

Review paper

GAME INTERRUPTIONS AS A SIGNIFICANT FACTOR FOR SCORING GOALS IN A FOOTBALL MATCH

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Abstract: The aim of this review paper is to determine the significance of game interruptions for scoring a goal during a football match by providing a detailed analysis of the relevant literature. The collection of compiled research articles covered the period between 2000 and 2018. The following electronic databases were used to search the relevant literature: PubMed, MEDLINE, Google Scholar, EBSCO, all referring to the period from 2000 to 2018. The search included both male and female players of different age categories. Scientific papers that were excluded from this analysis are the ones written in another language, those presenting results from the training sessions, but not from the competition matches, and the papers which did not analyze game interruptions. The results show statistically significant correlation between game interruptions and scoring a goal. The most goals were scored from free kicks, followed by corner kicks. About 30% of the goals from different competitions and games were achieved after a set play. The factors that have the highest effect on scoring goals after a set play are the number of players in the wall, a distance from the

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goal and the number of players in the field between the goalkeeper and the position of the free kick. The data showed little or no differences, expressed in percentages, in terms of correlation between male and female players, including both senior and junior categories. Game interruptions have a significant impact on scoring a goal. They are part of the standard game situation and as such they require special attention during analysis.

Key words: *performance analysis, football/soccer, notational analysis, match analysis, performance indicators*

INTRODUCTION

Top results in football include a requirement that a football player take part in preparations related to technique, tactics, theory, as well as physical and psychological preparation. Football has, as the most popular sport, in its evolution, gone through various periods dominated by various forms of preparation. The requirements of contemporary sport require great intensity and load from an athlete. For that reason, it is very important to properly plan and program the training sessions i.e., the training units. They must be adapted both to the individual and the team, so that players could continue to achieve results and quickly adapt to all the changes in the play. Modern athletes, including football players, have to be well trained, task-oriented, and ready to provide a maximum manifestation of physical abilities, willingness and creativity during training and during a competition. In contemporary football, players are expected to have, without exception, a high level of preparedness in all aspects, especially from the aspect of the tactical skills both of the player himself and the team (Janković, Leontijević & Tomić, 2016). For the past few years, research focused on the tactics of the game itself. Notational analysis is a key topic in improvement of tactical and theoretical knowledge (De Baranda & Lopez - Riquelme, 2012). The statistical analysis of the game is used to monitor tactical combinations and competitive results. A detailed analysis of the game of football is a more objective way of viewing the tactical activities during a game (Carling, Williams & Reilly 2005). Tactics in football represent an important factor in the preparation of the team or an individual for a competition, and represent a part of the integral preparation of an athlete. The lack of tactical preparation and development of a strategy is one of the basic reasons for the poor performance and the results of the team (Ali, 1998).

Game interruptions are a significant factor in achieving results during a competition match. A well-thought out, preplanned and practiced interruption can significantly affect the outcome. Interruptions are a constituent part of a

match and special attention needs to be paid to how they are performed. Numerous studies have shown that anywhere between 30% and 40% of goals are scored after a set play (Casal, Maneiro, Ardá, Losada & Rial, 2015). The research of Simiyu (2013) indicates that more than 24% of the goals scored at the World Cup held in 2010 in South Africa were scored after a set play. Of the average 30% of interruptions from which goals are scored, the most dominant type are free kicks 17%, followed by corner kicks with 7% (Wright, Atkins, Polman, Jones & Sargeson, 2011). By analyzing the competitive activities in football on the individual or team level, those moments in the game which to a greater or lesser extent affect the final outcome can be identified (Castellano, Álvarez - Pastor & Blanco - Villaseñor, 2013; Liu, Gomez, Lago-Penas & Sampaio, 2015). The objective of research dealing with this form of analysis, over a longer period of time, is to determine those technical-tactical parameters of the game which are related to success, on one hand, and , predict new directions, primarily regarding the tactics of the game of football, on the other hand (McGarry, Anderson, Wallace, Hughes & Franks, 2002). The results of such studies and their interpretations are used for defining new standards, both technical-tactical and theoretical postulates in the development of football (Leontijević, Janković & Tomić, 2017). A constituent part of game interruptions are corner kicks as an important factor in the preparation of the team or individual for a competition, as a unique part of the integral preparation of an athlete.

The main aim of the paper is to determine the significance of game interruptions in scoring goals during a football game by means of analyzing published research papers. The compilation of papers spanned the period between 2002 and 2018.

METHOD

The following databases were used to search for the relevant literature: PubMed, MEDLINE, Google Scholar, and EBSCO, from 2002 to 2018. The search was carried out based on the following key words: performance analysis, football/soccer, notational analysis, match analysis, performance indicators. The search strategy was modified for each electronic database, with the aim of increasing sensitivity. The identified research in English had to meet the criterion that the research was described in full, that the conclusions which were reached were presented, and that the research was not published prior to 2000. Table 1 shows the research which included both genders (male and female) of various age categories. The criteria for exclusion included: studies written in a language other than English, authors who in their studies did not analyze game interruptions, and studies whose results were obtained during a training session and not during a match.

Table 1. *An overview of the research*

Study	Participants			No. of analyzed matches	Competition rank	Analyzed parameters	Results	Conclusion
	Age	Gender	Type of interruption					
1. Link, D et al. (2016),	Seniors	M	Free kicks	612	Bundesliga, Germany	Duration of the interruption; Distance from the wall; No. of players in the wall; Breaking rules during the performance of the free kick; Lat. (position); Type of game; Outcome of the kick; Outcome following play.	The results indicate that the frequency of fouls, the type of game, no. of players in the wall, distance from the wall and fouls were very dependent on space. The centrality and the proximity of the target increased the variables such as the no. of players in the wall, breaking the rules when performing a free kick, the duration of the interruption, and the relationship between the scored goals increased from 5,9% (central far) to 10,9% (central close).	Free kicks from the right side outside the penalty area were 10% more successful than from the left side. The conclusion is that it might be useful to practice defending against balls that are coming from this side.
2. Casal, C. A. et al. (2015),	Seniors	M	Corners	124	UEFA Champions League (2010/2011) FIFA World Cup 2010; UEFA Euro- pean Championships 2012	Time; Position of the corner (left or right side); Lat. of the corner; No. of attackers; no. of defensive players; delivery of the ball; trajectory of the ball; type of defense; numerical intervention; no. of defensive players who intervene; no. of offensive players who intervene; zone of the pass; the initiation zone;	The following variables were significantly connected to corner kicks which resulted in the desired target: time ($p = 0,04$), no. of offensive players ($p = 0,001$) and offensive organizations ($p = 0,02$). The probability of the kick towards the goal zone or the kick might be increased with an intervention of 3 or 4 attackers.	This information could be of great importance for football professionals who are interested in improvement of performance of corner kicks.



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3. Alcock, A. (2010).	Seniors	F	Free kicks	32	World Cup 2007	The free kick zone; the duration of the ball flight; the target zone.	All seven free kicks which resulted in a goal were kicked from the central zone in the circle of 7m from the penalty circle, kicked toward the edge of the goal in a circle of approximately 1m from the goal post, while the average flight time of 1.09 s is significantly faster than the recorded values. All free kicks are focused toward the bottom and center.	For free kicks from wide areas and in the area further from the target, the players should be aware of their individual abilities and only attempt a shot when they see the probability of achieving a goal.
4 Simiyu, W. W. N. (2013)	Seniors	M	Patterns and trends and scored goals	64	World Cup 2010	No. of goals; the parts of the body used to score these goals; distance from the target; time schedule based on minutes; the nature of the game which precedes the goal; the halftime result and win in the game; open play and interruptions; and the position of the players during the scoring of the goal.	More goals were scored during open play (75.86%) than after a set play (24.14%); most of the goals were scored through kicks at the goal zone (108) instead of from jumps (26); Attackers achieved most of the goals (53,10%), then midfielders (34,48) and defense players (11,04%); more goals were scored in the second half especially in the final 15 min of normal regulation time.	Coaches need to focus on improving the technical and tactical performance in the penalty area; encourage more attempts at kicks within the penalty area.

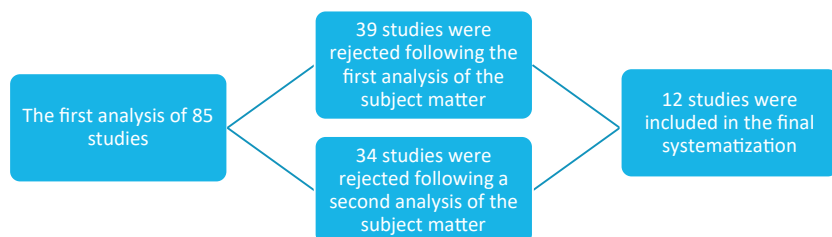
5. Hughes, M., & Wells, J. (2002)	Seniors	M	Penalty kicks	129	World Cup and Champions League	Duration of the preparation for a kick, the no. of steps in the run-up, the relative speed, strength of the kick, the initiation zone and the outcome, as well as the behavior, position, movement of the player during the run-up, their first movements and direction following the kick.	One of five goals defended (20%; 3/15), one of fifteen missed (7%; 1/15) and three out of four scored (73%; 11/15).	It was concluded that these data analyses indicate that there are optimal strategies in scoring goals and defending penalty kicks. This indicates the ways that individual player's efforts can be improved.
6. De Baranda, P. S., & Lopez-Riquelme, D. (2012)	Seniors	M	Corner kicks	64	World Cup 2006	The modality of the kick, the style of the corner kick, the target zone, effectiveness, the outcome following the corner kick, the part of the body which is being used during the kick at the goal, the no. of defensive players, the defense system.	Regarding the modality of the center shot, the teams are prone to using short center shots more; for defense, when the teams who are winning perform the corner kick, the defense lines have a tendency of having fewer players defending from the goal line;	It was concluded that mostly shorter center shots are being sent and that the target zone is the one closer to the semi-circle.
7. Casal, A. C. et al. (2014).	Seniors	M	Direct and indirect free kicks	124	World Cup 2010, Champions League 2010 and the European Championship 2012	The time, position of the free kick, Lat. of the free kick, no. of offensive players taking part, the no. of defensive players taking part, the ratio of offensive and defensive players, the type of kick (direct or indirect), the target zone, the type of defense, the no. of offensive players intervening, the target zone of the center shot, offensive organization, the part of the body making the kick at the goal zone, the status of the match.	It takes almost 36 indirect free kicks in order to achieve a goal, but 64% of the goals are from indirect free kicks and have a deciding effect on the outcome of the game.	These findings can help coaches improve the performance on the free kick.

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8. Yiannakos, A., & Armatas, V. (2006).	Seniors	M	Goal characteristics	32	European Championship (2004)	The frequency of achieving goals during half-times, the way the attacks are organized, the actions which led to scoring goals, game interruptions and the area from which the goal was scored.	The results have indicated that more goals were scored in the second half (57.4%) than in the first (42.6%, $p < 0.05$). As far as the way the game is organized is concerned, the goals were scored through organized play, including frequency (44.1%) followed by game interruptions (35.6%) and counter-attacks (20.3%).	The results indicate that coaches should focus on the sequence of situations which occur during the game itself. Also, increased game time should be dedicated to team tactics so that the synchronization of the movement of team members would be successful.
9. Wright, C. et al. (2011).	Seniors	M	Factors which are connected to scoring goals and the possibility for scoring	One season of the Premier League. 1788 shots at the goal were analyzed	Premiere League, England	The way the game is played (playing through possession, high balls, "dead balls"), game interruptions, ball possession (the number of passes during a play).	Transitions in the game make up 63% of all the scored goals and more than one half of all the kicks at the goal zone. Somewhat less than 30% of the goals would be achieved after set play (most from free kicks, 17%, and corner kicks, 7%).	A high contribution of the factors which are connected to the transition in the game helped to determine the importance of monitoring goals.
10. Castellano, J., Casamichana, D., & Lago, C. (2012).	Seniors	M	The identification of the best statistics and the isolation of the parameters of the wins, draws, and lost matches	177	World Cups: 2002, 2006, 2010	No. of scored goals, the overall no. of kicks, kicks at the goal zone, kicks outside the goal zone, ball possession, offside positions, fouls, corners, yellow cards and red cards.	The variables which refer to the attack game which are best distinguished between wins, draws and lost games were the overall number of kicks, kicks at the goal zone and ball possession.	This information could be useful both for coaches and players, as it could contribute to their knowledge of football, including indicators of success, and help focus the course of training.

11. Beliveau, S. et al. (2014).	Under the age of 20	F	Characteristics of the goals	32	Women's World Cup for those under 20 in 2014	Goals scored during open play, goals scored after a set play, the number of scored goals based on the positions of the players, the time when the goals were scored, scoring goals in relation to the time of player substitutions, the initiation zone of the scored goals.	Goals scored during open play, goals scored after a set play, the no. of goals scored based on the player positions, the time when the goals were scored, scoring goals in relation to substitution time, the initiation zone.	Women's World Cup for those under 17 in 2014	The results from the World Cup indicate that most of the goals were scored during open play. Of the 102 goals in total, 72 were scored during open play, while 30 goals were scored after a set play. Most of the goals were scored between the 76th and 90th minute of the match. Also, most of the goals were scored from the penalty area.	The conclusion is that most goals are scored during open play, and that approximately 30% of the scored goals come after a set play. Attention should also be paid to the level of physical fitness, since goals are mostly scored at the very end of the match.
12. Ruemoller, F. et al. (2014).	Under the age of 17	F	Characteristics of the goals	32	Women's World Cup for those under 17 in 2014	Goals scored during open play, goals scored after a set play, the no. of goals scored based on the player positions, the time when the goals were scored, scoring goals in relation to substitution time, the initiation zone.	Goals scored during open play, goals scored after a set play, the no. of goals scored based on the player positions, the time when the goals were scored, scoring goals in relation to substitution time, the initiation zone.	Women's World Cup for those under 17 in 2014	The results from the Women's World Cup for those under 17 indicated that more than 38% of goals were scored after a set play. Out of the 113 goals, 34 were scored after a set play. Most of these goals were penalty kicks (9) and corner kicks (11).	In addition to most of the goals being scored during open play and good tactical play, great significance is placed on and should be given to exercise (play) and game interruptions, primarily corner kicks.
Legend: No. - number; Lat. - laterality; Of. - offensive; Def. - defensive										

Figure 1. *An overview of the process of identifying studies which refer to the given topic*



DISCUSSION

After examining the available scientific databases, we were able to select 85 papers from the ones originally identified in the search. Following a cursory analysis of these papers, due to the subject matter of a number of them which did not coincide with the subject matter of our research, 39 were rejected because they did not refer to the problem of the significance of game interruptions and scoring goals in football.

The total number of studies included in our systematization was 12 and they refer to game interruptions as a significant factor in scoring goals during football matches or deal with the characteristics of the game itself (open play and set play).

The discussion of the research indicates that the *group of authors who dealt with the effects of free kicks concluded that effectiveness itself greatly depends on various factors*: Link, Kolbinger, Weber & Stöckl (2016) obtained results that indicate that the rate of fouls, the type of play, the number of players in a wall, the distance from the wall, and fouls were all strongly spatially dependent. Free kicks on the right side of the penalty area were 10% more successful than those on the left. That is why it would be useful to pay more attention to defending against the ball coming from this side. Alcock (2010) concluded that seven free kicks which resulted in a goal were initiated from the central zone within an area of 7m from the penalty circle, that they were kicks at the edge of the goal zone within a span of approximately 1 m from the goal post, and had a greater speed than kicks which were defended or were not precise. The kicks were mostly directed towards the lower half of the goal zone. In the case of kicks from wider areas, further from the goal, the player himself is supposed to make a decision based on his performances whether he will perform a direct kick at the goal or center the ball. The research results obtained by Wright, Atkins, Polman, Jones & Sargeson (2011) indicate that approximately 36 indirect free kicks are needed to score a goal,

but 64% of the goals from indirect free kicks have a deciding influence on the outcome of the game. These findings may help coaches pay more attention to and improve the performance of a free kick.

The group of authors who dealt with the effects and effectiveness of the corner kick concluded that factors which are directly or indirectly related to success significantly affect scoring goals: Casal et al. (2015) obtained results where the variables time ($p = 0,04$), the number of attackers ($p = 0,001$), and offensive organization ($p = 0,02$) were significantly connected to corner kicks. The probability of scoring a goal might increase if at least three or four players take part in the offensive corner. This information could be of great benefit for professional football players who are interested in improving the performance of the corner kick. The authors De Baranda & Lopez-Riquelme (2012) concluded that teams use more of short center kicks for defense. When teams which are winning perform a corner kick, the defense has a tendency of having fewer defensive players.

The authors who dealt with the analysis of penalty kicks concluded: the most successful performers were those who took 4, 5 or 6 run-up steps. Penalty kicks were mostly carried out at the height of the goal keeper's waist or slightly above it. The goal keepers did not wait for the kick of the player performing the penalty shot, but instinctively chose a side to react to. One out of five penalty kicks were defended (20%; 3/15), one out of fifteen were missed (7%; 1/15), and three out of four resulted in goals (73%; 11/15). It was concluded that these analyses indicate that there are optimal individual strategies in achieving goals and defending penalty kicks (Hughes & Wells, 2002).

The group of authors who dealt with the characteristics and factors which lead to scoring goals both after a set play and from open play concluded that game interruptions could play a significant role in the final result: Simiyu (2013) reached the conclusion that at the World Cup in football held in 2010 in South Africa, more goals were scored during open play (75.86%) than after a set play (24.14%); most of the goals were scored through kicks at the goal zone (108) as opposed to jumps (26). This could lead to coaches focusing more on improving the technical and tactical game in the penalty area, but also to their paying attention to the analysis of and preparations for game interruptions, since it turned out that slightly less than 30% of the scored goals came after a set play, which is not negligible. Authors who dealt with the analysis of the European Championship in 2004, Yiannakos & Armatas (2006), indicated that the goals were achieved through an organized game and through frequency (44,1%), after a set play (35,6%), and counter-attacks (20.3%) which indicates that in this study as well, game interruptions follow right behind organized play in terms of the number of scored goals. Compared to the World Cup in 2010, at this European championship, in terms

of percentages, more goals were scored after a set play (35,6%) (Wright et al., 2011). Transitions in the game make up 63% of all the scored goals and more than one half of all the attempts at the goal zone. Slightly less than 30% of the goals were achieved after a set play. Mostly, free kicks were achieved after a set play (17%), followed by corner kicks (7%), while (5%) were penalty shots. In this research, as in the previous two, approximately 30% of the goals were scored after a set play. The authors who dealt with parameters which were deciding factors between wins, draws and losses, Castellano, Casamichana & Lago (2012), reached the conclusion that the greatest influence on whether a team will win lies in the overall number of kicks, kicks at the goal zone, and ball possession. Game interruptions did not have a statistically significant importance and deciding role in whether a team will win, reach a draw, or lose. A group of authors, Beliveau, Sakatte, Martinez, Heidermann, Chan & Kratz (2014), who analyzed the World Cup in 2014 for younger categories, determined that of the 102 scored goals, 72 were scored during open play, while 30 were scored after a set play, which makes up approximately 30% of the overall scored goals from game interruptions. They are usually corner kicks (11) and penalty kicks (8). Furthermore, the authors who dealt with the analysis of the World Cup held for younger age categories, Rutemoller, Heinrichs, Justus, Loisel, Wong & Shipanga (2014), concluded that game interruptions accounted for slightly more than 38% of the scored goals. Of the 113 goals scored, 34 were after a set play. Most of the goals scored from game interruptions were penalty kicks (9) and corner kicks (11).

CONCLUSION

In the covered systematization of the research, which was aimed at presenting the importance of game interruptions in scoring a goal at a football game by reviewing the relevant literature - the following conclusions were made:

1. Both genders, men and women, senior and junior age categories were taken into account. It has not been established that there are major deviations in the younger age categories with respect to seniors when it comes to the performance of interruptions or the way they are performed. Also, there are no significant percentage differences between men and women which are competing in the elite rankings of the competition.
2. Based on a majority of the analyzed papers, we can conclude that most of the goals were scored from corner kicks, followed by free kicks and penalty kicks. The research has shown that teams which score goals from corner kicks mostly attack with more than four

or five players and that the centering will be “shorter” when they are closer to the first goal post in the goal keeper’s space. When it comes to free kicks, they mostly depend on variables such as: the initiation zone, the number of players in the “wall”, the distance of the “wall”, etc. In the paper that analyzed penalty kicks, the players were most precise and had most success if they took between five or six run-up steps. Most players performed penalty kicks at the height of the goalkeeper’s waist.

By reviewing the current research, we can conclude that game interruptions have a significant impact on achieving goals. Approximately 30% of the goals at various competitions or championships were scored after a set play. They represent some of the standard situations of the game, and as such, special attention should be paid to them during the analysis of both the opposing team and one’s own team.

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