

COVID-19 Pandemisi Sonrasında Futbolda Değişen Oyuncu Değişikliği Kuralının Takım Performansına Etkileri Üzerine Bir İnceleme**RESEARCH ARTICLE**

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ÖZET

Bu çalışma, COVID-19 pandemisini takiben profesyonel futbol liglerinde uygulamaya konan güncellenmiş beş oyuncu değişikliği kuralının, dört büyük Avrupa ligi olan İngiltere Premier Ligi (İPL), Bundesliga, Serie A ve La Liga'daki takım performansları üzerindeki etkilerini incelemektedir. Küresel bir öneme sahip olan futbol, pandemi sürecinde ciddi kesintilere maruz kalmış; bu durum, oyuncu yönetimi ve maç taktikleri konusunda yeni stratejilerin geliştirilmesine yol açmıştır. Sıkışık maç takvimlerinde oyuncuların yorgunluğunu ve sakatlık risklerini azaltmak amacıyla uygulamaya konan beş oyuncu değişikliği kuralı, antrenörler için merkezi bir taktiksel araç haline gelmiştir.

Araştırma, 2019/2020 sezonuna ait maç verilerini kullanarak pandemi öncesi ve sonrası dönemlerdeki takım performanslarını karşılaştırmakta; oyuncu değişikliği kullanım modellerini ve bu modellerin lig sıralamaları ile Avrupa kupalarına katılım üzerindeki etkilerine dair korelasyonları incelemektedir. Veriler, Opta Sports, FBref.com ve www.statsperform.com gibi dijital platformlardan temin edilmiştir. Bulgular, lig sıralamasını koruyan veya yükselten takımlar ile sıralamada gerileyen takımlar arasında oyuncu değişikliği stratejileri açısından anlamlı farklılıklar olduğunu ortaya koymaktadır. Örneğin, İngiltere Premier Ligi'nde sıralamasını koruyan takımlar maçların 42,4%'ünde beş oyuncu değişikliği hakkının tamamını kullanırken, sıralamada gerileyen takımlarda bu oranın yalnızca 11,1% olduğu görülmüştür. Bundesliga ve Serie A'da da benzer eğilimler gözlemlenmiş, bu da rekabetin yüksek olduğu ortamda oyuncu değişikliği stratejilerinin önemini vurgulamaktadır.

Bu çalışma, antrenörler ve spor bilimcileri için değerli içgörüler sunmakta; elit sporda kriz dönemlerinde takım performansını optimize etmede etkili bir oyuncu değişikliği yönetiminin ne denli kritik bir rol oynadığını ele almaktadır.

Anahtar Kelimeler: Futbolda Taktik, Takım Performansı, Oyuncu Değişikliği Stratejileri

An Examination of the Impact of the Updated Substitution Rule on Team Performance in Football After the COVID-19 Pandemic**ABSTRACT**

This study examines the impact of the updated five-substitution rule, implemented in professional football leagues following the COVID-19 pandemic, on team performance in the four major European leagues: the English Premier League (EPL), Bundesliga, Serie A, and La Liga. As a global phenomenon, football was significantly disrupted during the pandemic, leading to the development of new strategies in player management and match tactics. The five-substitution rule, introduced to reduce player fatigue and injury risk amid congested match schedules, has become a central tactical tool for coaches.

Using match data from the 2019/2020 season, this research compares team performance before and after the pandemic, analyzes substitution usage patterns, and explores the correlation between these patterns and changes in league standings and participation in European competitions. Data for the study were obtained from digital platforms such as Opta Sports, FBref.com, and www.statsperform.com. The findings reveal significant differences in substitution strategies between teams that maintained or improved their league positions and those that experienced a decline. For example, in the English Premier League (EPL), teams that retained their league positions used all five substitutions in 42.4% of matches, whereas teams that dropped in the standings did so in only 11.1% of matches. Similar trends were observed in the Bundesliga and Serie A, highlighting the importance of substitution strategies in highly competitive environments.

This study provides valuable insights for coaches and sports scientists, demonstrating how effective substitution management plays a critical role in optimizing team performance during crisis periods in elite sport.

Keywords: Football Tactics, Team Performance, Substitution Strategies

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Introduction

Football, since the 20th century, has continuously increased its global influence, becoming one of the most universally shared concepts of modern humanity. FIFA, the international federation of football, has more member nations than the United Nations (Waalkes, 2018). As a global phenomenon, it is inevitable that football would be affected by social events happening around the world. In December 2019, pneumonia cases were identified in Wuhan, China, and by February 2020, a new zoonotic virus was identified, which eventually evolved into a coronavirus disease named COVID-19. The disease rapidly spread, posing serious health threats on a global scale. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic (Chowdhury, 2022; Hertelendy & Waugh Jr, 2023; World Health Organization, 2020; Zanke et al., 2020). To control the pandemic, widespread measures were introduced, which deeply disrupted the fabric of social life, leading to the near-total suspension of activities such as sports, arts, and tourism. Governments implemented strict measures like border closures and lockdowns to curb the spread of the infection, and these measures inevitably and directly impacted social phenomena like sports (Al-Mhanna et al., 2023; Corsini et al., 2020; Donnelly & Darnell, 2023; Kromka, 2023). The industrial aspect of sports, coupled with the massive economic interests in the field, also led to demands for the continuation of competitions during the pandemic. However, during the period of uncertainty caused by the pandemic, many sports organizations either postponed or prematurely ended their competitions based on the existing schedules (Alieva et al., 2024; Rankin & Heron, 2021; Scerri & Grech, 2021). Particularly in football, decisions

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regarding the completion of major European leagues were made by the relevant federations. Prominent leagues such as Spain's La Liga, Germany's Bundesliga, England's Premier League, Italy's Serie A, and France's Ligue 1, along with prestigious tournaments including the UEFA Champions League, EURO 2020, the Tokyo 2020 Olympics, and Türkiye's Super League, were all resumed after pauses, under specific health precautions (Castagna et al., 2022).

Football is among the most widely followed sports worldwide. In sports science literature, its tactical, technical, and physiological aspects have been extensively studied. Key elements such as tactical discipline, team formation, training quality, and opponent analysis play a crucial role in performance. Among these, the substitution rule stands out as a critical strategic tool that can directly influence the outcome of a match (García-Aliaga et al., 2023; Leite & Figueredo, 2020; Wei et al., 2024). The rules of football have evolved over time to optimize game dynamics and player health. One key development in this process is the substitution rule, which holds a significant place in the history of football. First introduced by FIFA in 1958, the rule initially allowed substitutions only for the goalkeeper and one outfield player (Kent et al., 2013). By the 1970 FIFA World Cup, the rule was expanded to two outfield players, enabling both injury replacements and tactical changes (Varela-Quintana et al., 2016). In 1994, the number of substitutions increased to three, laying the foundation for modern football by enhancing tactical flexibility and reducing injury risk (Leite & Figueredo, 2020; Varela-Quintana et al., 2016; Lorenzo-Martínez et al., 2022).

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Substitutions are crucial for optimizing in-game performance and gaining strategic advantage (Ayabe et al., 2022). They impact team success physiologically, technically, tactically, and statistically (Amez et al., 2021; Silva & Swartz, 2016). During the COVID-19 pandemic, increasing the number of allowed substitutions positively affected physical performance, as it enabled more frequent player rotations, helping to maintain intensity and reduce injuries (García-Aliaga et al., 2023). Generally, substitutes perform better in high-intensity running compared to starters, as they are fresher and able to maintain speed more effectively, while players who complete the entire match may not reach their maximum output (Sydney et al., 2023). Tailored warm-up routines further enhance substitute readiness and minimize injury risk (Hills et al., 2020). Especially during congested fixture periods, substitution-based fatigue management is essential for sustaining performance and preventing injuries (Schlumberger & Beck, 2022). Monitoring metrics such as total distance and acceleration frequency provides insights into player fatigue, supporting more informed substitution decisions (Kjøsnes, 2014).

From a tactical perspective, substitutions are among the most critical decisions that can influence match outcomes. Coaches frequently adjust strategies based on match flow—bringing on a defensive player to maintain a lead, or an attacker to chase a goal (García-Aliaga et al., 2023; Lorenzo-Martínez et al., 2022). These changes allow teams to adapt formations and respond quickly to opponents' tactics (Iglesias et al., 2022). Introducing key or high-morale players at crucial moments can also strengthen a team both physically and mentally (Rey et al., 2015).

Statistically, substitutions significantly influence team performance and match outcomes. Studies show that well-timed substitutions improve physical and technical performance, enhancing results (Gomez et al., 2016). Substitutes often outperform starters in sprinting and high-intensity actions, and they help turn contextual disadvantages—like match location or opponent quality—into strategic opportunities (Caballero et al., 2017). Historical substitution data further supports future strategic planning by helping coaches make better decisions (Bradley et al., 2014).

The literature includes many studies examining the impact of substitutions on team dynamics (Gomez et al., 2016; Hills et al., 2020; Iglesias et al., 2022; Wei et al., 2024). For instance, Carling et al. (2010) highlighted how well-timed substitutions can significantly contribute to winning outcomes.

During the COVID-19 pandemic, the traditional three-substitution limit was temporarily raised to five. This change aimed not only to protect player health but also to introduce new tactical approaches. The pandemic brought major challenges to football—matches without fans, packed schedules, and a rise in injuries (Fernández-Cortés et al., 2024; Thron, 2022). The five-substitution rule gave coaches more tools to cope with these challenges, helping to maintain tempo, reduce fatigue, and prevent injuries (García-Aliaga et al., 2023; Iglesias et al., 2022; Schlumberger & Beck, 2022; Varela-Quintana et al., 2016).

This study aims to comprehensively examine the impact of the updated substitution rule on team performance following the COVID-19 pandemic. By comparing team performances before and after the pandemic, the tactical,

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physiological, and statistical effects of substitutions are analyzed. The study focuses on match data and substitution counts from the English Premier League, Bundesliga, Serie A, and La Liga. Teams were grouped based on league ranking changes and European competition participation to assess variation in substitution strategies.

Method

This study employed document analysis, a commonly used method in sports sciences research. Document analysis entails systematically collecting, reviewing, and interpreting written sources to obtain relevant data (Karasar, 2005; Bowen, 2009). It allows researchers to access and evaluate existing information to address specific research questions (Yıldırım & Şimşek, 2013; Ekiz, 2015).

The data analyzed in this study were drawn from matches played during the 2019/2020 season in the English Premier League, Bundesliga, Serie A, and La Liga. Key performance indicators included: number of shots, shots on target, pass success rate, number of successful passes, number of corners, substitutions, and league rankings. These were obtained from reliable and recognized data sources such as Opta Sports, www.statsperform.com, and www.fbref.com, ensuring transparency and reproducibility.

The teams included in the analysis comprised 20 from the English Premier League, 18 from the Bundesliga, 20 from Serie A, and 20 from La Liga, totaling 78 professional football teams. Teams were categorized into three groups based on changes in league standings and European competition status after the COVID-19 break: (1) improved performance, (2) unchanged performance, and (3) declined performance. The frequency of using 3 or fewer, 4, and 5 substitutions post-break was compared across these groups. Statistical comparisons were conducted using Pearson's chi-square test, and where significant differences were found, Bonferroni-corrected z-tests were used for pairwise post-hoc analyses. The significance level was set at $p < 0.05$.

Findings

Table 1. Comparison of Substitution Rates According to Changes in League Rankings in the Four Major Leagues

League	League Ranking	Number of Substitutions			Chi-Square Test		
		3 or Fewer	4	5	χ^2	p	
Bundesliga	Dropped in Rankings	n	5 _a	12 _a	28 _a	6,635	,156
		%	11,1%	26,7%	62,2%		
	Unchanged in Rankings	n	15 _a	24 _a	33 _a		
		%	20,8%	33,3%	45,8%		
	Rose in Rankings	n	7 _a	8 _a	30 _a		
		%	15,6%	17,8%	66,7%		
EPL	Dropped in Rankings	n	18 _a	14 _a	4 _a	14,544	,006*
		%	50,0%	38,9%	11,1%		
	Unchanged in Rankings	n	35 _a	22 _a	42 _b		
		%	35,4%	22,2%	42,4%		
	Rose in Rankings	n	17 _a	17 _a	11 _{a, b}		
		%	37,8%	37,8%	24,4%		
Serie A	Dropped in Rankings	n	14 _a	20 _a	62 _a	6,482	,166
		%	14,6%	20,8%	64,6%		
	Unchanged in Rankings	n	9 _a	14 _a	25 _a		
		%	18,8%	29,2%	52,1%		
	Rose in Rankings	n	14 _a	13 _a	69 _a		
		%	14,6%	13,5%	71,9%		
La Liga	Dropped in Rankings	n	8 _a	28 _a	63 _a	2,436	,656
		%	8,1%	28,3%	63,6%		
	Unchanged in Rankings	n	2 _a	7 _a	24 _a		
		%	6,1%	21,2%	72,7%		
	Rose in Rankings	n	11 _a	21 _a	56 _a		
		%	12,5%	23,9%	63,6%		

Pearson Chi-Square Test

*Significant p-value at the 0.05 level

When examining Table 1, it can be observed that in the English Premier League, teams grouped by changes in their rankings before and after COVID-19 exhibited differences in their substitution preferences ($\chi^2 = 14.544$, $p = 0.006$). Teams whose rankings remained unchanged used all five substitutions in 42,4% of their matches during the COVID period, while teams that dropped to lower rankings used five substitutions in only 11,1% of their matches after the break ($p < 0.05$). There was no statistically significant difference between the percentage of teams that rose to higher rankings and the other two groups in terms of using all five substitutions ($p > 0.05$). Similarly, there were no

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significant differences between the three groups in terms of using 3 or fewer and 4 substitutions ($p > 0.05$).

For the Bundesliga, Serie A, and La Liga, there were no statistically significant differences in the preference for 3 or fewer, 4, and 5 substitutions among teams categorized as Dropped in Rankings, Unchanged in Rankings, and Rose in Rankings before and after COVID-19 ($p > 0.05$).

Table 2. Comparison of Substitution Rates in the Four Major Leagues According to Participation in European Competitions

League	Participation in European Competitions	Number of Substitutions			Chi-Square		
		3 or fewer	4	5	χ^2	p	
Bundesliga	Relegated to a Lower Competition/ Did Not Qualify	n	3 _a	5 _a	1 _a	10,160	,038*
		%	33,3%	55,6%	11,1%		
	Participation Status Unchanged	n	23 _a	38 _a	83 _b		
		%	16,0%	26,4%	57,6%		
	Promoted to a Higher Cup	n	1 _a	1 _a	7 _b		
		%	11,1%	11,1%	77,8%		
EPL	Relegated to a Lower Competition/ Did Not Qualify	n	10 _a	5 _a	3 _a	6,661	,155
		%	55,6%	27,8%	16,7%		
	Participation Status Unchanged	n	51 _a	36 _a	48 _a		
		%	37,8%	26,7%	35,6%		
	Promoted to a Higher Cup	n	9 _a	12 _a	6 _a		
		%	33,3%	44,4%	22,2%		
Serie A	Relegated to a Lower Competition/ Did Not Qualify	n	0 _a	0 _a	12 _a	11,632	,020*
		%	0,0%	0,0%	100,0%		
	Participation Status Unchanged	n	36 _a	45 _a	135 _b		
		%	16,7%	20,8%	62,5%		
	Promoted to a Higher Cup	n	1 _a	2 _a	9 _{a, b}		
		%	8,3%	16,7%	75,0%		
La Liga	Relegated to a Lower Competition/ Did Not Qualify	n	3 _a	12 _a	18 _a	5,078	,279
		%	9,1%	36,4%	54,5%		
	Participation Status Unchanged	n	16 _a	39 _a	99 _a		
		%	10,4%	25,3%	64,3%		
	Promoted to a Higher Cup	n	2 _a	5 _a	26 _a		
		%	6,1%	15,2%	78,8%		

When Table 2 is examined, it is evident that in the Bundesliga, teams' substitution preferences differed significantly based on changes in their European competition status before and after COVID-19 ($\chi^2 = 10.160$, $p = 0.038$). Teams whose participation status remained unchanged used all five substitutions in 57,6% of their matches. In contrast, those that lost their participation rights used five substitutions in only 11,1% of matches ($p < 0.05$). No statistically significant differences were found between teams that gained European competition status and the other two groups in terms of five-substitution use ($p > 0.05$). Similarly, no significant differences were observed among the three groups regarding the use of up to three or four substitutions ($p > 0.05$).

In Serie A, a similar pattern was identified ($\chi^2 = 11.632$, $p = 0.020$). Teams with unchanged European competition status used five substitutions in 62,5% of their matches, while teams that lost their participation rights used all five substitutions in 100% of matches ($p < 0.05$). Again, no significant differences emerged regarding five-substitution use between teams that gained European participation rights and the other groups ($p > 0.05$), nor in the use of three or four substitutions across all groups ($p > 0.05$).

In the English Premier League, teams that maintained their standings post-COVID used five substitutions more frequently than those that were relegated. Similarly, in the Bundesliga, teams with unchanged European competition status used five substitutions more often than those who lost such status. However, in Serie A, the opposite trend was observed: teams that lost European competition rights utilized all five substitutions more frequently than teams whose status remained unchanged.

Discussion and Conclusion

This study comprehensively examines how teams' substitution strategies in the four major European football leagues (Bundesliga, English Premier League, Serie A, La Liga) varied according to their league standings and participation in European competitions during the COVID-19 pandemic. Our data provide critical insights into how teams adapted their substitution strategies in response to the unique challenges they faced during this period. In this section, we will discuss how these findings can be related to the existing knowledge in sports science literature.

The findings of our study show that in the English Premier League (EPL), teams whose standings remained unchanged fully utilized the five substitution rule in 42,4% of their matches during the COVID-19 period, while teams that dropped in standings only utilized this right in 11,1% of their matches ($\chi^2 = 14.544$, $p = 0.006$). This result is consistent with previous studies such as Wittkugel (2022) and Martinez (2022), which indicate that successful teams manage their substitution rights more effectively, gaining tactical advantage by using these substitutions not only for fatigue management but also to optimize in-game strategies (Lorenzo-Martínez et al., 2022; Wittkugel et al., 2022).

In this context, the study by Bradley et al. (2014) also supports the notion that frequent use of substitutions by high-performing teams enhances both physical endurance and tactical flexibility (Bradley et al., 2014). The trend observed in the EPL in our study aligns with these previous findings regarding the impact of substitutions on team performance. Specifically, teams that made greater use of their substitution rights were more likely to maintain or improve their standings by

minimizing performance declines.

In contrast, no significant differences were observed in the substitution strategies of teams whose league standings changed in the Bundesliga, Serie A, and La Liga ($p > 0.05$). This can be evaluated in relation to the Markov process model proposed by Hirotsu and Wright (2002), which suggests that substitutions should be optimized according to specific scenarios and may not be equally effective across all leagues or tactical contexts (Hirotsu & Wright, 2002). Therefore, the effectiveness of substitution strategies may vary depending on the tactical and strategic plans implemented within a particular context.

These findings highlight the complexity of substitution strategies and their context-dependent nature, suggesting that what works effectively in one league or team might not yield the same results elsewhere.

The data obtained from the Bundesliga show that teams whose participation in European competitions remained unchanged after the COVID-19 period made five substitutions in 57,6% of their matches, while teams that lost their participation rights or were relegated to a lower competition used this substitution right in only 11,1% of their matches ($\chi^2 = 10.160$, $p = 0.038$). These results are supported by the study of Almeida et al. (2014), which provides important findings on how teams should adapt their substitution strategies based on different opponents and match scenarios throughout the season (Almeida et al., 2014). In particular, the continued participation in European competitions allowed teams to maintain a more consistent and planned substitution strategy per match.

In Serie A, teams whose participation in

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European competitions remained unchanged made five substitutions in 62,5% of their matches, while teams that lost their participation rights used this option in 100% of their matches ($\chi^2 = 11.632$, $p = 0.020$). These findings align with the research by Del Corral et al. (2008), which suggests that teams must dynamically adjust their substitution strategies based on the current game situation and their long-term goals (Del Corral et al., 2008). Specifically, the more aggressive substitution strategies adopted by teams at risk of losing their participation in European competitions can be seen as an effort to improve their performance for the remainder of the season.

The impact of substitutions on team performance can be assessed in light of the data obtained in our study and is consistent with existing literature. Research by Bradley et al. (2014) found that substitute players covered more distance and performed more high-intensity sprints compared to other players after entering the field, emphasizing the significant impact of substitutions on a team's overall physical performance. Additionally, a study by Fleming et al. (2023) on the English Football League Championship found that injury risk increased in the later stages of the match due to rising locomotor and mechanical demands on players. The study concluded that substitutions were an effective way to minimize this risk, particularly for players with heightened injury risk, positively contributing to both player health and the team's physical performance. Similarly, Varjan et al. (2024) found that players starting in the initial lineup experienced a decrease in the total distance covered per minute as physiological load increased later in the match. Substitutes, on the other hand,

increased their total running distance per minute, thereby enhancing the overall distance covered by the team. It is believed that the changes in substitution rules following COVID-19 significantly contributed to the total running distances of many football teams. These findings align with the studies by Martinez (2022) and Ekstrand et al. (2011), which emphasize the critical role of substitution timing and numbers in managing team health and injury risk (Bradley et al., 2014; Ekstrand et al., 2011; Lorenzo-Martínez et al., 2022).

Specifically, the Markov process model proposed by Hirotsu and Wright (2002) emphasizes that the timing and number of substitutions in football matches should be optimized, serving as a critical strategy for enhancing teams' in-game performance. This model helps determine the most appropriate substitution timing for maintaining or altering a team's score, aiding coaches in adjusting their game strategies accordingly. In our study, teams that utilized their substitution rights more frequently were observed to have a tendency to minimize performance declines and maintain or improve their league standings, which aligns with the existing literature.

The COVID-19 pandemic forced football teams to reassess and adapt their substitution strategies. During this period, the need to protect player health and minimize injury risks increased, further highlighting the importance of substitutions. Wittkugel (2022) and Ekstrand et al. (2011) support this, emphasizing how substitutions were used to cope with the physical and psychological demands imposed by the pandemic. By making frequent substitutions, teams sought to safeguard their players' health and adapt to the congested match schedules. Peñas et al.

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(2015) found in their study that substitutions in the second half of football matches significantly contributed to total distance covered, high-intensity running, and sprinting distances, especially as physiological demands increased.

The studies by Del Corral et al. (2008) illustrate how substitution strategies vary based on the current game situation and the strength of the opposing team. Similarly, in our study, teams were observed to prefer more defensive substitutions when ahead in the match, while opting for more attacking changes to increase tempo and offensive opportunities when trailing. These strategic approaches, particularly under the unexpected conditions brought about by the pandemic, tested the adaptability and flexibility of teams.

In this study, some of the comparisons—specifically those related to changes in league rankings in the Bundesliga, Serie A, and La Liga (see Table 1), as well as changes in European competition qualification status in the Premier League and La Liga (see Table 2)—did not yield statistically significant results ($p > 0.05$). One possible explanation for these findings is that coaching strategies and substitution decisions may have been guided primarily by concerns related to player health, injury prevention, and load management, rather than direct performance optimization.

Additionally, factors such as squad depth, staff continuity, financial constraints, match-specific conditions, and fixture congestion may have confounded the potential impact of substitution strategies, thereby diminishing detectable effects. Although the overall sample size was adequate, imbalances in group distribution within certain leagues may have reduced the statistical power of

comparisons based on performance categories, limiting the detection of meaningful differences.

It should also be noted that the current study focused solely on the number of substitutions used. Contextual factors such as substitution timing, player positions involved, and the scoreline at the moment of substitution were not included in the analysis. The integration of such variables in future studies may enhance the explanatory power of group comparisons and reveal more nuanced patterns.

In conclusion, non-significant results observed in this study should not be interpreted as the absence of an effect but rather as an indication of the need for more context-sensitive analyses. Incorporating additional match dynamics may provide a more comprehensive understanding of substitution behavior and serve as a foundation for future research in this area.

The findings of this study provide important insights for future research in sports science and coaching. More extensive and comprehensive datasets are needed to better understand the long-term effects of substitutions on performance. Moreover, the impact of substitutions not only on physical performance and fatigue management but also on team dynamics, player morale, and psychological factors should be explored in greater depth (Gomez et al., 2014; Carling et al., 2010).

Coaches and sports scientists can use the findings of this study to make more informed decisions about optimizing the timing and number of substitutions. Furthermore, the importance of data-driven decision-making processes in sports management is highlighted. Future research could explore how these strategic approaches can be applied

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across a wider range of scenarios and how they might help football teams develop more sophisticated methods to optimize performance.

In conclusion; this study comprehensively evaluates how football teams' substitution strategies differed in the post-COVID-19 period, depending on their league standings and participation in European competitions, and assesses the impact of these strategies on team performance. The findings provide valuable information for coaches and sports scientists in terms of strategic planning and player management, offering guidance for future strategic developments. Substitutions have been shown to be a critical tool for understanding the tactical and strategic aspects of football, and this study illustrates how these strategies can be used more effectively to optimize performance and influence match outcomes.

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