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KUBAYI, Alliance and STONE, Joseph <http://orcid.org/0000-0002-9861-4443>

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Alliance Kubayi & Joseph A. Stone

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Effect of the away goal rule on the technical performance of football teams in the UEFA Champions League

Alliance Kubayi [a] and Joseph A. Stone [b]

[a]Department of Sport, Rehabilitation and Dental Sciences, Tshwane University of Technology, Pretoria, South Africa; [b]Academy of Sport and Physical Activity, Sheffield Hallam University, Sheffield, UK

ABSTRACT

Despite significant debate surrounding UEFA's removal of the away goal rule in 2021, its impact on technical performance has not been studied. Therefore, this study aimed to investigate how selected technical performance indicators were impacted by the change in the away goal rule during the UEFA Champions League. Data were sourced via the Wyscout platform. The sample consisted of 112 UEFA Champions League games played during the knock-out stages of the competition, in which 56 games were played during seasons with an away goal rule (2017–2018 and 2018–2019) and 56 were played in seasons without an away goal rule (2021–2022 and 2022–2023). The findings showed that the removal of the away goal rule was accompanied by significant ($p < 0.05$) decreases in average pass length, long passes, progressive passes, passes to the final third, offsides, duels, duels won, and counterattacks. Furthermore, a significant ($p < 0.05$) interaction was found between the away goal rule and the leg of competition, affecting the number of counterattacks with shots. Therefore, UEFA should take cognisant of the present findings when considering the use of the away goal rule in future competitions.

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KEYWORDS
Tactics; match location; knock-out stages; passes; counterattacks

1. Introduction

Match analysis research is increasingly being adopted in football as a tool to provide coaches and players with crucial feedback and to inform their understanding of the most effective tactical strategies to guide the coaching process (Pearson et al., 2023). For example, studies have investigated various performance indicators related to passing sequences, possession, playing tactics, and contextual variables in football (e.g. Fernandez-Navarro et al., 2019; Gonzalez-Rodenas et al., 2020; Wang et al., 2022). Beyond the coaching process, notational analysis can also be used to examine the effects on the game of rule changes and whether these rule changes achieve the intended modification (Eaves et al., 2008).

Rule changes are typically implemented for safety, the ethos of the game, game development, commercial/media pressure, or entertainment (Arias et al., 2011;

CONTACT Alliance Kubayi kubayina@tut.ac.za Department of Sport, Rehabilitation and Dental Sciences, Tshwane University of Technology, Pretoria, South Africa

Williams et al., 2005). The focus of this study is the away goal rule introduced into UEFA competitions in the 1965/1966 season. The away goal rule decided the winner of a two-legged knockout match (i.e. two matches with a combined score where one is played at home and one away) when the two teams had scored an equal number of goals in aggregate. The rule granted victory to the team that scored more goals when away, allowing them to progress to the next round of the competition (UEFA, 2023).

This rule change was designed to encourage away teams to attack the home team and reduce the benefit of the away team tactic of focusing on defending, ideally resulting in a more active and entertaining match (Jost, 2021; Patterson, 2020; UEFA, 2021, 2023). However, recent years have seen calls to remove the away goal rule. For instance, Arsene Wenger, the former manager of Arsenal, made the following remarks after his team's elimination from the 2014–2015 UEFA Champions League by AS Monaco: "This rule has been created in the '60s to encourage the teams to attack away from home. Since that football has changed. The weight of the away goal is too big today" (Lawrence, 2015).

Furthermore, in case of a tie after regulation time, the home team will be at a disadvantage, as the away goals rule still applies if the second match goes into extra time (Jost, 2021). For example, after losing 1–0 in the first match in Spain, Liverpool F.C. hosted Atletico Madrid for the second match of their round of the 16 UEFA Champions League at Anfield on 11 March 2020. Liverpool scored in the first half to put the game into extra time. During these extra 30 minutes, Atletico Madrid scored three goals and won 4–2 in aggregate (Jost, 2021). Nevertheless, Diego Simeone, the Atletico Madrid coach, offered an unexpected response: "What I have to say, and will be saying at the next UEFA coaches' meeting, is what I think is unfair. Today we had 30 minutes of extra time to score. Liverpool never had that. We had 30 more minutes to score an away goal. The rule favoured us today but it might go against us in the future. Liverpool had 30 minutes fewer to score an away goal. That's wrong" (Chomyn, 2020).

To date, few published studies have examined the effect of removing the away goal rule on technical performance parameters in football. For example, although Waquil et al. (2020) examined the away goal rule in the Brazil Cup, their observations considered only matches that included the application of the rule. Furthermore, Bahamonde Birke's and Bahamonde Birke (2023) recent examination of elimination competition in football with and without the away goal implementation focused solely on match outcomes and goals scored. No data-led investigations have been conducted into how removing the away goal rule has impacted match style or technical performance. To address this gap, this study draws on objective analyses of key match and tactical variables to elucidate how the change to the away goal rule in the UEFA Champions League has affected various technical performance indicators. Based on the limited data to date (Bahamonde Birke & Bahamonde Birke, 2023), it was hypothesised the removal of the away goal rule would not change the number of goals scored by the away team. However, it was anticipated that more goals would be scored during the second leg of the competition than the first, regardless of rule changes.

2. Methods

2.1. Match sample

The sample included 112 UEFA Champions League games played during the knock-out stages of the UEFA Champions League – 56 games played during seasons with an away goal rule (2017–2018 and 2018–2019) and 56 played in seasons without the rule (2021–2022 and 2022–2023). Games played during the COVID-19 pandemic (2019–2020 and 2020–2021) were excluded because some games were played in empty stadiums or neutral locations. The final games of each competition were removed from the sample because they were held in neutral locations with one leg, meaning that the away goal rule did not apply. This study received ethical approval from the institutional research ethics committee.

2.2. Data source and technical variables

Data were sourced via the Wyscout platform, which gave the researcher permission to use its data. The study's technical performance variables included goals, shots, shots on target, passes, percentage of accurate passes, average passes per possession, average pass length, long passes, progressive passes, passes to the final third, percentage of ball possession, fouls, offsides, yellow cards, defensive duels, duels won, counterattacks, counterattacks with shots, corners, and free kicks. Data from "normal time" (i.e. 90 mins, plus stoppage time) were used in the sample. For matches that went into extra time (i.e. 30 extra minutes of play), this period of play was excluded from the analysis. Furthermore, the match outcome (i.e. win, lose, or draw) was based on the final score reached within regular time (i.e. 90 min plus stoppage time), meaning that matches that went into extra time and penalties were taken as draws. Table 1 shows the operational definitions of these technical indicators. Inter-observer reliability using Intraclass correlation was conducted to determine the reliability of the technical performance variables. One match was randomly chosen, analysed and compared with the data from the Wyscout platform. The values ranged from 0.93 to 1.00, demonstrating excellent reliability.

2.3. Data analysis

Data were analysed using SPSS (version 28), and the statistical significance level was set to $p < 0.05$. Descriptive statistics are reported as frequency counts, percentages, means, and standard deviations. The Kolmogorov – Smirnov test indicated that none of the technical performance indicators were normally distributed ($p < 0.05$). The Mann-Whitney U test was used to assess how the technical performance indicators differed between the competitions with and without the away goal rule. A generalised linear model (GLM) was calculated to determine whether removing the away goal rule significantly affected the teams' technical performances. The model was specified as follows:

$Y_i = \beta_{0i} + \beta_{1i}$. Away goal rule $+ \beta_{2i}$. Match location $+ \beta_{3i}$. Away goal rule. Match location $+ \varepsilon_i$

Table 1. Operational definitions of the technical variables (further information of each variable can be found here: https://dataglossary.wyscout.com.).

Variable	Definitions
Goals	A goal scored as specified in law 10.1 of the IFAB Laws of the Game.
Shots	An attempt towards the opposition's goal with the intention of scoring.
Shots on target	A shot is considered successful if it lands on the target of the goal. A shot that hits the frame of the goal is not considered successful.
Number of passes	An attempt to pass the ball to a teammate.
Accurate passes (%)	A pass is considered successful if a teammate receives the next touch of the ball.
Average passes per possession	The mean number of completed passes per possession.
Average pass length	Mean pass length in metres.
Long passes (ground 45 or high 25)	A ground pass longer than 45 metres or a high pass longer than 25 metres.
Progressive passes	A forward pass that attempts to move a team significantly closer to the opponent's goal. A pass is considered progressive if the distance between the starting point and the next touch is: • at least 30 metres closer to the opponent's goal if the starting and finishing points are within a team's own half • at least 15 metres closer to the opponent's goal if the starting and finishing points are in different halves • at least 10 metres closer to the opponent's goal if the starting and finishing points are in the opponent's half
Passes to final third	Any pass that originates outside the final third and where the next ball touch occurs within the final third.
Fouls	An offence committed by a player according to law 12 (1, 3) of the IFAB Laws of the Game.
Offsides	As described in law 11 of the IFAB Laws of the Game. Only offsides that are whistled by the referee and where the game is resumed with an indirect free kick awarded to the opposite team are labelled as offsides.
Yellow cards	Disciplinary action by the referee. Indicated by showing a yellow card according to law 12.3 of the IFAB Laws of the Game.
Duels	A challenge between two players to gain control of the ball, progress with the ball, or change its direction.
Defensive duels	When a defender attempts to dispossess an opposition player to stop an attack.
Duels won	If the player stopped the progression of the attacking player with the ball and did not commit a foul, the duel is considered won.
Counterattacks	A transition of possession from the opposing team, where the team is transitioning quickly from a defensive to an attacking phase and trying to catch the opponent out of their defensive shape.
Counterattacks with shots	A counterattack (defined above) that ends in the team taking a shot at the goal.
Corners	A corner kick as specified in law 17 of the IFAB Laws of the Game.
Free kicks	The execution of a free kick according to law 13 of the IFAB Laws of the Game.

Y_i refers to all technical performance indicators. The away goal rule is a categorical variable, assigned a value of one if the rule was implemented and zero if not. Similarly, match location is a dichotomous variable that equalled one if the team was playing at home and zero for away matches. Furthermore, as a game's location may influence the away goal rule's impact on technical variables, the interaction term of these two independent factors was included to indicate potential association. β_{0i} denotes a constant term, and $\beta_{1i,}$ $\beta_{2i,}$ and β_{3i} represent the model coefficients that need to be estimated. ε_i represents random error.

The second model was specified as follows:

$$Y_i = \beta_{0i} + \beta_{1i}.\text{Away goal rule} + \beta_{2i}.\text{Leg of competition} + \beta_{3i}.\text{Away goal rule}.\text{Leg of competition} + \varepsilon_i$$

In this model, match location was replaced by leg of competition (0 = first leg, 1 = second leg). Each technical performance variable was initially fitted with a GLM using a Poisson

distribution, and overdispersion was checked (Cameron & Trivedi, 1990). Goals, shots, shots on target, passes, percentage of accurate passes, fouls, offsides, defensive duels, duels won, counterattacks, counterattacks with shots, corners, free kicks, percentage of accurate passes, average passes per possession, average pass length, long passes, progressive passes, and passes to the final third were subjected to a negative binomial distribution. In contrast, yellow cards were subjected to a Poisson distribution.

3. Results

3.1. Match outcome

The outcomes of the first leg of matches were not affected by the away goal rule. The home team won 43% of matches, lost 36%, and drew 21% (see Figure 1). However, during leg two, there was an increase in the number of losses for the home team when the away goal rule was in place (50%) compared to games when it was not. Five (8.9%) of the matches played with the away goal rule in place decided which team would progress to the next stage of the competition.

3.2. Technical performance indicators

Table 2 indicates the change in the technical performance variables between the two conditions (i.e. when the away goal rule was and was not applied) during the UEFA Champions League. The results show that the removal of the away goal rule was followed by significant ($p < 0.05$) decreases in average pass length, long passes, progressive passes, passes to the final third, offsides, defensive duels, duels, duels won, and counterattacks. Table 3 presents the estimated results of the technical variables' GLM for the away goal rule, match location, and the interaction between the two variables. No significant ($p > 0.05$) differences were found in any of the

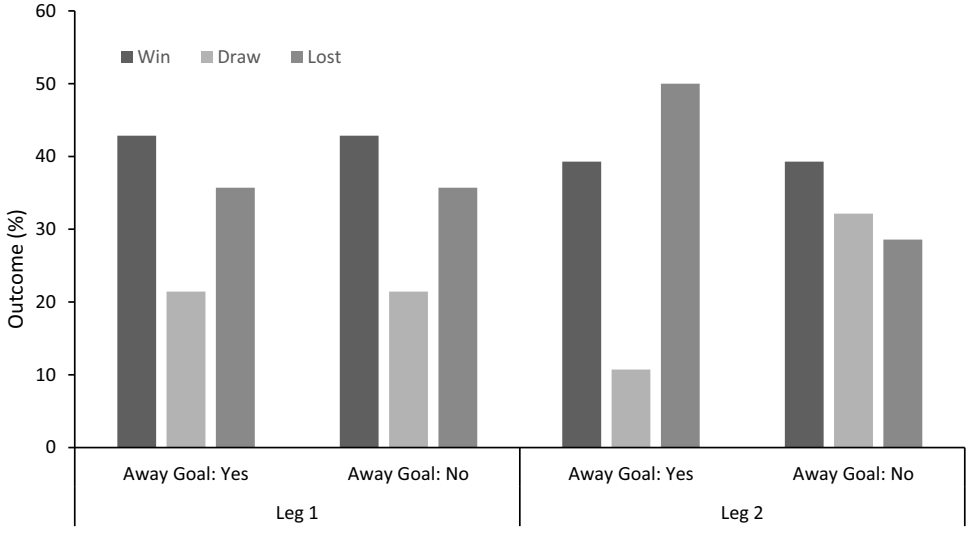

Figure 1. Home team outcome across the two legs and away goal implementation.

Table 2. Technical performance indicators between when there was away goal and no away goal rule.

	Away goal	No away goal	Z	Sig.
Goals	1.60 ± 1.47	1.31 ± 1.45	−1.70	0.90
Shots	12.12 ± 5.24	11.30 ± 4.98	−0.87	0.38
Shots on target	4.46 ± 2.62	4.05 ± 2.55	−1.31	0.19
Passes	480.99 ± 143.64	480.08 ± 130.12	−0.60	0.59
Accurate passes (%)	84.33 ± 4.51	85.20 ± 4.44	−1.80	0.07
Average passes per possession	4.65 ± 1.50	4.93 ± 1.40	−2.37	0.32
Average pass length	19.70 ± 1.58	18.48 ± 1.54	−5.39	0.00**
Long passes (ground 45, or high 25)	47.63 ± 12.23	40.84 ± 9.62	−4.21	0.00**
Progressive passes	83.15 ± 19.40	64.87 ± 14.18	−7.36	0.00**
Passes to final third	60.73 ± 19.70	49.90 ± 20.53	−4.27	0.00**
Fouls	11.69 ± 3.57	11.63 ± 3.65	−0.22	0.83
Offsides	2.34 ± 1.93	1.77 ± 1.53	−2.07	0.03*
Yellow cards	1.98 ± 1.22	1.95 ± 1.35	−0.55	0.58
Defensive duels	75.03 ± 14.14	64.35 ± 13.77	−5.15	0.00**
Duels	222.16 ± 33.21	190.13 ± 31.68	−6.60	0.00**
Duels won	105.78 ± 17.66	91.79 ± 16.66	−5.41	0.00**
Counterattacks	3.49 ± 2.57	2.37 ± 2.02	−3.44	0.00**
Counter attacks with shots	1.21 ± 1.34	0.91 ± 1.02	−1.55	0.12
Corners	4.78 ± 2.63	4.56 ± 2.88	−0.74	0.90
Free kicks	2.12 ± 1.56	2.06 ± 1.38	−0.14	0.38

*$p < 0.05$; **$p < 0.01$.

Table 3. The introduction of away goal rule on match location using GLM.

	Goals	Shots	Shots on target	Passes	Accurate passes
Away goal rule (β_1)	0.19	0.07	−0.02	0.02	−0.01
Match location (β_2)	0.20	−0.27	0.10	0.10	0.01
Away goal rule*Match location (β_3)	0.01	0.01	0.21	−0.03	−0.00
Constant term (β_0)	0.16	2.28**	1.35**	6.12**	4.43**
	Long pass	Passes to final third	Progressive passes	Average passes per possession	Average pass length
Away goal rule (β_1)	0.13	0.22	0.25	0.04	0.02
Match location (β_2)	0.01	0.19	0.08	0.19	0.03
Away goal rule*Match location (β_3)	0.04	−0.05	−0.01	−0.07	0.09
Constant term (β_0)	3.70**	3.81**	4.13**	5.99**	7.41**
	Fouls	Offsides	Yellow cards	Defensive duels	Duels
Away goal rule (β_1)	0.03	0.22	0.11	0.12	0.16
Match location (β_2)	0.03	0.14	0.00	−0.09	0.00
Away goal rule*Match location (β_3)	−0.04	0.10	−0.20	0.06	0.00
Constant term (β_0)	2.44**	0.50*	0.66**	4.21**	5.25*
	Duels won	Counterattacks	Counterattacks with shots	Corner kicks	Free kicks
Away goal rule (β_1)	0.13	0.32	0.14	0.11	−0.08
Match location (β_2)	0.01	−0.07	−0.32	0.31	0.25
Away goal rule*Match location (β_3)	0.03	0.13	0.30	−0.10	0.19
Constant term (β_0)	4.51**	0.89**	0.05	1.35**	0.59**

*$p < 0.05$; **$p < 0.01$.

technical performance variables. Table 4 shows the estimated results of the GLM for the away goal rule, leg of competition, and the interaction between the two variables. The results showed significant ($p < 0.05$) differences in the numbers of counterattacks and counterattacks with shots depending on the application of the away goal rule. A further significant ($p < 0.05$) interaction was found between the

Table 4. The introduction of away goal rule on the leg of competition using GLM.

	Goals	Shots	Shots on target	Passes	Accurate passes
Away goal rule (β_1)	0.24	0.09	0.09	0.01	−0.01
Leg of competition (β_2)	−0.15	0.01	−0.26	0.02	0.01
Away goal rule* Leg of competition (β_3)	−0.09	−0.05	−0.01	−0.01	0.00
Constant term (β_0)	0.05	2.42**	1.41**	6.16**	4.44**
	Long pass	Passes to final third	Progressive passes	Average passes per possession	Average pass length
Away goal rule (β_1)	0.10	0.20	0.23	0.00	0.02
Leg of competition (β_2)	0.01	0.01	0.02	−0.03	−0.10
Away goal rule* Leg of competition (β_3)	0.11	−0.00	0.03	0.00	0.09
Constant term (β_0)	3.70**	3.91**	4.16**	6.11**	7.47**
	Fouls	Offsides	Yellow cards	Defensive duels	Duels
Away goal rule (β_1)	0.01	0.30	0.01	0.17	0.16
Leg of competition (β_2)	−0.02	−0.16	−0.09	0.03	0.02
Away goal rule* Leg of competition (β_3)	−0.01	−0.05	0.02	−0.03	−0.01
Constant term (β_0)	2.46**	0.65**	0.71**	4.15**	5.24**
	Duels won	Counterattacks	Counterattacks with shots	Corner kicks	Free kicks
Away goal rule (β_1)	0.15	0.58**	0.67*	0.10	−0.04
Leg of competition (β_2)	0.01	0.27	−0.32	0.11	−0.03
Away goal rule* Leg of competition (β_3)	−0.01	−0.36	0.75*	−0.10	0.12
Constant term (β_0)	4.51**	0.72**	−0.34	1.46**	0.74**

*$p < 0.05$; **$p < 0.01$.

away goal rule and the leg of competition on the number of counterattacks with shots.

As Figure 2 indicates, when the away goal rule was in play, counterattacks were used more frequently overall and increased in number from leg one to two. Conversely, playing without the away goal rule led to a decrease in counterattacks. Figure 2 provides further descriptive indications of possible metrics which changed across conditions but were not statistically different. For example, home teams scored the fewest goals when no away goal rule was in place. While more goals were generally scored in the second leg than the first, home teams in particular scored most goals in the second leg when the away goal rule was in place. Home teams also took the most shots; this also increased in the second leg. Away teams reduced their number of shots in the second leg when the away goal rule was removed.

4. Discussion

This research has examined how the change to the away goal rule during the UEFA Champions League has affected technical performance indicators. The findings showed that the removal of the away goal rule resulted in decreases in average pass length as well as numbers of long passes, progressive passes, passes to the final third, offsides, duels, duels won, and counterattacks. Furthermore, a significant interaction was found between the away goal rule and the leg of competition, affecting the number of counterattacks with shots. Home teams won slightly more matches in leg one regardless of whether the away goal rule was in place. However,

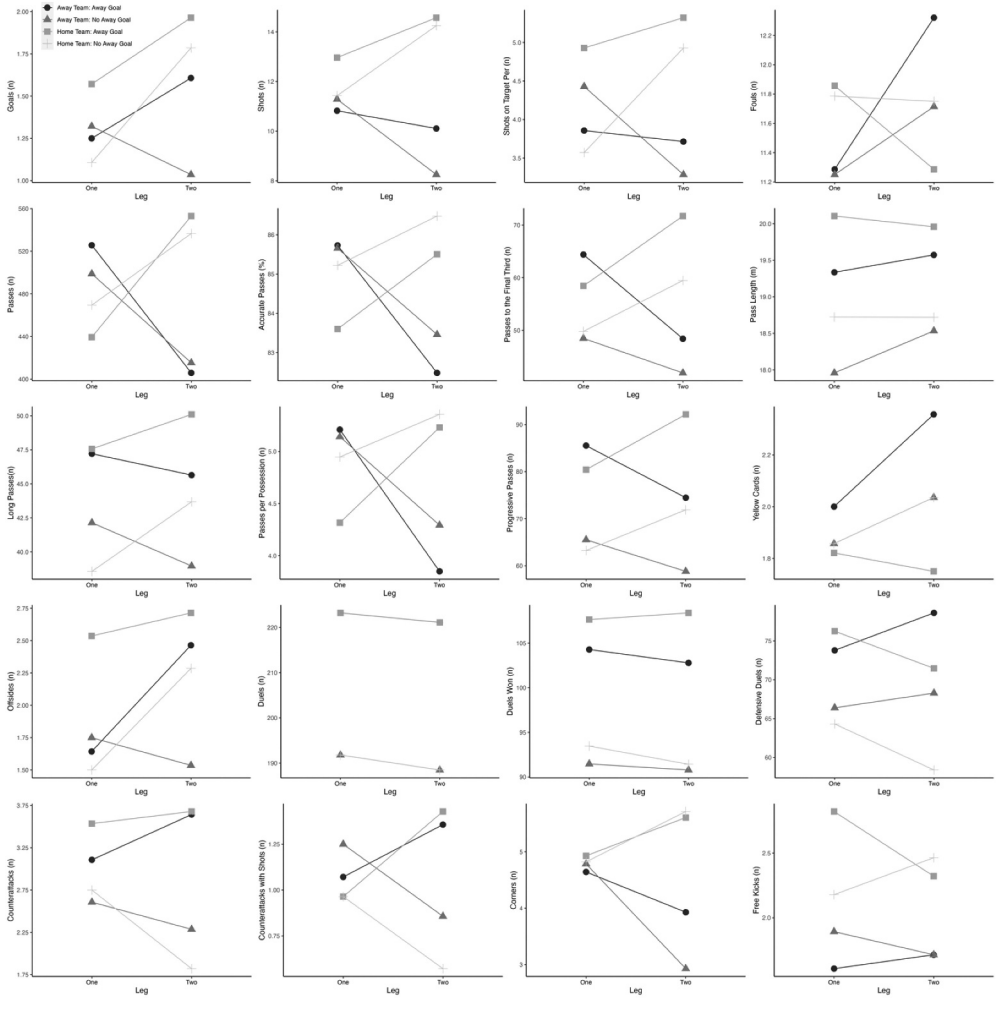

Figure 2. Technical variables displayed as mean values per match calculated on away goal rule, leg, and location.

the home team lost more often in the second leg when the away goal rule was in place. Since the removal of the away goal rule, home teams now draw more often than they lose. Bahamonde Birke and Bahamonde Birke (2023) similarly reported that more goals were scored in the second leg of competition. The descriptive findings here tentatively support that more goals were scored in the second leg than in the first leg when the away goal rule was in place (see Figure 2), but this did not reach statistical significance and thus should be interpreted with caution. This study's findings suggest that teams preferred to play more open, end-to-end games and were more aggressive in their attacks to score goals when the away goal rule was still in place.

The results demonstrate that the rule change has influenced some of the game's performance metrics. The removal of the away goal rule was accompanied by a significant reduction in the average pass length, progressive passes, passes to the

final third, and long passes. This suggests that teams adopted a more conservative playing style and more often looked for shorter, less risky passes. Maintaining possession of the ball through short passing is a more reliable means of moving the ball into the opposing half to create goal-scoring opportunities than using less accurate, long passes (Liu et al., 2015; Oberstone, 2009). Hence, without the urgency to score more goals when playing away, teams may look for more controlled and "safer" attack options. The reduction in the number of duels prompted by the removal of the away goal rule indicates that players are taking fewer defensive actions. This could be linked to the reduction in attacking passes, which results in less need for defensive actions.

The number of counterattacks decreased after removing the away goal rule, whereas counterattacks increased between leg one and leg two when the away goal rule was in place. This finding suggests that the team trailing might "sit back" in the first leg and hope for a better result in the second using a more positional attack style in which teams perform more passes and circulate the ball more in width than in depth, employing a more cadenced play in terms of intensity and ball speed circulation. Whereas the team being outscored is forced to play aggressively in the second leg to avoid the risk of elimination (Bahamonde Birke & Bahamonde Birke, 2023). Similarly, the number of counterattacks decreased after the away goal rule was removed. This seems to suggest that teams are not looking to "push" to win the match via the away goal rule, but are rather more comfortable playing conservatively towards extra time.

The significant decrease in the number of offsides since removing the away goal rule may have been caused by a shift to a less attack-focused style of play that results in teams having fewer chances to be in an offside position. The reduction in progressive and final third passes would seem to confirm this. However, this finding could also be linked to the introduction of Video Assisted Referees (VAR) into the Champions League, which may have impacted the number of offside decisions taken (some incorrectly). For example, previous research (Kubayi et al., 2022) has reported a decline in the number of offsides called by referees following VAR implementation. The authors explained that this may be because assistant referees have been instructed not to raise their flags for close offside calls, allowing play to continue. This is because VAR can review an incident and reverse a goal if an offside occurred before it (Kubayi et al., 2022). Players may also have adjusted their play to account for VAR.

5. Strengths and limitations of the study and recommendations for future research

Despite this study's contribution to understanding how removing the away goal rule has affected technical performance indicators in the UEFA Champions League, it does have some limitations that should be considered when interpreting its findings. The limited number of seasons covered by the study restricts the results' generalisability. However, it should be noted that the away goal rule was in place until the start of the 2021–2022 season. Future research could examine how technical and tactical metrics may have changed over time from the introduction of the away goal rule in 1965 to its removal in 2021. Furthermore, given the lack of research into the

removal of the away goal rule, there is no basis on which to compare the results of this study with other recent investigations. Future studies should investigate how the UEFA Champions League's removal of the away goal rule has changed the game's physical demands. Other research approaches, such as mixed-method design (quantitative and qualitative methods), could be used to fully explore coaches' and fans' perceptions of the away goal rule to obtain further rich data and in-depth information.

6. Conclusion

This study has investigated how technical performance metrics have changed following the UEFA Champions League's removal of the away goal rule. The results showed that removing the away goal rule has impacted several of the game's technical performance parameters, leading to significant reductions in average pass length, long passes, progressive passes, passes to the final third, offsides, defensive duels, duels, duels won, and counterattacks. The results demonstrate that removing the away goal rule has decreased the technical performance of teams in the UEFA Champions League.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Alliance Kubayi http://orcid.org/0000-0002-8370-3056
Joseph A. Stone http://orcid.org/0000-0002-9861-4443

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