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ARTICLE

Determinant Football Elements for Euro16 Match Results

Elementos Futebolísticos Determinantes Para os Resultados dos Jogos do Euro16

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ABSTRACT

Purpose: The current article aimed to verify patterns that could explain match results of the Euro Cup 2016, using as references the following match performance indicators: finishing, ball possession, passing, crosses and defensive actions.
Methodology/approach: The necessary information about the matches was collected from the Dailymail's website. The Weka (Waikato Environment for Knowledge Analysis) program was adopted to help in the analyses of these data.
Originality/Relevance: Football matches components have been analysed in order to understand the behavior of the teams in the competitive scenario of this sport.
Key findings: The results show that the more accurate shots a national squad takes in their games, the more chances they got to win, instead of using a game plan based on crossing movements. Ball possession, on its turn, can be a good indicator or a bad one to win matches, when associated to a high number of crosses. Moreover, the alternative of long passes seems to be relevant only when the opponent makes more shots from outside the area or get more blocked shots. Complementarily, defensive actions focused on successful tackles and more interceptions appear as a positive aspect for getting the triumph, considering only the total number of tackles. The accuracy of kicks and defensive actions were relevant to the success of the teams in the competition, suggesting that the improvement of actions related to these two indicators should help national teams to improve their own strengths, in order to maximize their chances of winning matches.
Theoretical/methodological contributions: Collecting a large volume of football data from a website and using the Weka program have helped not only to speed up and facilitate the analyses but also should have been important in order not to lose any relation that could be relevant inside the studied scenario.

Keywords: Football; Finishing; Ball possession; Passing; Defensive actions.

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RESUMO

Objetivo: O presente artigo teve como objetivo verificar padrões capazes de explicar os resultados das partidas da Eurocopa 2016, tendo como referência os seguintes indicadores de desempenho: finalização, posse de bola, passe, cruzamento e ações defensivas.
Metodologia/abordagem: As informações sobre todas as partidas foram coletadas no site do Dailymail. Além da utilização do site do Dailymail, foi adotado o programa Weka (Waikato Environment for Knowledge Analysis) com o intuito de analisar os dados coletados sobre os jogos da Eurocopa 2016.
Originalidade/Relevância: Os indicadores de desempenho das partidas de futebol foram analisados de forma a contribuir para a compreensão dos comportamentos dentro do cenário competitivo deste esporte.
Principais conclusões: É possível perceber que, quanto mais certeiros os chutes que uma equipe faz em seus jogos, mais chances ela tem de vencer, ao invés de um plano de jogo baseado em movimentos cruzados. A posse de bola, por sua vez, se mostra um bom indicador e também um mau indicador para vencer partidas, quando aparece um número elevado de cruzamentos. Além disso, a alternativa de passes longos parece ser relevante apenas quando o adversário faz mais chutes de fora da área ou recebe mais interceptações. Complementarmente, ações defensivas focadas em desarmes bem-sucedidos e mais interceptações aparecem como um aspecto positivo para a obtenção da vitória, preocupando-se apenas com o número total de desarmes. A precisão dos chutes e ações defensivas foram relevantes para o sucesso das equipes na competição, sugerindo que o aprimoramento das ações com base nessas evidências deve ajudar seleções e clubes nacionais a aprimorar suas próprias forças, a fim de maximizar suas chances de vencer partidas.
Contribuições teóricas/metodológicas: Ao coletar um grande volume de dados futebolísticos de um site e utilizar o programa Weka foi possível obter auxílio não apenas para acelerar e facilitar as análises, mas também pode ter sido importante para não perder nenhuma relação que poderia ser relevante no cenário estudado.

Palavras-chave: Futebol; Finalização; Posse de bola; Passes; Cruzamentos; Ações defensivas.

1 INTRODUCTION

Football matches components have been analysed in order to contribute for a better understanding about the behavior of the teams inside the competitive scenario of this sport, corresponding to the actions of players and teams. The results of these analyses may improve squad preparations and their game models, consequently, providing an enhancement at the matches level (Berber, McLean, Beanland, Read, & Salmon, 2020; Marcelino, Sampaio, & Mesquita, 2011; Rocha-Lima, Tertuliano, & Fischer, 2021a, 2021b).

Performance analysis is seen as a relevant resource to improve the behavior and results of football teams, with the association among match-related performance indicators and success being a possible alternative to find playing styles which can increase the positive outcome likelihood (Gollan, Bellenger, & Norton, 2020). Authors

also point that there has been an increase in the amount of football analysis researches and that they can offer benefits to improve teams and players performance (Spyridon Plakias et al., 2022; 2023).

Literature already presents studies associating outcomes and football performance indicators (Rocha-Lima, Tertuliano, & Fischer, 2023), such as ball possession (Escher, 2020; Gong, 2023; Merlin et al., 2020; Myftiu & Berisha, 2022), game styles (Gollan et al., 2020; Plakias et al., 2023; Stafylidis, Michailidis, Mandroukas, Gissis, & Metaxas, 2022), duels (Zenger, 2020) among others.

This research is important for the football scenario because it has analysed simultaneously a high number of performance indicators related to the winning matches occurrence, which can help to guide football teams to apply the alternatives that give to them the best chances to win their competitive matches. In addition, there is a methodological contribution, since collecting data from a website and using the WEKA program have helped not only to speed up and to facilitate the analyses, but also should have been important in order not to lose any relation that could be relevant inside the studied scenario.

On this way, the current article presents the purpose of analysing simultaneously 25 performance indicators in order to evaluate patterns that might explain match results of the most important football competition for European national teams occurred at France in 2016, the Euro Cup.

2 THEORETICAL REFERENCE

The mentioned tournament is the third biggest sport event of the world and takes place every four years, being played only for European national squads qualified by a competition played previously (Jaskulowski & Surmiak, 2016). Moreover, to understand the Euro Cup's relevance, in 2004's edition, the championship had more than 7 billion viewers in all matches, with an average of 150 million viewers per match, a plus of 157% in comparison with the Euro2000 (Humphreys & Prokopowicz, 2007).

Considering this media and supporters impact, it is also possible to expect high-quality matches, where details can make such a decisive difference. Furthermore, performance indicators like shooting, ball possession, passing and tackles, analysed in this research, can be interesting and useful to provide benefits for the teams.

About ball possession, some researches present that teams lose more matches when they have longer time of this indicator (Barreira, Garganta, & Anguera, 2011; Lago-Peñas & Dellal, 2010; Lago & Martín, 2007; Rocha-Lima et al., 2021a), while there are other studies which show that winning teams are the ones with more ball possession time (Casal, Anguera, Maneiro, & Losada, 2019; Maneiro, Losada, Casal, & Ardá, 2020).

Considering the passes, quantity and precision are pointed as important aspects to be successful in shooting, goal scoring and winning chances (Anderson & Sally, 2013; Collet, 2013; Grund, 2012), with long passes associated to shots on target being an interesting pattern to be explored to achieve a high number of victories (Rocha-Lima et al., 2021b).

Besides, literature reinforces that crosses are not consistently reported as an efficient alternative to score goals (Flynn, 2001) since the goal conversion rate is low (Rocha-Lima, 2018), despite the area close to the second post is seen as a main

destination to maximize the goal scoring chances (Hughes, 1990). However, it is important to maximize the number of shots not only to increase goal scoring probabilities but also to decrease the chance to lose the ball (Anderson & Sally, 2013; Hughes, 1990). Authors also point that it is important to maximize ball recoveries in the final third of the pitch (Almeida, Ferreira, & Volossovitch, 2014; Kuper & Szymanski, 2014; Wilson, 2013) and that the interceptions are the defensive movements which provide more benefits for the football teams (Claudino, 1993; Silva, 1997).

The technology growth has allowed the football performance analysis to be more efficient, once applying the performance indicators that have more chances to guide teams to positive outcomes is relevant (Afonso et al., 2020; Alves, Graça, Feitosa, & Soares, 2021; Jones, Rands, & Butterworth, 2020; Lepschy, Wäsche, & Woll, 2018; Rocha-Lima et al., 2021a). Authors also argue that researches on football have been focused on football performance indicators (Jamil, Liu, Phatak, & Memmert, 2021) in order to find alternatives that can influence players and teams performances (Bradley, Carling, McCall, & Dupont, 2016; Jamil et al., 2021; Liu, Gómez, Gonçalves, & Sampaio, 2016; Yang, Leicht, Lago, & Gómez, 2018; Zhou, Zhang, Calvo, & Cui, 2018), also in specific competitions (Liu, Gomez, Lago-Peñas, & Sampaio, 2015; Liu, Hopkins, & Gómez, 2015; Rocha-Lima et al., 2021b, 2021a; Schauberger, Groll, & Tutz, 2018) and through relevant data collection (Pulling, 2015), allowing the verification of game models, the rise of teams strong points and also to identify the elements' influence on football performance (Garganta, 2001; Silva, 2007; Yi et al., 2019). Authors already discuss the importance of ball possession to have more finishing opportunities and score more goals (Anderson & Sally, 2013), the positive consequences conceded by more passes and ball touches to teams' success (Rampinini, Impellizzeri, Castagna, Coutts, & Wisløff, 2009), and the actions of ball recovery related to scoring goals opportunities (Hughes, 1990).

Even though the literature brings productions about the understanding of those performance indicators, it treats the mentioned match factors, the majority of them, in an isolated way. Although it provides pertinent conclusions, to observe more complex relations among those variables is not a simple and easy task. Differently, in this current article, we analyse data related to 25 performance indicators simultaneously. For this and considering the relatively high volume of collected data, we used a data mining technique that made easier and faster the analyses process. As a result, we could observe interesting relations among those indicators, as the one described here related to the indicators: finishing, ball possession, passing, crosses and defensive actions.

Complementarily, with the intention to connect those and other performance indicators, this current article, adopting a computational tool, contributes to football studies showing more complex patterns based on the Euro16 match results.

On that way, since technology growth has granted more efficiency in performance analysis acts (Jones et al., 2020) and knowledge of performance indicators that can determine success in football is seen as critical, added to the fact that there is still a space for more predictive analysis in this area (Lepschy, Wäsche, & Woll, 2020), the current article aimed to verify patterns able to explain match results of Euro Cup 2016, using as references the 25 performance indicators described in the "Methods"

section.

3 METHODS

The data of all 51 Euro16 matches were collected from the Dailymail's website (http://www.dailymail.co.uk), which divides every match indicator into 4 groups: Attack, General Play, Distribution and Defence & Discipline.

Inside the first group, statistics about goals scored and shots (total, accuracy, blocked, on target, from outside and inside the area) are found. General Play's division contains data about ball possession, duels won, interceptions, offsides and corners. The third one shows evaluations of total passes, long passes, passing accuracy and also inside the opponent half, besides total and successful crosses. Finally, Defence & Discipline provides numbers of total and won tackles, clearances, fouls conceded, yellow and red cards.

The Weka (Waikato Environment for Knowledge Analysis) (Weka, 2020), a computer resource that implements various algorithms of data mining (Fayyad; Piatetsky-Shapiro & Smyth, 1996; Freitas, 2003), was used to facilitate the analyses of the collected data about all matches of the Euro Cup 2016.

To facilitate the data analyses, some classifiers were used for each variable of interest. These classifiers are the following. Related to the match results, A corresponds to the national squad considered to be the home team into the scoreboard as victorious, B reports a draw, and C represents the remaining team as the match winner. For the other elements, the idea of three levels of classification was kept; they represent a higher value for each indicator for the considered home team (A), the same value for both teams (B), or superiority for the away team (C), to then, verify if there is some relation with the scoreboard in the end of the game.

The resulting data were analysed using Weka, which integrated every data and generated association rules considering all the classifiers and the final match results. Although all classifiers had been analysed simultaneously, this research had the main focus in the relations concerned to only five performance indicators: finishing, ball possession, passing, crosses and defensive actions.

4 RESULTS AND DISCUSSION

About finishing opportunities, Weka showed some interesting patterns. In 81% of the matches which counted with teams that presented the highest number of shots on target, finishing opportunities inside the area and had a better shooting accuracy, national teams won the respective matches. Moreover, considering the 19 cases that only shots on target and shooting accuracy were higher than the opponent, a victory came in 74% of the matches, as it can be seen in Figure 1.

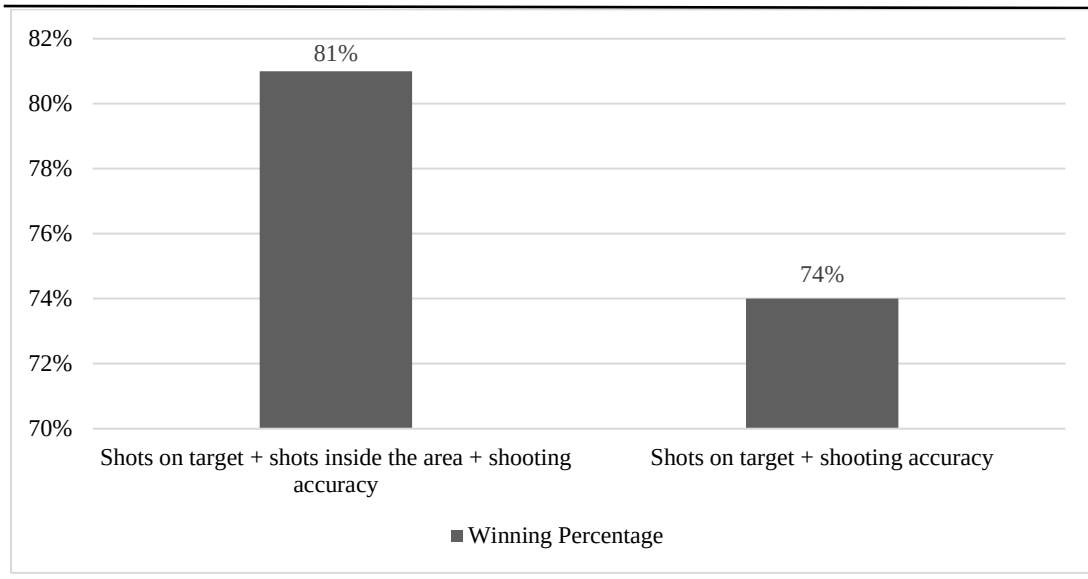

Figure 1. Winning occurrence based on shots classifiers.
Source: The authors.

Nonetheless, when the crossing movements come to the scenario, Weka evidenced that they are definitely not effective in terms of quantity. A bigger amount of accurate shots against a higher quantity of crosses gives the victory for the first teams in 100% of the 10 matches which had this pattern (Figure 2).

With the inclusion of the ball possession classifier, some rules generated by the software show this indicator as relevant for winning matches, since it is associated with finishing classifiers. More total shots, finishing acts inside the area and ball possession appeared into 21 matches for home teams, where 62% of those matches had the home teams as the winners (Figure 2).

However, a higher number of crosses associated to other variables, might be responsible for the ball possession becomes a not so suggested factor for beating the opponents. On this hand, 8 games showed that, when team A had more crosses and ball possession, and team C got more correct shots, the away teams won 100% of those matches (the last bar of Figure 2).

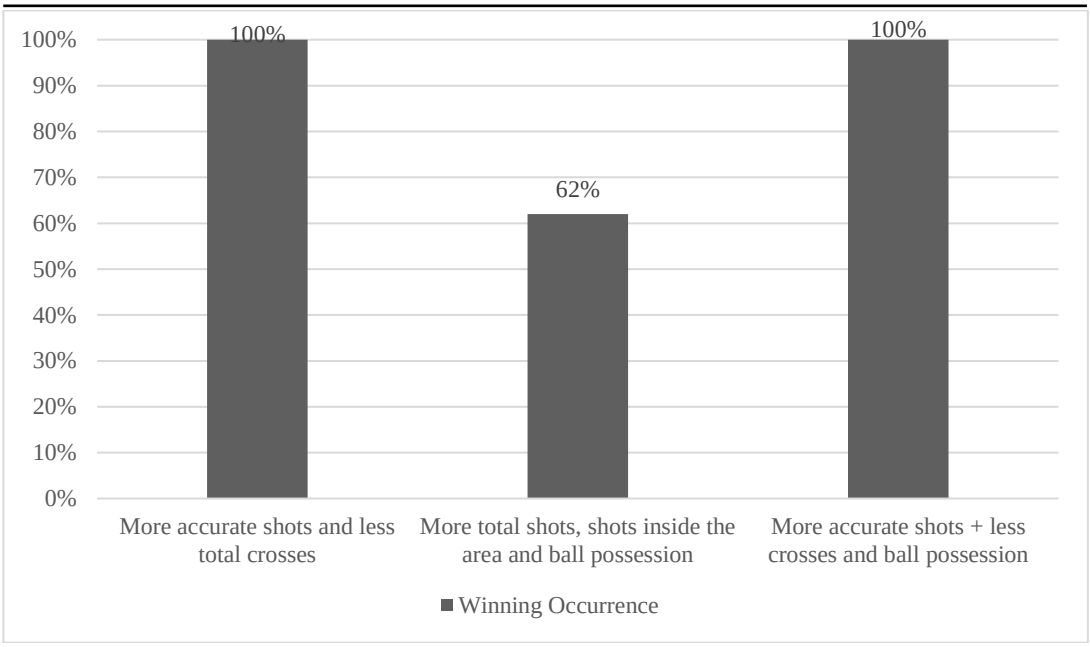

Figure 2. Winning occurrence based on shots, ball possession and crosses classifiers.
Source: The authors.

Concerning the passing variability, it was possible to see that more shots made inside the area connected with more passes and also accurate ones for team A as a pattern in 21 times, justifying the winning in 62% of the cases (Figure 3). On the other hand, although with the same percentage, more ball possession and total passes by team A were not enough to win team C when they got a best ratio of accurate shots to opponents' goal.

When there are more long passes and more precision in the shots, it seems that these actions help in the victories. While in 19 matches, more total shots and accurate shots by team A against a greater amount of long passes by team C, team A was victorious in 63% of these matches. In 8 matches which team C achieved more accurate kicks and long passes, while A team took more shots from outside the box, the first team won 100% of those Euro16 games (Figure 3).

Complementarily, concerning the opponent's field passing, in 62% of 21 matches, more accurate passes on there with highest ball possession and shots made inside the area by team A, they got the triumph, as it can be seen in Figure 3 as well.

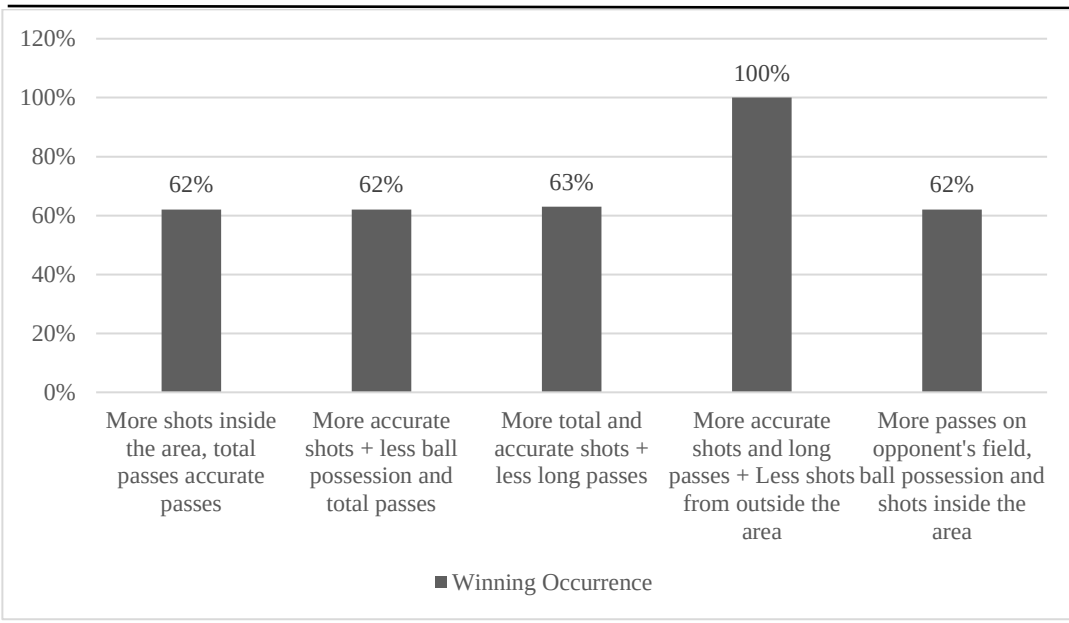

Figure 3. Winning occurrence based on classifiers of shots, ball possession and passes. **Source:** The authors.

Patterns including defensive actions also show some interesting relations with match results. Successful tackles obtained in 18 matches by the teams A had a direct relation with their victory with a percentage of 61% (Figure 4).

However, total tackles do not necessarily represent a victory in most part of the Euro16 matches, since when team C got a highest value for that in 26 matches, team A won 50% of the matches. Furthermore, while team A got more ball possession and total tackles in 11 matches, team C won 7 times, representing 64% of these matches (Figure 4).

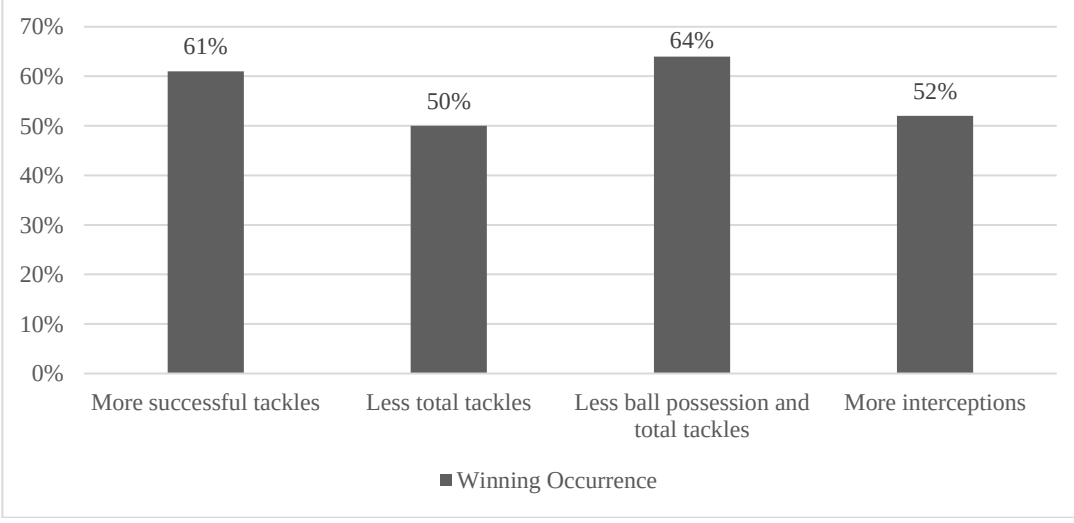

Figure 4. Winning occurrence based on defensive movements and ball possession.

Source: The authors.

This study aimed to verify football patterns able to explain match results of the Euro Cup 2016, using as references the following performance indicators: finishing, ball possession, passing, crosses and defensive actions.

According to the results in Figure 1, the connection between a large amount of shots (81% of the matches) or a great efficiency in shots (74 % of the matches) and victories in the matches are already reinforced by literature (Rocha-Lima et al., 2021a; 2021b). On this line, scoring 10 goals more than what is expected in a tournament dropped the number of lost matches in 1,76, maintaining the chances of winning between 50% e 58% when the number of shots on target rises (Anderson & Sally, 2013). In addition, it is also argued that performance indicators like total shots (Lepschy et al., 2020; Rocha-Lima et al., 2021b; Souza, Campo, Blanco-Pita, Resta, & Coso, 2019), shots on target (Elyakim et al., 2020; Rocha-Lima, 2018; Rocha-Lima et al., 2021b; Zhou, Zhang, Calvo, & Cui, 2018) and shots inside the penalty area (Konefał et al., 2018) are related to success, what gives support to the presented data in this article.

The bad winning probabilities coming from a crossing strategy (Figure 2) might be explained for effectiveness, since it is more difficult to score goals if the defensive positioning has enough time to make the space smaller for the opponent, gaining more conditions to recover the ball. In order to sustain that lack of success of this play style, Kuper & Szymanski (2014) mention the English Liverpool Football Club that in 2011 aimed to build a team based on a crossing style and for that, bought players like Stewart Downing, Jordan Henderson, and Andy Carroll to achieve this objective. However, the idea failed, since opponents already knew exactly what the team was going to do and performed successful defensive actions, while Liverpool, not having another attacking strategy, scored only one goal from 421 open play crosses made.

Complementarily, there are other authors who reinforce that losing teams presented high numbers of open play crosses made (Lepschy et al., 2020; Rocha-Lima et al., 2021a; Zhou et al., 2018). Moreover, literature presents additional studies which points the low conversion ratio of open play crosses in goals scored (Pulling et al., 2018; Rocha-Lima et al., 2021a) and the lack of efficiency in performing more crosses than the opponents, since these movements need to be precise, not excessive and can be trained to provide more efficiency, as positioning footballers in the most susceptible positions to score goals as well (Rocha-Lima, 2018).

Sequentially, as it is supported by literature as well, the inclusion of ball possession classifier evidenced even more the strength of shots as performance indicators to be explored in order to achieve victories (Figure 2). On that way, it is argued that ball possession has been discussed with different results showing positive and negative effects (Lepschy et al., 2018; Rocha-Lima et al., 2021b). It is pointed that ball possession seems to be less important to reach triumphs than other indicators (Lepschy et al., 2020), what supports the last variable in Figure 2. However, there are authors who defend ball possession as an important performance indicator for success (Anderson & Sally, 2013; Lago-Peñas, Lago-Ballesteros, Dellal, & Gómez, 2010), as the association between this indicator and shots to win football matches (Rocha-Lima, 2018; Rocha-Lima et al., 2021b), what supports the second pattern presented in Figure 2 and some of the patterns showed in Figure 3.

Results in Figure 3 reinforce that it is possible to achieve a high number of victories through indirect play approaches, but also alert that direct play options, above all through long passes and shots association, represent an effective pattern to be explored and also subsidized by the literature (Rocha-Lima et al., 2021b). Despite of arguments which defend that long passes are not effective and result in ball possession losses (Reis, Vasconcellos, & Almeida, 2017), even when the best football teams cover a higher distance with the ball possession than the opponents (Souza, Campo, Blanco-Pita, Resta, & Coso, 2020), there are authors who argued that total distance without ball possession has no significant influence on winning matches (Yang et al., 2018) and that the longer is the attacking sequence, the lower will be the probability of entering into the final third of the pitch and of scoring goals (Bate, 1988).

Complementarily, it is also emphasized that the majority of attacks last between 0 and 5 seconds (Barbosa, 2009), four or less passes (Mitrotasios & Armatas, 2014) and also that 85% of goals scored occur from attacking sequences of 5 or less passes in a row (Hughes, 1990), what supports the results presented in this article.

About the defensive actions related to victories, results showed that having more total tackles and less ball possession than opponents is an interesting pattern to be explored, what reinforces the direct play efficiency. In addition, successful tackles, as the use of interceptions, provide high winning occurrences and are supported by the literature as well. Concerning this, Silva (1997), and Barreira et al. (2014) consider the interceptions as the best way to get the ball back. However, enhancing the defensive aspect, Almeida et al. (2014) present that medium teams usually recover the ball from tackles and mainly into the defensive zone; yet top teams were 93,8% less susceptible to recover the ball by the goalkeeper, 59,7% from set pieces, and also recover the ball, in majority, on the final third, in comparison with the worst teams.

Moreover, authors argue that overall offensive play has decreased while defensive play has increased (Lane, van der Ploeg, Greenham, & Norton, 2020) and also that defensive efficiency against shots, number of recoveries (Souza et al., 2019) and defensive errors registered high influence in teams' performance (Lepschy et al., 2020), aspects that contribute to the understanding the results presented in this article.

5 CONCLUSION

Considering the results of the present study, it is possible to conclude that, for the investigated tournament, the more accurate shots a national squad takes into their matches, the more chances they got to win, instead of using a crossing style, since it showed itself as a poor alternative to get positive results in Euro16 matches.

Besides, ball possession, as literature supports and the results in this article agree, shows itself as a good performance indicator to be explored, when associated with shots, but also a bad performance indicator if associated with a high number of crosses. Moreover, the alternative of long passes seems to be relevant when connected with accurate shots, not disregarding total, accurate and inside the opponent's field passing as positive elements to help winning as well, since they also showed a high winning occurrence when associated with classifiers of shots.

Complementarily, defensive actions focused on successful tackles and more interceptions appear as a positive aspect for getting triumphs, being careful only about the total number of tackles, that can result in a lower winning occurrence when used separately, but can provide a high winning percentage when associated with less ball possession time than the opponents.

Thus, improving actions based on those evidences should help national teams to maximize their own strengths, increasing their chances of winning matches.

For future investigations, the inclusion of data from a high number of matches of other tournaments is suggested, not only to verify similarities and differences in the patterns between the different scenarios, but also to provide more alternatives to be explored in order to maximize the winning chances. On this line, we intend to include indicators from other seasons and tournaments. It should allow comparisons between cup competitions and also inside the Euro Cup, since it would be possible to identify new patterns to be explored, avoided and also to reinforce the ones that were already presented, planning to contribute for the winning chances increasement in tournaments that are going to be played.

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