was found between inswinging and outswinging corners regarding goal conversion (OR = 0.99, p = 0.67). However, outswinging corners increase the probability of a final attempt (OR = 0.79, p = 0.02) compared to inswinging corners.
Conclusion: This first meta-analysis comparing corner kick delivery types shows that, while both are equally effective for scoring, outswinging corners lead to more final attempts. Coaches may prioritize outswinging deliveries to improve offensive output and reduce counterattack risk. Future studies should examine contextual factors (e.g., marking systems, delivery zones) and include defensive outcomes for a more holistic tactical understanding.

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INTRODUCTION

Set pieces are widely recognized as decisive moments in soccer, offering structured opportunities for teams to score (Englund, 2022; Fernández-Hermógenes et al., 2017; Stafylidis et al., 2024). Among these, corner kicks are particularly frequent, occurring roughly ten times per match at the professional level and contributing to up to 30–40% of goals in major tournaments (Dimov & Atanasov, 2022; Sarmento et al., 2025). However, despite this apparent significance, the conversion rate from corners to goals remains remarkably low, ranging from 1.5% to 3.5% across elite leagues (Goodman et al., 2024; Shaw & Gopaladesikan, 2020). However, due to the importance of goals scored from corner kicks - in the majority of instances where a goal is scored from a corner kick, the scoring team avoids defeat by either securing a win or earning a draw - their in-depth analysis becomes imperative. Understanding the factors that influence the success of corner kicks holds substantial promise for improving offensive efficiency and reducing vulnerability to counterattacks (Plakias et al., 2023).

Over the last decade, interest in corner kick analysis has grown. Studies have examined corner characteristics, including delivery type (inswinging vs. outswinging), target zones, and number of involved players (Sarmento et al., 2025). Shaw and Gopaladesikan (2020) used machine learning to classify attacking routines, revealing the potential for data-driven strategic planning.

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Gouveia et al. (2022) found inswinging deliveries to be more prevalent but not necessarily more successful. Meanwhile, other studies emphasized the role of defensive structure (Bauer et al., 2022; Pulling & Newton, 2017; Pulling et al., 2013) and contextual variability (Casal et al., 2017; De Baranda & Lopez-Riquelme, 2012) in corner outcomes. Despite this research volume, no consensus has emerged regarding whether one delivery type is superior. More critically, no previous meta-analysis has systematically quantified these differences across studies and competition levels.

A systematic review by Plakias (2025) highlighted persistent methodological inconsistencies in the literature, such as varied definitions of success (e.g., goals vs. final attempts), lack of standardization in spatial zoning of the penalty area, and insufficient reporting of contextual variables. Additionally, corner execution is rarely analyzed in the transition phase following the loss of possession, even though counterattacks from poorly executed corners pose significant risks (Plakias et al., 2023). As Sarmento et al. (2025) noted, set pieces—especially corners—remain underexplored despite their influence on match outcomes and would benefit from more robust, cross-study synthesis and modeling. Despite numerous studies, there is still no consensus on whether inswinging or outswinging deliveries are more effective. More importantly, no prior meta-analysis has systematically synthesized these findings, making it difficult to draw robust, generalizable conclusions for tactical application.

To address this challenge, we hypothesized that a meta-analysis of studies comparing inswinging and outswinging deliveries could uncover trends that individual studies could not detect. Our approach aggregated binary outcome data (goal and final attempt) and applied log odds ratios under a random-effects model to account for population heterogeneity (Field & Gillett, 2010). This is the first known meta-analysis focusing on the corner kick delivery type. Taking into account the advantages of meta-analysis - such as increased statistical power, broader generalizability across contexts, and the ability to detect underlying patterns (Chen & Chi, 2023; Gelardi et al., 2021; Hagger, 2022; Wallace et al., 2022) - this study can offer new evidence-based insights to both researchers and practitioners. Furthermore, our study differentiates between domestic and international contexts, uncovering potential competition-specific trends that inform tactical applications. This was done because previous research has suggested that tactics differ across competition types (James et al., 2002; Kostiukevych et al., 2024).

Therefore, this study aimed to evaluate the offensive effectiveness of inswinging versus outswinging corner kicks in elite soccer. Specifically, the research questions were: (1) Do inswinging and outswinging corners differ in their ability to generate goals? (2) Does their ability to generate final attempts differ? (3) Are these patterns influenced by competition type (domestic vs. international)? By synthesizing available evidence, we provide performance analysts and coaches with practical insights to optimize corner kick strategies.

METHOD

Included Studies

The selection of studies used in the meta-analysis was based on a recently published systematic review (Malinowska et al., 2024), which performed a structured search in Scopus and Web of Science. The search strategy included combinations of terms such as "corner kick," "soccer," and "football." We refer readers to the original review for full details on the search process, including exact Boolean expressions and inclusion/exclusion criteria (https://doi.org/10.3390/app15094984). Additional exclusion criteria for the present meta-analysis included the non-professional level of the competition and the absence of effectiveness-related data. As a result, nine were excluded from the 21 articles included in the original review: two because they did not involve professional leagues, three because they lacked data on effectiveness, and four because their data were already included in other, larger studies. Among the 12 studies that were ultimately included, 2 had portions of their data removed (Fernández-Hermógenes et al., 2021; Strafford et al., 2019) due to duplication with a larger study (Tütüncü et al., 2024)(only the unique data not present in the larger study were retained). Figure 1 presents a simplified PRISMA flow diagram illustrating the updated selection process. Table 1 presents the included studies and the competitions analyzed in chronological order.

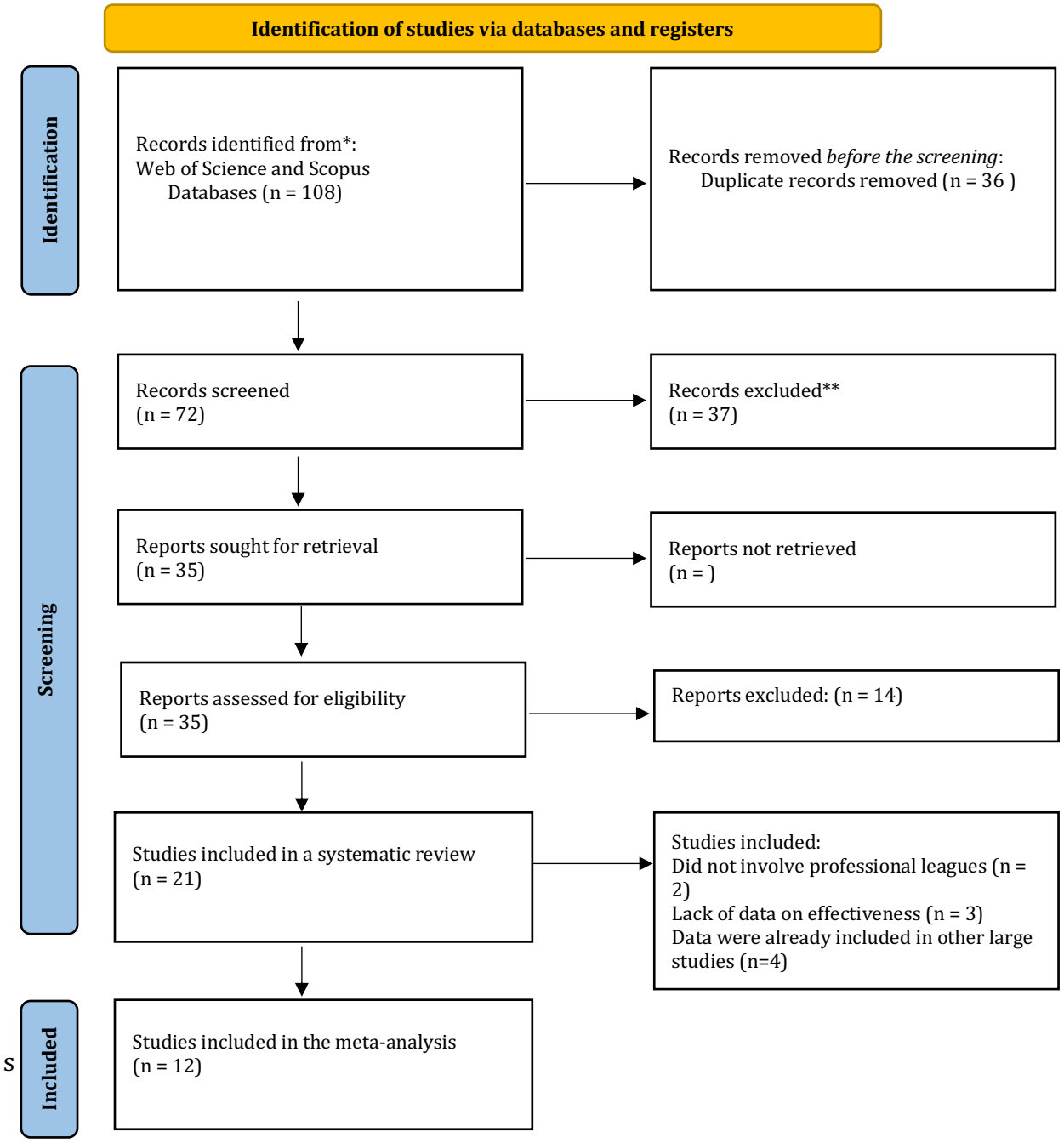

Figure 1. Simplified PRISMA Flow Diagram That Illustrates the Updated Selection Process.

Table 1. List of Included Studies and the Competitions Analyzed

Author / (Year)	Competitions
De Baranda and Lopez-Riquelme (2012)	2006 World Cup
Schmicker (2013)	2010 Major League Soccer season
Pulling et al. (2013)	English Premier League during the 2011-12 season
Casal et al. (2015)	2010 FIFA World Cup, UEFA Euro 2012, and UEFA Champions League 2010-2011
Pulling (2015)	English Premier League during the 2011/2012 and 2013/2014 season
Kubayi and Larkin (2019)	2018 FIFA World Cup

Author / (Year)	Competitions
Maneiro et al. (2019)	FIFA World Cup 2014
Strafford et al. (2019)	2015/2016 English Premier League Season
Mitrotasios et al. (2021)	LaLiga during the 2019/2020 season
Fernández-Hermógenes et al. (2021)	First and second Spanish division during the 2016-2017 season
Plakias et al. (2023)	Greek Super League 2020–21
Tütüncü et al. (2024)	33 different leagues and UEFA Europa League 2014-2019 (5 seasons, 2014-2019)

Statistical Analysis

The cumulative percentages for goals and final attempts were calculated manually using the formulas below after first computing the total number of goals, final attempts, and corners included in the analysis: (a) Cumulative percentage of goals = (goals/corners) × 100%: (b) Cumulative percentage of final attempts = (final attempts/corners) × 100%.

To examine the differences between inswinging and outswinging corners for both outcomes (goals and final attempts), a meta-analysis was conducted using SPSS software (version 29.0). In all cases, the log odds ratio was used as the effect size (as it is suitable for binary data), and a random effects model was employed, given that the data originated from different populations (i.e., competitions). Log odds ratios were chosen due to their ability to measure the association between two binary outcomes across studies with varying sample sizes and conditions (Haddock et al., 1998; Trikalinos & Olkin, 2008). OR refers to the ratio of the odds of an event occurring in the inswinging group compared to the outswinging group. For easier interpretation, a reference table explaining the meaning of odds ratio values is provided (Table 2).

Table 2. Interpretation Guide for Odds Ratios (OR)

OR Value	Interpretation
OR = 1.00	No difference between inswinging and outswinging corners
OR > 1.00	Outcome (e.g., goal or final attempt) more likely after inswinging delivery
OR < 1.00	Outcome more likely after outswinging delivery

A random-effects model was selected for this meta-analysis because the included studies originated from different competitions and potentially distinct tactical contexts, suggesting that the true effect sizes may vary across studies. Field and Gillett (2010) emphasize that such heterogeneity in population effects is common in social science research, and a random-effects model allows for generalization beyond the included studies by accounting for both within- and between-study variance.

Additionally, a subgroup analysis was conducted based on competition type (domestic or international). Previous research has suggested that the tactical dynamics of matches differ across competition types (James et al., 2002; Kostiukevych et al., 2024). Therefore, examining domestic and international competitions separately may help detect such contextual moderators and improve the practical relevance of the findings for coaches tailoring corner kick strategies to specific environments. The study by Tütüncü et al. (2024) was excluded from this subgroup analysis because it included domestic and international competitions without separating the data.

Study Registration

The study protocol, including hypotheses, design, and analysis plan, was preregistered on the Open Science Framework (OSF) following the completion of data analysis. The registration is publicly available at: https://doi.org/10.17605/OSF.IO/A5GCE (Associated project: osf.io/4gfyk).

RESULTS AND DISCUSSION

Results

Cumulative Percentages

The studies that reported data on corners resultinsg in goals found that 14,435 corners resulted in goals, while 452,202 did not, corresponding to a goal percentage of 3.09%. The studies that reported data on corners resulting in final attempts found that 3,384 corners led to final attempts, while 9,828 did not, corresponding to a final attempt percentage of 25.61%.

Comparison of Inswinging and Outswinging Corners – Goals

According to the forest plot shown in Figure 2, there was no statistically significant difference in the number of goals scored between the inswinging and outswinging corners (OR = 0.99, p = 0.67). The subgroup analysis (Figure 3) also showed no statistically significant difference for either domestic leagues (p = 0.19) or international competitions (p = 0.39). However, a trend was observed in favor of outswinging corners in domestic leagues (OR = 0.82, 95% CI = 0.60–1.10), while a trend in favor of inswinging corners appeared in international competitions (OR = 1.52, 95% CI = 0.59–3.93).

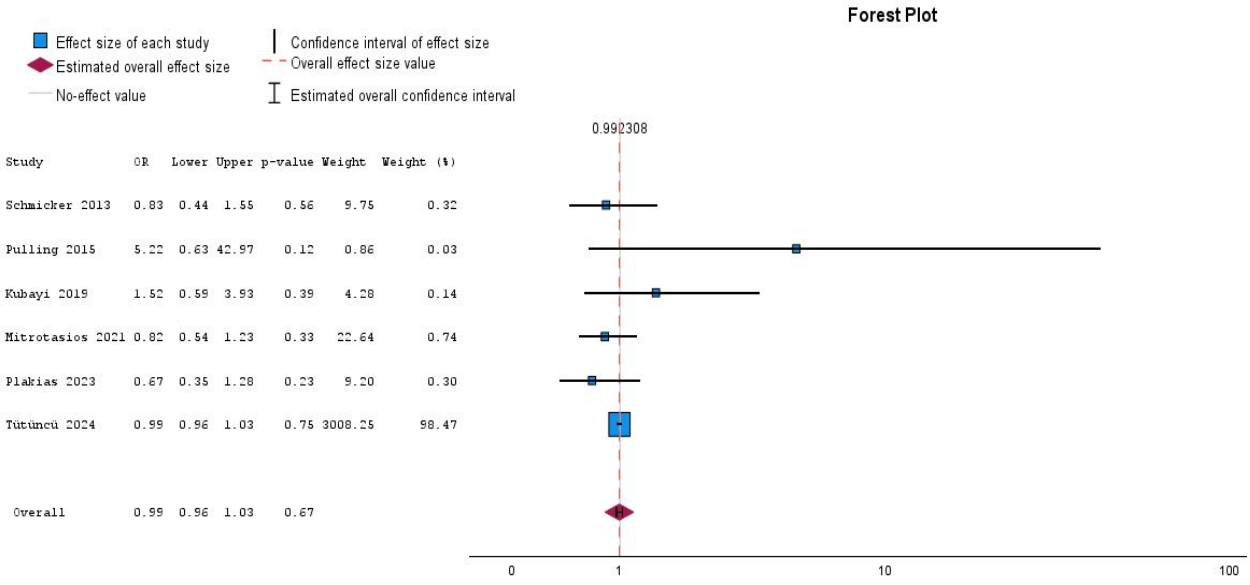

Figure 2. Forest Plot Comparing Goals from Inswinging and Outswinging Corners Across All Studies

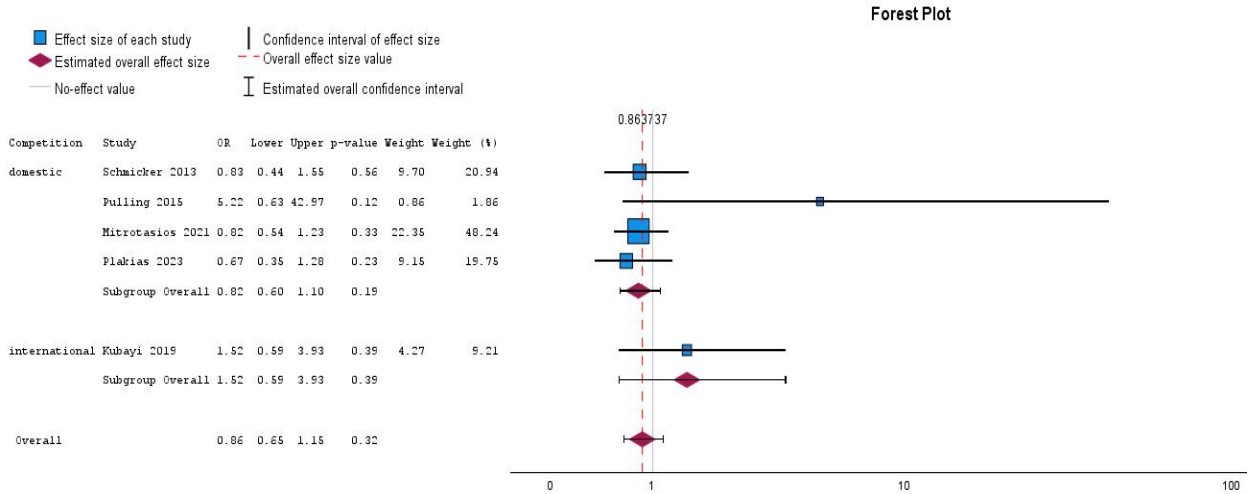

Figure 3. Subgroup Analysis of Goals by Competition Type (Domestic vs. International)

Comparison of Inswinging and Outswinging Corners – Final Attempts

According to the forest plot shown in Figure 4, there was a statistically significant difference in the final attempts between the inswinging and outswinging corners. Specifically, outswinging corners resulted in more final attempts (OR = 0.79, p = 0.02). The subgroup analysis presented in Figure 5 shows that this difference was statistically significant only in domestic leagues (p = 0.03). In contrast, although a similar trend was observed in international competitions, the difference was not statistically significant (p = 0.33).

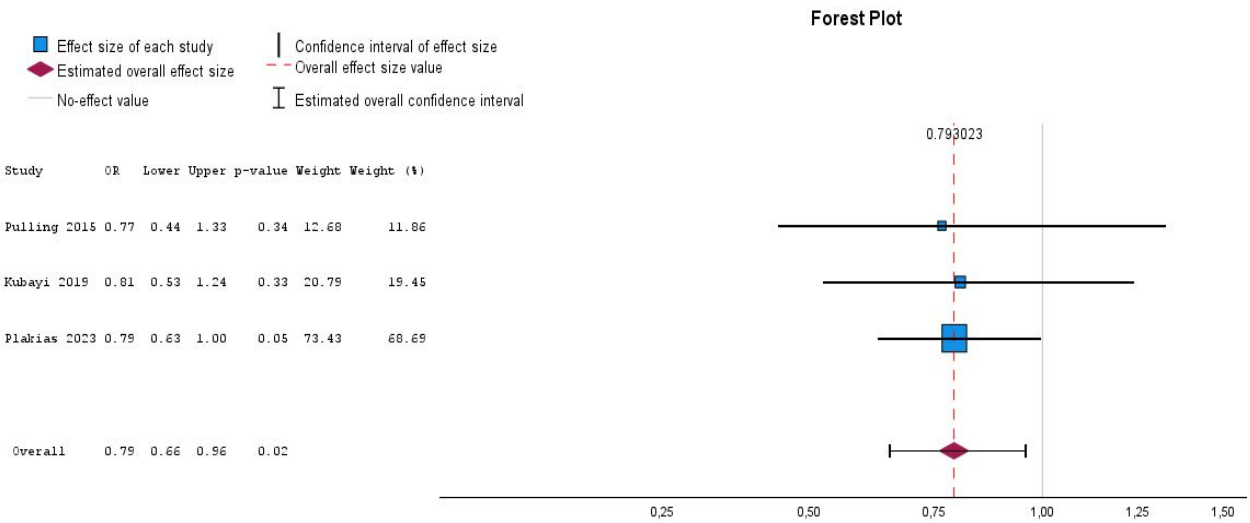

Figure 4. Forest Plot Comparing Final Attempts from Inswinging and Outswinging Corners Across All Studies

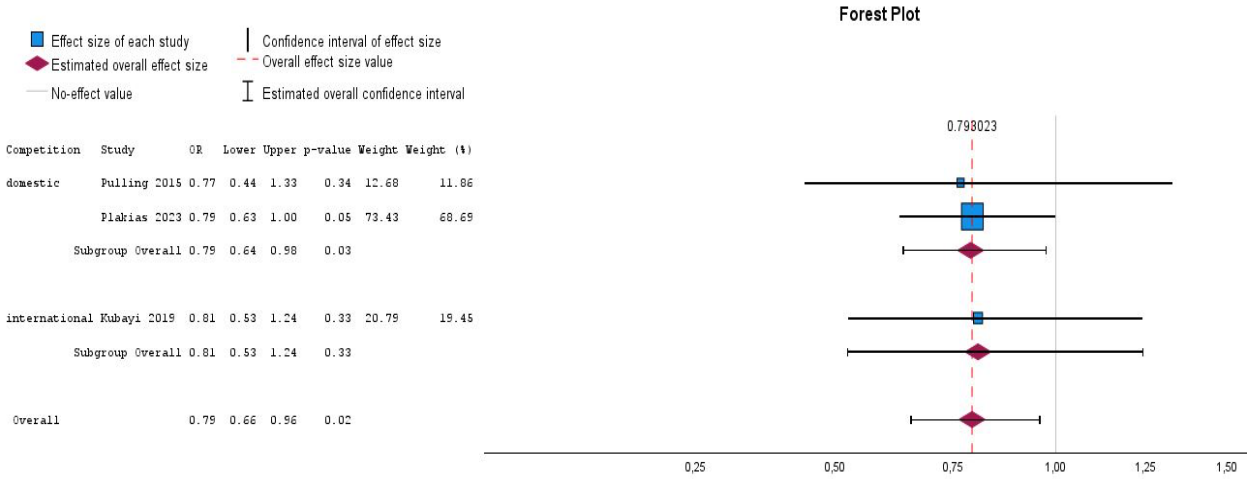

Figure 5. Subgroup Analysis of Final Attempts by Competition Type (Domestic vs. International)

Discussion

Overview

This meta-analysis investigated the effectiveness of inswinging and outswinging corner kicks in professional soccer, focusing on two offensive outcomes: goals and final attempts. The results revealed no significant overall difference in goals scored between the two types of deliveries but a statistically significant advantage for outswinging corners in generating final attempts. These findings contribute novel evidence to a growing work on set-piece optimization, providing the first comprehensive synthesis across multiple leagues and tournaments using meta-analytic techniques.

Connecting the Present Findings with Existing International Theory and Literature

The finding of a statistically significant difference in generating final attempts is novel, as although individual studies had indicated this trend, they had not established statistical significance

(Kubayi & Larkin, 2019; Plakias et al., 2023; Pulling, 2015). While no significant difference was found between inswinging and outswinging corners in terms of the goals scored, the observed difference in final attempts may prove to be a crucial factor in shaping coaches' strategies for corner kick execution. For instance, a team may develop tactical routines to enable a specific player, particularly one proficient at heading, to receive the final attempt, thereby increasing the team's chances of scoring. Additionally, coaches might invest more time in training all players to improve their finishing skills during such situations.

Moreover, increasing the rate of final attempts means reducing the probability of the defending team's immediate ball recovery, consequently lowering the likelihood of conceding a counterattack. This was highlighted in the study by Plakias et al. (2023), which was the only study to explore the possibility of counterattacks initiated by the defending team after a corner kick. Although the researchers did not find statistically significant differences, the likelihood of a counterattack was greater following inswinging corners. This makes intuitive sense, given that inswinging deliveries inherently send the ball closer to the goal area, where the opposing goalkeeper can use their hands to claim the ball. We should not forget that counterattacks are perhaps the most effective method of scoring goals (Plakias, et al., 2025; Schulze et al., 2021).

Another important insight from this meta-analysis concerns the reporting practices of researchers studying corners and drafting their respective manuscripts. Future meta-analyses would benefit significantly from more detailed descriptive statistics and separation of results by competition type. For example, the study by Tütüncü et al. (2024) reported aggregate results for domestic and international competitions, making it unsuitable for inclusion in subgroup analyses. In contrast, providing primary data in supplementary files, as performed by Maneiro et al. (2019), is highly beneficial. Without access to the raw data in that study, it would have been impossible to include it in our meta-analysis, as it also contained results from a women's competition that needed to be excluded. One further issue with individual studies is the considerable variability in dividing the goal area into zones (Tütüncü et al., 2024). A consensus among researchers to adopt a standard (or at most two) zoning methods would enable future meta-analyses to produce more robust and visually coherent findings. After all, this lack of consensus in functional definitions has been highlighted as one of the major issues in soccer performance analysis (Plakias, 2025).

Implications

These findings carry several important theoretical and practical implications. Theoretically, this is the first meta-analytic evidence to demonstrate that the type of corner kick delivery influences the probability of generating final attempts, adding a new layer of understanding to the tactical value of set pieces. This contribution strengthens the scientific foundation for performance analysis in soccer, emphasizing that not all corner types are tactically equivalent when the goal is to increase offensive activity. The results suggest that outswinging deliveries may be a more efficient option for teams aiming to maximize their chances of generating final attempts while minimizing the risk of conceding counterattacks. This has tactical implications for coaches and analysts, particularly in domestic leagues where the effect was statistically significant. Additionally, developing routines that increase the probability of a successful final attempt (such as targeting specific aerially dominant players) may further enhance the offensive yield from corner situations.

Research contribution

The contribution of this study lies in its methodological innovation and scope. By synthesizing data from 12 studies across multiple professional competitions and applying a random-effects meta-analytic model using log odds ratios, the study provides a more reliable and generalizable understanding of delivery-type effectiveness than previous isolated investigations. Including subgroup analysis by competition type adds contextual depth and supports a more nuanced interpretation of the tactical trends in different environments.

Limitations

Despite its important findings and the innovative application of meta-analytic methodology to corner kicks, our study is not without limitations. For example, the articles included were derived from a systematic review that had searched only two databases (Scopus and Web of Science) and had

restricted inclusion to English-language publications. It is likely that searching additional databases (e.g., Google Scholar and SportDiscus) and including studies published in other languages could have identified further relevant articles, thereby strengthening our findings. Furthermore, only peer-reviewed articles were included in the systematic review, excluding grey literature. However, meta-analyses should consider unpublished studies as well due to the risk of a 'file-drawer' effect, where studies with negative findings remain unpublished and lead to bias (Field & Gillett, 2010; Hansen et al., 2022; Wagner III, 2022). Finally, our meta-analysis did not include any assessment of publication bias, as the small number of individual studies meant that such analyses would not yield reliable results (Aert et al., 2019).

Suggestions

Future research should address these gaps by (a) expanding database coverage and including non-English and gray literature, (b) incorporating more detailed contextual variables such as the number of players in the box, types of marking systems, and match status, (c) standardizing spatial zoning schemes to improve between-study comparability, and (d) including defensive outcomes (e.g., clearances, transitions, counterattacks) to capture the dual nature of set pieces. Moreover, tracking and positional data and qualitative tactical analysis (Plakias et al., 2025) could help model movement dynamics and further explain how delivery type interacts with player behavior. Stratifying analyses by competition type and considering women's competitions would also contribute to a more comprehensive understanding of corner kick effectiveness across contexts.

CONCLUSION

This meta-analysis investigated the offensive effectiveness of inswinging and outswinging corner kicks in professional soccer. By synthesizing data from 12 studies across multiple competitions and using robust statistical techniques, we found no significant difference in goal conversion between the two delivery types but a clear advantage for outswinging corners in producing final attempts, particularly in domestic leagues. These findings highlight an underexplored tactical dimension of set pieces and provide the first meta-analytic evidence. One of the main strengths of this study is its methodological rigor, including the use of log odds ratios, a random-effects model to account for heterogeneity across competitions, and subgroup analysis by competition type. Furthermore, the novelty of applying meta-analysis to this specific aspect of football tactics represents a significant contribution to the field. However, limitations include the relatively small number of available studies and the exclusion of non-English or unpublished literature due to the constraints of the original systematic review. This research holds value for performance analysts and coaches in elite football and the broader scientific community focused on sports analytics and tactical modeling. By identifying evidence-based differences in offensive potential based on delivery type, teams can make more informed decisions about set-piece routines, potentially increasing scoring chances and reducing exposure to counterattacks. Practically, the findings suggest that coaches may consider favoring outswinging deliveries, especially in domestic leagues, where the evidence indicates a higher likelihood of creating final attempts. Future research should expand on this work by including more analytical, contextual data (e.g., number of attackers in the box, marking systems, delivery zones), parallelly analyzing defensive strategies, and incorporating tracking data to model player movements. Additionally, establishing a consensus on the functional definitions of corner kick outcomes and standardizing spatial zoning methods would greatly enhance the comparability of future studies and support more comprehensive meta-analytic efforts.

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AUTHOR CONTRIBUTION STATEMENT

SP conceived and designed the study, conducted the statistical analysis, and drafted the manuscript. VA contributed to the design of the methodology, assisted with data interpretation, and provided critical revisions. GG supervised the analytical process, contributed to the interpretation of

findings, and reviewed the manuscript for important intellectual content. All authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

AI DISCLOSURE STATEMENT

The authors used ChatGPT (OpenAI) during the preparation of this work to improve the quality of the English language. After using the tool/service, the authors thoroughly reviewed and edited the content as needed and took full responsibility for the publication's content.

CONFLICTS OF INTEREST

The authors have no relevant financial or non-financial interests to disclose.

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