



# Association between goal kick strategies and the offensive outcome in the UEFA Euro 2020

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## ABSTRACT

**Purpose.** This study investigates the association between different goal kick strategies and the success of the offensive sequence in games of the Men's UEFA Euro 2020. The study hypothesis is that using the short pass as the goal kick strategy may generate more successful offensive sequences than the long pass strategy.

**Methods.** The data collection was accomplished by observing 595 goal kicks collected from 51 games of the referred competition. The analysed variables were the type of goal kick (short or long) and the result of the offensive sequence (successful and unsuccessful). These variables were collected through an observational instrument. The logistic regression and the association chi-square test were used to analyse the association between the type of goal kick and the offensive outcome.

**Results.** The results indicate significant associations between the variables 'type of goal kick' and 'result of offensive sequence' ( $p = 0.021$ ,  $z = 2.1$ ). The regression analysis revealed that the model accurately predicts 64% of the offensive outcome based on the goal kick strategy. The short goal kick strategy was related to the unsuccessful offensive sequences, and the long goal kick strategy was associated with the successful offensive sequences. These results are contrary to the initial study hypothesis.

**Conclusions.** This study concludes that the long goal kick strategy showed more efficiency than the short goal kick strategy in obtaining possession of the ball in the offensive half.

**Key words:** soccer, goal kick, performance analysis, game analysis, observational analysis.

## Introduction

Match analysis provides coaches with valuable information to enhance the training prescription and match strategy in elite soccer on individual and collective scales [1, 2]. In addition, observational instruments, based on gathering data from experts' assessments from recorded matches, are usually low cost and the data-gathering process requires less equipment than tracking systems. For this reason, observational instruments have been extensively adopted in the past decades to provide researchers and analysts with information from matches and training [3, 4].

The observational methodology consists of a scientific procedure in which observable behaviours are analysed in contextual situations [5]. Validated instruments that make it possible to detect associations be-

tween the criteria support this procedure [5]. The most relevant issue of such an approach is the possibility of gathering information from the real world in which the behaviours occur, capturing the whole contextual and environmental influences on the observed output [5]. Previous studies adopted observational instruments to analyse the offensive phase of soccer matches under different research questions, such as the creation of goal-scoring opportunities [1, 6, 7] and the influence of ball recovery patterns on offensive sequences [8]. However, studies on the start of the offensive phase, including the goal kick, are scarce.

Observational instruments were adopted in studies trying to identify playing patterns in different game phases, including the set pieces. For example, studies on free kicks, penalty kicks, corner kicks, and throw-ins are available in the literature [9–11]. Corner kicks

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were also reported to be the most frequent source of goals compared to other set pieces [12]. However, the goal kick, a set-piece that occurs seventeen times on average in a match [13] and might represent the start of the whole offensive process of the team, has been under-investigated. This might be due to the excessive focus on goal-related actions in previous research, neglecting the beginning of the offensive process. Understanding behaviours inherent to different goal kick strategies might benefit coaches by improving their training of players and teams for such a set piece.

One consequence of knowing soccer's game-related characteristics is the ability to better design training contexts. In the training context, changing the rules of the tasks is supposed to impact players' and teams' behaviours [14–17]. In game contexts, rules also change, which might impact players' actions. 'Law changes' were adopted by the International Football Association Board and became effective from the 2019/20 season, which have directly and positively affected the way the game is played. As stated in Law 16, 'the ball is in play when it is kicked and clearly moves', instead of being required to leave the penalty box, as established by the previous version [18]. While the opponents still needed to wait outside the penalty box, players from the attacking team could wait for the goal kick inside the penalty box. Consequently, the team in possession of the ball can receive the first pass without effective pressure from the opposing team, which was impossible under the previous version of the game's laws. This change in the rule may have impacted players' behaviours. However, to the best of our knowledge, there are no available studies on the efficacy of different goal kick strategies in elite soccer.

Concerning the offensive phase, a previous study showed that goal kicks start 6.3% of the offensive sequences [7]. Another study analysed the start and end of goal-scoring opportunities in Major League Soccer and found that 7.5% of the goal-scoring opportunities started in goal kicks [19]. However, those studies did not consider the different goal kick strategies that teams can adopt. Regarding the build-up play (such as the offensive sequence started by a goal kick), previous studies identified that 72.6% of the goal-scoring opportunities are initiated by non-penetrative actions (those technical actions in which no opponents are being overcome directly, such as passing in a goal kick) [19]. Also, 85.9% of the build-up attacking units that generated goal-scoring opportunities during the knockout phase of the 2010 FIFA World Cup were characterised by short passes connecting the defensive and offensive lines of the team [7]. Another study

showed that the percentage of successful short passes was higher than long passes in the Italian Serie A [20]. These studies may indicate the importance of a short-pass goal kick strategy to obtain goal-scoring opportunities in soccer. That strategy could be even more successful when considering the recent change in the game's law, which allowed the first pass to be received by the offensive player with no pressure from the opposing team. This hypothesis, however, has not yet been tested in the literature.

Analysing game patterns in top-level competitions allows researchers to elucidate tendencies that can guide game patterns worldwide in the upcoming years. At this point, the UEFA Euro can be considered the second most relevant national-teams competition globally, which indicates the relevance of analysing teams' and players' behaviours in such a competition. Previous studies emphasised World Cups [21–23], while few have been published in other national team competitions. Nevertheless, no previous study examined goal kick patterns and their relationship with successful offensive actions. Therefore, this topic remains a gap in the literature and requires further attention. Based on this rationale, this study will investigate the association between goal kick strategies and the outcome of offensive sequences in the UEFA Euro 2020.

## Material and methods

### Sample

The current study sample was non-probabilistic and comprised 595 goal kicks collected over 51 games in the Men's UEFA Euro 2020, played in 2021, due to issues related to COVID-19. Two expert match analysts analysed the games from August to November 2021. This competition was selected as it represents one of the most globally relevant and therefore has the potential to dictate tendencies in elite soccer. The sample comprised all the goal kicks observed in all the matches of the competition, including those that occurred in extra time during the knockout phase. These goal kicks were manually trimmed from the original videos by the match analysts.

### Procedures

The observational analysis was conducted by analysing the videos publicly broadcast during the competition and recorded for scientific purposes by the researchers. The data were organised into a Microsoft Excel spreadsheet. Goal kicks were excluded when

the video occluded part of the initial action of the players (for example, in replays).

The observational instrument comprised two criteria: the type of the goal kick (short or long) and the offensive outcome (successful or unsuccessful). The definitions of each criterion are presented below.

*Type of goal kick*

Goal kicks were classified into two categories (long and short) according to the distance the first pass covered. Specifically, an imaginary line was drawn from the end of the penalty area (16.5 metres from the end line) to the sideline of the field of play. When the first player to touch the ball after the goal kick was inside this area, the goal kick was classified as ‘short’. The goal kick was classified as long when this first touch took place in front of the 16.5-metre line. Figure 1 shows a representation of these spatial references. This variable is nominal.

*Offensive outcome*

The offensive sequence corresponded to the interval between the start of the offensive process (goal kick) and at least one of the four following events: (a) the ball leaves the pitch; (b) the opponent recovers the ball and touches it consecutively three times; (c) the opponent

recovers the ball and successfully passes it to a teammate; (d) there is a violation of the game’s rules (off-sides, for example) [24, 25]. Each offensive sequence was classified as successful or unsuccessful. An offensive sequence was considered successful when the team kept the ball possession until the offensive midfield and performed: (a) three consecutive touches of the ball in the offensive midfield; (b) a successful forward pass in the offensive midfield; (c) awarded a set piece (a foul kick or a corner kick, for example) in the offensive midfield. On the other hand, if the team loses the ball before performing at least one of the three criteria above, or even when it keeps the ball through a set piece, but in the defensive midfield, this offensive sequence is considered unsuccessful. This variable is nominal.

Data quality

To ensure the quality of the observations, 99 (20%) goal kicks were randomly selected for reanalysis by the same original researcher (intra-observer agreement) and by a different researcher (interobserver agreement). All match analysts have a bachelor’s degree in Physical Education and more than three years of working as match analysts. Cohen’s Kappa measure of agreement was calculated for both intra-observer and interobserver agreement, and the values showed satisfactory agreement (0.945 and 0.838, respectively).

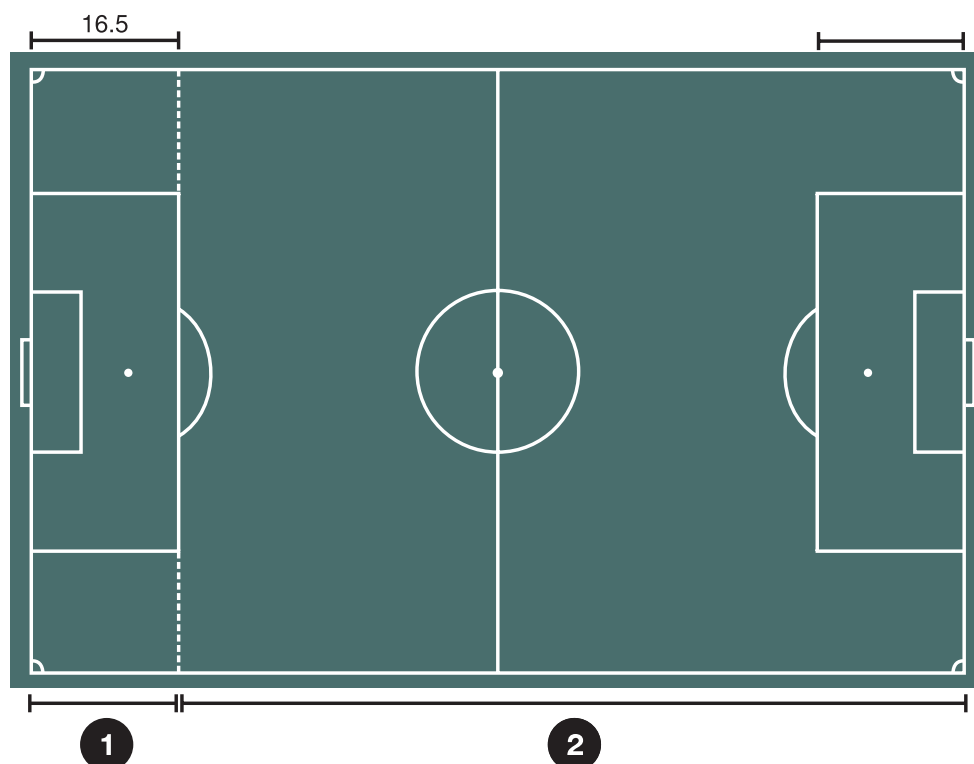


Figure 1. Types of goal kicks based on the ball’s destination: 1 – short, 2 – long

Data analysis

The association between the type of goal kick and the offensive outcome was analysed by the association chi-square test (contingency tables). The level of significance was set at 5%. To analyse the strength of the association between the variables, the adjusted residuals (*z* values) were analysed, being considered significant when above 1.96. A binary logistic regression (step-wise method) was also performed to estimate the strength of the relationship between the dependent behaviour (outcome) and the independent behaviour (goal kick strategy). The assumptions of linearity of the logit ( $p > 0.05$  for the interaction between the type of goal kick and logit of type of goal kick) and multicollinearity were tested and assumed (VIF = 1.000;  $p = 0.034$ ). The binary logistic regression followed the guidelines proposed in the literature [26]. All the analyses were performed using the IBM SPSS Statistics software (version 19; SPSS, Inc., Chicago, IL, USA).

Ethical approval

The conducted research is not related to either human or animal use.

Results

Table 1 shows the summary of the regression analysis. The logistic regression indicated that 64% of the outcome is predicted by the type of goal kick (-2LL = 772.802). The regression equation has  $B = 0.366$  (S.E. = 0.172), an  $\text{Exp}(B) = 1.442$  for the type of goal kick and a significant Wald statistic (4.503;  $p = 0.034$ ). Therefore, it is assumed that the strategy to start the offensive phase accurately predicts the outcome of the upcoming attacking unit.

Table 2 shows the number of offensive sequences classified as successful and unsuccessful for both goal kick strategies. The results indicated a significant association between the variables ( $p = 0.021$ ). Specifically, short goal kicks increased the frequency of unsuccessful offensive sequences ( $z = 2.1$ ), and long goal kicks increased the frequency of successful offensive

Table 2. Statistical values concerning the analysis of the association between the goal kick strategy and offensive outcome

Type	Success (adjusted residual)	Percentage of successful sequences	Unsuccess (adjusted residual)	Percentage of unsuccessful sequences
Short	89 (-2.1)	31.6	193 (2.1)	68.4
Long	125 (2.1)	39.9	188 (-2.1)	60.1
Total	214	36	381	64.0

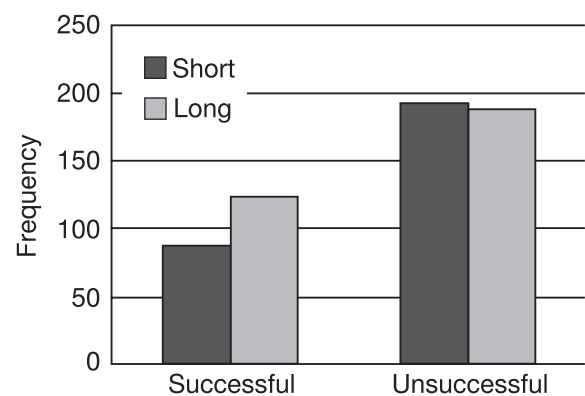


Figure 2. Distribution of successful and unsuccessful offensive sequences according to the goal kick strategy

sequences ( $z = 2.1$ ). Figure 2 represents the distribution of the data across the categories of analysis.

Discussion

Identifying successful behavioural patterns in soccer allows coaches and match analysts to improve the strategic planning and training prescription. For this reason, this study aimed to investigate how different goal kick strategies relate to success in offensive sequences during the UEFA Euro 2020. The results revealed significant associations between the investigated variables. Specifically, short goal kicks were negatively associated with success in the offensive sequences, contrary to the initial hypothesis.

In the literature, the criteria adopted to define success and failure in soccer are usually associated with goal-scoring opportunities [1, 27, 28] or penetrative actions [29]. However, in the current study, the offensive sequence was considered successful when the team kept the ball possession in the offensive midfield, which was also suggested in another observational instrument [30]. Consequently, the team’s distance to progress with the ball was at least 36 metres, which may have been considered a challenge for the team. Notwithstanding, it is essential to highlight that, in the present study, the number of long goal kicks was

Table 1. Binary logistic regression report

	95% CI for the odds ratio			
	B(SE)	Lower	Odds ratio	Upper
Included				
Constant	0.408(0.115)			
Type of goal kick	0.366(0.172)	1.028	1.442	2.022

higher than the short ones (313 versus 282). The UEFA Euro 2020 final technical report [31] showed that only four teams predominantly adopted the short goal kick strategy (Portugal, Italy, Hungary, and Spain). This indicates a tendency in the competition to prefer long goal kicks, which might explain the higher success rate of this strategy.

Besides the abovementioned rationale, a previous study investigated top European club competitions and found that 71.6% of the direct attack offensive sequences were successful, while 63.8% of the positional attack sequences had the same classification [28]. In that study, the direct play style was characterised when the offensive sequence lasted up to eighteen seconds and had no more than seven passes. Therefore, the long goal kick is likely to be adopted in teams preferring the direct play style, which implies that our results are supported by Sarmiento et al. [28]. However, we acknowledge that in some cases, after a short goal kick, teams might opt for a direct play style. For this reason, future studies are recommended to detail the current findings and expand them to other leagues and competitive levels.

Another interesting issue is related to the type of competition. It is usually pointed out in the literature that results in national teams' matches must be cautiously interpreted due to the low training time these teams receive compared to clubs in local leagues [23]. For example, top teams showed more ball touches, passes, and pass accuracy than bottom teams during the Spanish 'La Liga BBVA' 2012–2013 national championship [32], while this expectancy of a more ball-possession strategy was not reflected in changes in the network properties in the 2018 FIFA World Cup [23]. This indicates that national teams might have a different game style than clubs, in which the training time is significantly higher over the year. This issue is even more prominent when we consider that many national teams did not have enough training time to adapt their game strategy to the game's law change regarding the goal kick. Consequently, the low success rate of offensive sequences started with short passes might be a one-off event. As soon as teams and players get used to this new possibility, they might find solutions for safely keeping the ball in possession and progressing towards the opposing midfield.

The current study provided innovative information about the association between the goal kick strategy and the offensive outcome in elite soccer. Analysing all goal kicks from an entire competition is a strength of the current study. However, caution is required when generalising the results. Specifically, we did not ac-

count for contextual variables (tactical positioning of the defensive and offensive teams, match status, match period, and others). This implies that the current results might not be reproducible under other conditions. Further, only a top-level European competition was considered. Even though investigating top-level competitions is common in Sports Science [23], expanding the knowledge to lower-level competitions (such as local leagues) and youth academies would help to better understand the impact of goal kick strategies on offensive outcomes in soccer.

### Conclusions

We conclude that long goal kicks positively affect teams' ability to achieve the offensive midfield during elite soccer matches. Therefore, this result might help coaches and match analysts plan strategies for upcoming games. The current study showed that strategies for short goal kicks in top European national teams must be enhanced to improve the effectiveness of this action considering that the current laws of the game provide the possibility of starting offensive sequences from inside the team's own penalty box.

### Disclosure statement

No author has any financial interest or received any financial benefit from this research.

### Conflict of interest

The authors state no conflict of interest.

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