



Ruthless Victory: Determining the Game-Related Characteristics That Affect Winning and Losing in EuroLeague Basketball Games Decided by 1 and 2 Points

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Abstract

To win a basketball game, it is necessary to fight until the last second of the game. This study aimed to determine the game-related characteristics that directly affect winning or losing in men's basketball games decided by 1 and 2 points. The data consisted of 664 games played in the European Basketball League (Euroleague) between 2001 and 2023, covering 22 years and were tested with logistic regression analysis to find the most significant characteristics of such games. In the games decided by 1 point, fewer characteristics (points off turnover $p:0.001/\beta -0.114$, fastbreak points $p:0.000/\beta -0.214$, fouls committed $p:0.002/\beta 0.081$, fouls received $p:0.007/\beta -0.068$, points by bench $p:0.014/\beta -0.054$) were identified, while in those decided by 2 points, more characteristics (points off turnovers $p:0.000/\beta -0.205$, 2 field points percents $p:0.000/\beta -0.081$, 3 field points percents $p:0.000/\beta -0.049$, rebounds offensive $p:0.017/\beta -0.070$, rebounds defensive $p:0.000/\beta -0.135$, steals $p:0.002/\beta -0.082$, turnovers $p:0.000/\beta -0.107$, fastbreak points $p:0.000/\beta 0.193$, assists $p:0.024/\beta 0.075$) were prominent. In the games won by 1 point, more fastbreak points and fouls committed/received for home teams had the most significant impact on winning the game, while the visitors teams 3 Field points, points off turnover, points by bench and fastbreak points had the most significant impact on winning the game. Also in the games won by 2 point, more 2 field points, rebounds offensive/defensive, steals, turnovers, fastbreak points and points off turnovers for home teams had the most significant impact on winning the game, while the visitors teams 2 field points, 3 field points, rebounds defensive, assists, turnovers, fastbreak points and points off turnover had the most significant impact on winning the game. This study has helped us understand how basketball teams win games in the EuroLeague. It was observed that in closely contested games with small margins, the required game-related characteristics varied significantly for all winning teams. While there were fewer distinguishing parameters in games decided by a 1-point difference, the number of parameters increased in games decided by a 2-point difference.

Keywords: EuroLeague, game-related characteristics, loser, winner, points difference

Özet

Acımasız Zafer: EuroLeague'de 1 ve 2 Sayı ile Sonuçlanan Basketbol Maçlarında Kazanma ve Kaybetmeyi Etkileyen Oyunla İlgili Özelliklerin Belirlenmesi

Bir basketbol maçını kazanmak için oyunun son saniyesine kadar mücadele etmek gerekir. Bu çalışmanın amacı, 1 ve 2 sayı farkla sonuçlanan erkek basketbol maçlarında kazanmayı veya kaybetmeyi doğrudan etkileyen oyunla ilgili özellikleri belirlemektir. Veriler, 2001-2023 yılları arasında Avrupa Basketbol Ligi'nde (Euroleague) oynanan ve 22 yılı kapsayan 664 maçtan oluşmaktadır ve bu tür maçların en önemli özelliklerini bulmak için lojistik regresyon analizi ile test edilmiştir. 1 sayı fark ile biten maçlarda daha az basketbol karakteristik özelliğinin (top kaybindan sayı $p:0.001/\beta -0.114$, fastbreak sayıları $p:0.000/\beta -0.214$, yapılan fauller $p:0.002/\beta 0.081$, alınan fauller $p:0.007/\beta -0.068$, benchten gelen sayılar $p:0.014/\beta -0.054$) etkili olduğu tespit edilirken, 2 sayı fark ile biten maçlarda daha fazla özellik (top kaybindan sayı $p:0.000/\beta -0.205$, 2 saha sayısı yüzdesi $p:0.000/\beta -0.081$, 3 saha sayısı yüzdesi $p:0.000/\beta -0.049$, hücum ribauntları $p:0.017/\beta -0.070$, savunma ribauntları $p:0.000/\beta -0.135$, top çalma $p:0.002/\beta -0.082$, top kaybı $p:0.000/\beta -0.107$, fastbreak sayıları $p:0.000/\beta 0.193$, asist $p:0.024/\beta 0.075$) öne çıkmıştır. Bir sayı farkla kazanılan maçlarda, ev sahibi takımlar için daha fazla fastbreak sayısı ve yapılan/alınan fauller maçın kazanılmasında en önemli etkiye sahipken, deplasman takımları için 3 sayılık atış sayısı, top kaybindan elde edilen sayılar, benchten gelen oyuncuların aldığı sayılar ve fastbreak sayıları maçın kazanılmasında en önemli etkiye sahip olmuştur. Ayrıca 2 sayı farkla kazanılan maçlarda, daha fazla 2 sayılık atışlar, hücum/defans ribauntları ve top çalma özelliklerinin etkili olduğu bulunmuştur.

Anahtar kelimeler: Euro Lig, oyun karakteristikleri, kaybeden, kazanan, puan farkı

INTRODUCTION

Basketball is a popular cooperative sport in which the winner is often decided in the last minutes of the game, and it is necessary to make an effort until the last moment in order to win in games decided by a small point difference (1). Sport psychologists state that basketball players are highly vulnerable to psychological pressure in the last five minutes of the game and their performance decreases, with an even higher likelihood of performance deterioration in the final minute of the last period (2, 3, 4). Although the literature attempts to explain how and why changes in performance occur under pressure from a psychological perspective, it does not provide information about which game parameters have a greater effect on winning or losing in the last minutes of the game (5, 6).

Basketball players are expected to perform game-specific technical movements according to certain tactics (7, 8). These are technical moves used in offense and defense to score points or prevent the opponent team from scoring, such as throwing, free throws, offensive rebounds, defensive rebounds, steals, turnovers, and assists (9, 10, 11). Coaches should develop new strategies by adapting these technical moves to the style of play in order to win the game (10). This is because there are several characteristic behavioral patterns for each period or even each minute during the whole playing time (12).

Modern coaches conduct performance and match analysis of their players and teams to prepare the training process and to analyze the opposing team (13, 14, 15). It is important for coaches to identify the technical movements used by their own and opponent players during their performances that affect the outcome of the match and much research has been conducted on this subject (16, 17, 18). These studies use many statistical analysis methods to determine the characteristic movements that most affect winning and losing the game by using end-of-game outputs (19, 20, 21).

EuroLeague is one of the most popular professional basketball leagues in the world. The champion teams are known as European Champions. This study examined the results of games decided by small margins in EuroLeague seasons and tried to identify the game characteristics that affect the outcome of games. This study has different characteristics from other studies in the field because it (1) considers all games played since the beginning of the EuroLeague (5,207 games), (2) tests variables with logistic regression analysis (LRA) for the first time, and (3) analyzes game performances of home and visitor teams separately.

METHOD

Data extraction and processing

The data were collected from the boxscore, graphic stats, and shooting chart pages published after each game on the EuroLeague website (www.euroleaguebasketball.net). The study analyzed all seasons played under the name of EuroLeague after the status change (Table 1). A total of 5,252 games were played over 23 seasons, but the results of 5 games were not available. The 2019–20 season could not be completed due to the COVID-19 pandemic. In the 2021–22 season, due to the Russia-Ukraine war, some teams (CSKA Moscow, UNICS Kazan, and Zenit St Petersburg) were banned from the EuroLeague by FIBA and many games could not be played. For the purpose of this study, a total of 664 games were analyzed, including 361 games won by the home teams and 303 games won by the visitor teams.

Table 1. EuroLeague Games Decided by 1 and 2 Points between 2001 and 2023

Seasons	Matches	Points difference			Home			Visitor		
		1	2	Total	1	2	Total	1	2	Total
2001-2023	5,252	290	374	664	161	200	361	129	174	303

Note. Matches=matches played by seasons; Points difference=matches ending based on points difference; Home=matches won by home teams; Visitors=matches won by visitor teams.

In this study, 15 game characteristics were determined as variables of the study: 2 field points percent, 3 field points percent, free throws percent, rebounds (offensive), rebounds (defensive), assists, steals, turnovers, blocks, fouls (committed), fouls (received), points by bench, fastbreak points, points off turnovers, second chance points.

Statistical analysis

The study used LRA to analyze the data and the Hosmer-Lemeshow test to measure the goodness of fit of the test model. The Nagelkerke R^2 value evaluated the explanatory power of the model, considering a confidence interval 95% value. In LRA, the dependent variable is a binary variable and is used to calculate the probability of a binary outcome on one or more independent variables. Variables can be continuous, ordinal, or categorical. When creating a multivariate model, the presence of a high degree of correlation between independent variables is examined (22). The study conducted the Hosmer-Lemeshow test, which is used in risk prediction models, to test the goodness of fit in logistic regression models. The test evaluates the matching of observed and expected event rates in subgroups of the model sample. The models are referred to as the expected and observed event rates of similar subgroups (23) and a good model requires a "sig" value greater than 0.05 (24).

FINDINGS

Table 2.1 and Table 2.2. shows the differences between the winning and losing team averages according to the game characteristics used in the study for 664 EuroLeague games decided by 1 and 2 points between 2001 and 2023.

Table 2.1. Averages of Winning and Losing Teams in Games Decided by 1 and 2 Points According to Basketball Game Characteristics

		2 Field Points Percent	3 Field Points Percent	Free Throws Percent	Rebounds (Offensive)	Rebounds (Defensive)	Assists	Steals	Turnovers
1 Points	Winner	51.98	36.46	74.55	10.03	23.36	14.60	7.16	12.73
	Loser	51.13	35.49	74.30	10.43	23.11	14.34	7.19	12.79
	Difference	0.84	0.97	0.25	-0.40	0.24	0.26	-0.02	-0.06
2 Points	Winner	52.88	36.88	73.08	10.00	23.51	14.79	7.41	12.84
	Loser	50.87	35.12	74.77	10.08	22.65	14.09	7.10	13.05
	Difference	2.01	1.76	-1.69	-0.08	0.86	0.70	0.31	-0.21

Table 2.2 Averages of Winning and Losing Teams in Games Decided by 1 and 2 Points According to Basketball Game Characteristics

		Blocks	Fouls (Committed)	Fouls (Received)	Points by Bench	Fastbreak Points	Points Off Turnovers	Second Chance Points
1 Points	Winner	2.65	21.75	22.01	30.93	5.92	13.30	10.86
	Loser	2.52	22.35	21.35	29.50	5.10	14.06	11.09
	Difference	0.13	-0.60	0.66	1.43	0.82	-0.76	-0.23
2 Points	Winner	2.70	21.96	22.04	30.93	5.26	14.47	10.35
	Loser	2.52	22.20	21.80	29.57	6.04	13.43	10.08
	Difference	0.18	-0.24	0.23	1.36	-0.78	1.05	0.27

The positive averages for the teams winning the match by a 1-point difference compared with the losing teams are as follows: 2 field points percent 0.84, 3 field points percent 0.97, free throws percent 0.25, rebounds (defensive) 0.24, assists 0.26, blocks 0.13, fouls (received) 0.66, points by bench 1.43, fastbreak points 0.82. 9 mean positively differentiated and the largest average points by bench is 1.43.

The positive averages for the teams winning the match by a 2-point difference compared with the losing teams are as follows: 2 field points percent 2.01, 3 field points percent 1.76, rebounds (defensive) 0.86, assists 0.70, steals 0.31, blocks 0.18, fouls (received) 0.23, points by bench 1.36, points off turnovers 1.05, second chance points 0.27. 10 mean positively differentiated and the largest average 2 field points percent is 2.01.

InLRA, winning team values were taken as the reference point of the dependent variable (winner 0, loser 1). According to the omnibus test, when 10 parameters were taken into consideration, the chi-square value for the model coefficient was 151.038 and the p -value was 0.000 ($p < 0.05$). A p -value less than 0.05 indicates that the model is significant and good. Looking at the model summary, it can be observed that the model is relatively small based on -2 Log likelihood (2179.322), and the R^2 value (0.115) explains 11% of the variance. According to the Hosmer-Lemeshow goodness-of-fit test values, the chi-square value was 8.090 and the p -value was 0.425. The p -value being $p > 0.05$ and close to 1 indicates a good fit. Table 3 shows the statistically significant game characteristics and LRA results of all games decided and won by a 1-point difference, winning home teams and winning visitor teams.

Table 3. Game Characteristics and LRA of All Games Decided by 1 Point, Winning Home Teams and Winning Visitor Teams

Characteristic variables		β	SE	Wald	df	p	Exp(β)	95% C.I. for EXP(β)	
								Lower	Upper
All Matches	2 Field points percent	-.020	.016	1.670	1	.196	.980	.951	1.010
	3 Field points percent	-.012	.012	.990	1	.320	.988	.966	1.011
	Free throws percent	.005	.009	.255	1	.613	1.005	.987	1.023
	Rebounds (offensive)	.023	.033	.518	1	.472	1.024	.960	1.091
	Rebounds (defensive)	-.005	.027	.039	1	.843	.995	.944	1.048
	Assists	.003	.023	.012	1	.913	1.003	.957	1.050
	Steals	-.012	.028	.171	1	.679	.988	.935	1.045
	Turnovers	-.005	.028	.036	1	.849	.995	.942	1.051
	Blocks	-.061	.053	1.306	1	.253	.941	.847	1.045
	Fouls (committed)	.081	.027	9.290	1	.002	1.085	1.030	1.143
	Fouls (received)	-.068	.025	7.287	1	.007	.934	.890	.982
	Points by bench	-.022	.012	3.640	1	.056	.978	.956	1.001
	Fastbreak points	-.214	.049	18.832	1	.000	.807	.733	.889
	Points off turnovers	.114	.035	10.666	1	.001	1.121	1.047	1.201
	Second chance points	.025	.039	.395	1	.529	1.025	.949	1.106
Home	Constant	.946	1.898	.249	1	.618	2.576		
	2 Field points percent	-.028	.022	1.590	1	.207	.972	.930	1.016
	3 Field points percent	.016	.017	.839	1	.360	1.016	.982	1.050
	Free throws percent	.002	.013	.029	1	.865	1.002	.977	1.028
	Rebounds (offensive)	.017	.046	.130	1	.718	1.017	.929	1.113
	Rebounds (defensive)	.005	.038	.017	1	.896	1.005	.932	1.083
	Assists	-.030	.030	.997	1	.318	.970	.914	1.030

	Steals	-.043	.039	1.254	1	.263	.958	.888	1.033
	Turnovers	.016	.041	.154	1	.695	1.016	.938	1.101
	Blocks	-.134	.075	3.161	1	.075	.875	.755	1.014
	Fouls (committed)	.140	.038	13.698	1	.000	1.150	1.068	1.239
	Fouls (received)	-.121	.037	10.673	1	.001	.886	.824	.953
	Points by bench	-.003	.015	.044	1	.835	.997	.968	1.027
	Fastbreak points	-.141	.062	5.160	1	.023	.868	.769	.981
	Points off turnovers	.088	.045	3.821	1	.051	1.092	1.000	1.193
	Second chance points	-.030	.053	.324	1	.569	.970	.874	1.077
	Constant	.653	2.767	.056	1	.814	1.920		
Visitor	2 Field points percent	-.011	.025	.194	1	.659	.989	.942	1.039
	3 Field points Percent	-.046	.019	5.846	1	.016	.955	.921	.991
	Free throws percent	-.003	.014	.037	1	.848	.997	.969	1.026
	Rebounds (offensive)	.030	.053	.307	1	.580	1.030	.928	1.144
	Rebounds (defensive)	-.024	.044	.300	1	.584	.976	.896	1.064
	Assists	.051	.045	1.311	1	.252	1.053	.964	1.149
	Steals	.032	.051	.402	1	.526	1.033	.935	1.141
	Turnovers	-.027	.045	.377	1	.539	.973	.892	1.062
	Blocks	.018	.087	.043	1	.835	1.018	.858	1.209
	Fouls (committed)	.020	.042	.226	1	.635	1.020	.939	1.109
	Fouls (received)	-.024	.034	.497	1	.481	.976	.914	1.043
	Points by bench	-.054	.022	6.045	1	.014	.947	.907	.989
	Fastbreak points	-.284	.086	10.823	1	.001	.753	.635	.891
	Points off turnovers	.167	.065	6.481	1	.011	1.181	1.039	1.343
	Second chance points	.101	.067	2.307	1	.129	1.106	.971	1.261
	Constant	2.017	2.987	.456	1	.499	7.515		

Note. $p < 0.05$; Home=matches won by home teams; Visitor=matches won by visitor teams; β =estimated coefficient; SE=standard error of the estimate; Wald=wald value; df =degree of freedom; p =significance value; $\text{Exp}(\beta)$ =exponentiated b/odds ratio; C.I. for $\text{Exp}(\beta)$ =confidence interval for Exponentiated β /odds ratio.

In Table 3, based on the LRA results, where all games won by one point are examined together, the positive values in the β column, such as fouls (committed) and points off turnovers, indicate their influence on winning the game (since the winning team values are taken as the reference point). Conversely, the negative values, such as fouls (received) and fastbreak points, indicate their influence on losing the game. Specifically, having one unit more of fouls (committed) increases the probability of winning the game by a factor of 1.085, and having one unit more of points off turnovers increases the probability of winning the game by a factor of 1.121. Conversely, having one unit less of fouls (received) decreases the probability of losing the game by a factor of 1.07 (1/0.934), and having one unit less of fastbreak points decreases the probability of losing the game by a factor of 1.23 (1/0.807).

Considering all games of the winning home teams, three variables stand out: fouls (committed), fouls (received), and fastbreak points. Having one unit more of fouls (committed) increases the probability of winning the game by a factor of 1.150. Conversely, having one unit less of fouls (received) increases the probability of losing the game by a factor of 1.128 (1/0.886), and having one unit less of fastbreak points decreases the probability of losing the game by a factor of 1.15 (1/0.868).

Considering the games won by the visitor teams, four variables stand out: 3 field points percent, points by bench, fastbreak points, and points off turnovers. Having one unit more of points off turnovers increases the probability of winning the game by a factor of 1.181, while having one unit less of 3 field points percent increases the probability of losing the game by a factor of 1.047 (1/0.955). Similarly, having one unit less of points by bench increases the probability of losing the game by a factor of 1.055 (1/0.947), and having one unit less of fastbreak points increases the probability of losing the game by a factor of 1.328 (1/0.753).

Table 4 shows the statistically significant game characteristics and LRA results of all games decided and won by a 2-point difference, winning home teams and winning visitor teams.

Table 4. Game Characteristics and LRA of All Games Decided by 2 Points, Winning Home Teams and Winning Visitor Teams

	Characteristic variables	β	SE	Wald	df	p	Exp(β)	95% C.I. for EXP(β)	
								Lower	Upper
All Matches	2 Field points Percent	-.081	.014	31.428	1	.000	.922	.897	.949
	3 Field points Percent	-.049	.010	21.998	1	.000	.952	.933	.972
	Free throws percent	.009	.007	1.419	1	.234	1.009	.994	1.024
	Rebounds (offensive)	-.070	.030	5.671	1	.017	.932	.880	.988
	Rebounds (defensive)	-.135	.023	33.905	1	.000	.874	.835	.914
	Assists	.025	.022	1.336	1	.248	1.026	.982	1.071
	Steals	-.082	.026	9.826	1	.002	.921	.875	.970
	Turnovers	.107	.026	17.117	1	.000	1.113	1.058	1.171
	Blocks	-.043	.047	.812	1	.368	.958	.873	1.051
	Fouls (committed)	.027	.023	1.330	1	.249	1.027	.982	1.074
	Fouls (received)	-.021	.023	.816	1	.366	.979	.935	1.025
	Points by bench	.001	.009	.012	1	.914	1.001	.983	1.020
	Fastbreak points	.193	.038	26.008	1	.000	1.213	1.126	1.306
	Points off Turnovers	-.205	.035	35.172	1	.000	.815	.761	.872
	Second chance Points	-.031	.036	.780	1	.377	.969	.904	1.039
	Constant	9.835	1.625	36.630	1	.000	18671.912		
Home	2 Field points Percent	-.070	.021	11.058	1	.001	.932	.895	.972
	3 Field points percent	-.024	.015	2.611	1	.106	.976	.948	1.005
	Free throws percent	.002	.011	.043	1	.836	1.002	.981	1.024
	Rebounds (offensive)	-.128	.042	9.117	1	.003	.880	.809	.956
	Rebounds (defensive)	-.119	.034	12.452	1	.000	.888	.831	.949
	Assists	-.031	.032	.948	1	.330	.969	.910	1.032
	Steals	-.092	.038	5.875	1	.015	.913	.847	.983
	Turnovers	.112	.038	8.888	1	.003	1.119	1.039	1.205
	Blocks	-.078	.073	1.140	1	.286	.925	.803	1.067
	Fouls (committed)	.042	.033	1.631	1	.202	1.043	.978	1.111
	Fouls (received)	-.057	.033	2.917	1	.088	.945	.885	1.008
	Points by bench	.015	.015	.971	1	.325	1.015	.986	1.045
	Fastbreak points	.302	.072	17.585	1	.000	1.352	1.174	1.557
	Points off Turnovers	-.386	.074	27.565	1	.000	.680	.588	.785
	Second chance Points	-.039	.055	.494	1	.482	.962	.863	1.072
	Constant	11.629	2.489	21.824	1	.000	112353.471		
Visitor	2 Field points Percent	-.100	.022	19.945	1	.000	.905	.866	.946
	3 Field points Percent	-.080	.017	21.945	1	.000	.923	.893	.955
	Free throws percent	.017	.011	2.283	1	.131	1.017	.995	1.040
	Rebounds (offensive)	.000	.047	.000	1	.992	1.000	.912	1.096
	Rebounds (defensive)	-.146	.035	17.019	1	.000	.864	.806	.926
	Assists	.075	.033	5.076	1	.024	1.078	1.010	1.152
	Steals	-.078	.042	3.538	1	.060	.925	.852	1.003
	Turnovers	.101	.040	6.328	1	.012	1.106	1.023	1.197
	Blocks	.011	.068	.028	1	.868	1.011	.885	1.156
	Fouls (committed)	.004	.036	.012	1	.911	1.004	.936	1.077
	Fouls (received)	.022	.036	.355	1	.551	1.022	.952	1.097
	Points by bench	-.016	.014	1.325	1	.250	.984	.958	1.011
	Fastbreak points	.146	.048	9.081	1	.003	1.157	1.052	1.272
	Points off Turnovers	-.131	.042	9.738	1	.002	.877	.808	.953
	Second chance Points	-.053	.050	1.116	1	.291	.948	.859	1.047
	Constant	10.032	2.424	17.126	1	.000	22733.256		

Note. $p < 0.05$; Home=matches won by home teams; Visitor=matches won by visitor teams; β =estimated coefficient; SE=standard error of the estimate; Wald=wald value; df=degree of freedom; p =significance value; Exp(β)=exponentiated b/odds ratio; C.I. for Exp(β)=confidence interval for Exponentiated β /odds ratio.

In Table 4, based on the LRA results, where all games won by two points are examined together, the number of significant game characteristics increases. The variables turnovers and fastbreak points were effective for winning with significant positive results, while the variables 2 field points percent, 3 field points

percent, rebounds (offensive), rebounds (defensive), steals, and points off turnovers had significant negative results, indicating their effectiveness in losing.

Therefore, having one unit more of turnovers increases the probability of winning the game by a factor of 1.113, and having one unit more of fastbreak points increases the probability of winning the game by a factor of 1.213. Similarly, having one unit less of 2 field points percent decreases the probability of losing the game by a factor of 1.084 (1/0.922), having one unit less of 3 field points percent decreases the probability of losing the game by a factor of 1.050 (1/0.952), having one unit less of rebounds (offensive) decreases the probability of losing the game by a factor of 1.072 (1/0.932), and having one unit less of rebounds (defensive) decreases the probability of losing the game by a factor of 1.144 (1/0.874). In addition, having one unit less of steals decreases the probability of losing the game by a factor of 1.085 (1/0.921), and having one unit less of points off turnovers decreases the probability of losing the game by a factor of 1.226 (1/0.815).

Considering all games of the winning home teams, seven game characteristics were found to be significant. Having one unit more of turnovers increases the probability of winning the game by a factor of 1.119, and having one unit more of fastbreak points increases the probability of winning the game by a factor of 1.352. Similarly, having one unit less of 2 field points percent decreases the probability of losing the game by a factor of 1.072 (1/0.932), having one unit less of rebounds (offensive) decreases the probability of losing the game by a factor of 1.113 (1/0.880), having one unit less of rebounds (defensive) decreases the probability of losing the game by a factor of 1.126 (1/0.888), having one unit less of steals decreases the probability of losing the game by a factor of 1.095 (1/0.913), and having one unit less of points off turnovers decreases the probability of losing the game by a factor of 1.470 (1/0.680).

Considering all games of the winning visitor teams, seven game characteristics were found to be significant. Having one unit more of assists increases the probability of winning the game by a factor of 1.078, having one unit more of turnovers increases the probability of winning the game by a factor of 1.106, and having one unit more of fastbreak points increases the probability of winning the game by a factor of 1.157. Similarly, having one unit less of 2 field points percent decreases the probability of losing the game by a factor of 1.104 (1/0.905), having one unit less of 3 field points percent decreases the probability of losing the game by a factor of 1.083 (1/0.923), having one unit less of rebounds (defensive) decreases the probability of losing the game by a factor of 1.157 (1/0.864), and having one unit less of points off turnovers decreases the probability of losing the game by a factor of 1.140 (1/0.877).

Table 5. Game Characteristics That Affect the Winning of Home and Visitor Teams in Games Decided by 1 and 2 Points			
1 point		2 points	
All matches	Fouls (committed)	All matches	2 Field points
	Fouls (received)		3 Field points
	Fastbreak points		Rebounds (offensive)
	Points off turnover		Rebounds (defensive)
Home	Fouls (committed)	Home	Steals
	Fouls (received)		Turnovers
	Fastbreak points		Fastbreak points
Visitor	3 Field points		Points off turnover
	Points off turnover		2 Field points
	Points by bench		Rebounds (offensive)
	Fastbreak points		Rebounds (defensive)
			Steals
			Turnovers
			Fastbreak points
			Points off turnover
		Visitor	2 Field points
			3 Field points
			Rebounds (defensive)
			Assists
			Turnovers
			Fastbreak points
			Points off turnover

DISCUSSION AND CONCLUSION

The most significant factor that ensures victory is the ability to perform the fundamental techniques (game characteristics) specific to each sports branch within the game. Basketball has many game characteristics specific to itself. In games where one of the teams is significantly superior, it is known that the winning team performs the fundamental game characteristics perfectly. However, in games where the teams have similar strengths and the results are very close, it is not known which fundamental game characteristics affect winning the game. This study examined 15 fundamental basketball techniques and investigated which fundamental techniques would have a greater impact on winning the game in games decided by a 1-point and 2-point difference.

In the games decided by a 1-point difference, four parameters stand out, among which fastbreak points parameter affects both the whole game and winning the game for both home and visitor teams. For the winning home teams, both fouls committed and fouls received were differentiated, while for the winning visitor teams, points by bench, 3 field points, and points off turnovers were also important parameters. It is understood that visiting teams try to accelerate the game, while home teams try to slow down and control the offense.

In the games decided by a 2-point difference, the number of differentiated parameters increased. Thus, it can be considered that the parameters will increase as the point difference increases. Considering the results of both winning home and visitor teams in all games, game-related characteristics such as points off turnovers and fastbreak points were the most important parameters in winning the game, while the rebounds (defensive) parameter also had a significant impact on visitor teams winning the game. Moreover, the assist parameter had also differentiated for the first time when visitor teams won the game.

In a research study conducted on NCAA Division I men's basketball games, it was found that winning teams played with a higher 3-point shooting percentage, defensive rebounds, and steals, while losing teams attempted more 3-point shots and committed more personal fouls (8). In U-16 games involving teams with similar strengths, it was emphasized that turnovers and assists are more important, and due to less ball possession time, a faster-paced and higher-tempo game is played, with an emphasis on 2-point shots and defensive rebounds (11). This result explains the importance of the fastbreak points parameter suggested in our study. Another study states that the variables that best distinguish winners from losers are defensive rebounds and assists (26); a different study suggests that having a greater number of players who can secure rebounds directly affects the outcome of the game (27). In a separate study conducted to determine the factors that differentiate winners from losers, assists, defensive rebounds, and successful 2-point and 3-point shooting were highlighted in regular season games for winning teams, while in playoff games, winning teams established dominance with more defensive rebounds (28).

It has been found that free throws play a crucial role in determining the outcome of the game in the last minutes of games where the score difference was less than 3 points and in games played in overtime. Similarly, in NBA games decided by a 1-point difference, players tend to miss more free throws (16, 25). However, according to the results of the present study, game-related characteristics used throughout the entire game have a greater impact on winning the game, and free throws used only in the final stages of the game are not sufficient to secure a win. Considering that the free throws used throughout the game are caused by fouls, it can be said that the results of our study will directly affect winning.

Looking at player performances in the final moments of close-scoring games with high game pressure, it has been found that when a player is choking in one part of the game, this can affect other actions such as dribbling, passing, or ball handling (29). As players make more mistakes and fouls during choking phases of the game, free throws, which are considered to change the outcome of the game, also increase. The results of the present study showed that the number of fouls committed and received might affect the outcome of the match.

It is very unlikely for any basketball team to win a game without rotating its starters. Player rotation is more frequent in the EuroLeague compared with the NBA, allowing different players' skills to be utilized for scoring (30). Teams tend to have better scoring performance after player substitutions, and especially player substitutions made in the first and third quarters have a higher impact on the score, while in the fourth

quarter, the impact is lower (31). According to the results of this study, in the games between teams of equal strength, the visitor team needs more contribution from players coming off the bench to win.

Coaches tend to choose players who have fewer turnovers during the game (32). While some studies indicate that turnovers do not have a significant impact on winning (20), a study comparing experienced and inexperienced players suggested that turnovers do have a direct impact on the outcome, with experienced players committing fewer turnovers (33). In a research study that examined offensive and defensive performance as determinants of winning, possession of the ball and the turnover rate were identified as the third most important criteria (34). In games where teams have similar defensive rebounds, turnovers have the most significant impact on winning (32). One clear result from this study is that points off turnovers are the most significant determinant of winning.

This study has helped us understand how basketball teams win games in the EuroLeague. It was observed that in closely contested games with small margins, the required game-related characteristics varied significantly for all winning teams. While there were fewer distinguishing parameters in games decided by a 1-point difference, the number of parameters increased in games decided by a 2-point difference. Coaches can use these distinguishing variables as reference points in their training and matches based on the characteristics and difficulty level of their opponents.

REFERENCES

- García-Manso JM. Martín-González JM. Guerra YS. Valverde T. Jiménez SL. Last minute in NBA games. *Revista de Psicología del Deporte*. 2015; 24(1):31-35.
- Bar-Eli M. Psychological performance crisis in competition. 1984-1996: A review. *Eur Yearbook Sport Psych*. 1997; 1:73-112.
- Bar-Eli M. Tractinsky N. Criticality of game situations and decision making in basketball: An application of performance crisis perspective. *Psych Sport Ex*. 2000; 1:27-39.
- Solomonov Y. Avugos S. Bar-Eli M. Do clutch players win the game? Testing the validity of the clutch player's reputation in basketball. *Psych Sport Ex*. 2015; 16:130-138.
- Baumeister RF. Choking under pressure: self-consciousness and paradoxical effects of incentives on skilful performance. *J Personality Social Psych*. 1984; 46: 610-620.
- Beilock SL. Gray R. Why do athletes "choke" under pressure? In G Tenenbaum. RC Eklund (Eds.). *Handbook of sport psychology* (3rd ed., 425-444). Hoboken. NJ: Wiley; 2007.
- Conte D. Favero TG. Lupo C. Francioni FM. Capranica L. Tessitore A. Time-motion analysis of Italian elite women's basketball games: Individual and team analyses. *J Strength Cond Res*. 2015; 29(1):144-150.
- Conte D. Tessitore A. Gjullin A. Mackinnon D. Lupo C. Favero T. Investigating the game-related statistics and tactical profile in NCAA division I men's basketball games. *Biology of Sport*. 2018; 35(2):137-143.
- Şentuna M. Şentuna N. Özdemir N. Serter K. Özen G. The investigation of the effects of some variables in the Playoff games played in Turkey women's basketball super league between 2013-2017 on winning and Losing. *Physical education of students*. 2018; 22(3):146-150.
- Çene E. What is the difference between a winning and a losing team: insights from Euroleague Basketball. *International Journal of Performance Analysis in Sport*. 2018;18(1):55-68.
- Lorenzo A. Gómez MA. Ortega E. Ibáñez SJ. Sampaio J. Game related statistics which discriminate between winning and losing under-16 male basketball games. *Journal of Sports Science and Medicine*. 2010;9:664-668.
- Gomez MA. Gasperi L. Lupo C. Performance analysis of game dynamics during the 4th game quarter of NBA close games. *International Journal of Performance Analysis in Sport*. 2016;16:249-263.
- Hughes M. Franks IM. Notational Analysis of Sport. Systems for better coaching and performance in sport. *J Sports Sci Med*. 2004;3(2):104.
- Leite N. Baker J. Sampaio J. Paths to expertise in Portuguese national team athletes. *J Sports Sci Med*. 2009;8(4):560-566.
- Ortega E. Villarejo D. Palao JM. Differences in game statistics between winning and losing rugby teams in the six nations tournament. *J Sports Sci Med*. 2009;8(4):523-527.
- Gómez MA. Avugos S. Oñoro MA. Lorenzo A. Bar-Eli M. Shaq is Not Alone: Free-Throws in the Final Moments of a Basketball Game. *Journal of Human Kinetics*. 2018; 62(1):135-144.
- Leicht AS. Gomez MA. Woods CT. Explaining match outcome during the men's basketball tournament at the olympic games. *Journal of Sports Science and Medicine*. 2017; 16:468-473.
- Milanovic D. Stefan L. Sporis G. Vuleta D. Selmanovic A. Effects of situational efficiency indicators on final outcome among male basketball teams on the Olympic games in London 2012. *Acta Kinesiológica*. 2016; 10(1):78-84.
- Garcia J. Ibanez SJ. Gomez MA. Sampaio J. Basketball Game-related statistics discriminating ACB league teams according to game location, game outcome and final score differences. *International Journal of Performance Analysis in Sport*. 2014; 14(2). 443-452.
- Ibanez S. Sampaio J. Feu S. Lorenzo A. Gomez M. Ortega E. Basketball game-related statistics that discriminate between teams' season-long success. *European Journal of Sport Science*. 2008; 8(6):369-372.
- Courel-Ibanez J. McRobert AP. Toro EO. Velez DC. Inside pass predicts ball possession effectiveness in NBA basketball. *International Journal of Performance Analysis in Sport*. 2016; 16(2):711-725.
- Sperandei S. Understanding logistic regression analysis. *Biochemia Medica*. 2014; 24(1):12-8.
- Hosmer DW. Lemeshow S. *Applied Logistic Regression*. John Wiley and Sons. 2000. New York. USA.

24. Kılıç S. Binary Logistic Regression Analysis. *Journal of Mood Disorders*. 2015;5(4). 191-194.
25. Worthy DA, Markman AB, Maddox WT. Choking and excelling at the free-throw line. *International Journal Creativity Problem Solving*, 2009; 19: 53-58.
26. Gómez MA, Lorenzo A. Sampaio J. Ibáñez SJ. Ortega E. Game-related statistics that discriminated winning and losing teams from the Spanish men's professional basketball teams. *Coll Antropol*, 2008; Jun; 32(2): 451-6.
27. Ribas RL Navarro R. Tavares F. and Gómez MA. Analysis of Number of Players Involved in Rebound Situations in Euroleague Basketball Games. *The Open Sports Sciences Journal*, 2011, (4), 10-13.
28. García J. Ibáñez SJ. Santos RM. Leite N. Sampaio J. Identifying Basketball Performance Indicators in Regular Season and Playoff Games. *Journal of Human Kinetics*. 2013, 36, 161-168.
29. Hill DM. Hanton S. Fleming S. & Matthews N. A re-examination of choking in sport. *European Journal of Sport Science*, 2009, 9, 203-212.
30. Mandić R. Jakovljević S. Erčulj F. and Strumbelj E. Trends in NBA and Euroleague basketball: Analysis and comparison of statistical data from 2000 to 2017. *Plos One* 2019;14(10).
31. Gómez MA. Silva R. Lorenzo A. Kreivyte R. & Sampaio J. Exploring the effects of substituting Basketball players in high-level teams. *Journal of Sports Sciences*. 2017, 35(3), 247-254.
32. Zhang S. Modelling and Simulation in Game Performances of Basketball Players and Teams in the National Basketball Association. 2019. Doctoral Thesis. Universidad Politécnica de Madrid, INEF. Spain.
33. Sampaio J. Drinkwater E. and Leite N. Effects of season period, team quality, and playing time on basketball players' game-related statistics. *European Journal of Sport Science*. 2010, 10(2), 141-149.
34. Kubatko J. Oliver D. Pelton K. and Rosenbaum DT. A Starting Point for Analyzing Basketball Statistics. *Journal of Quantitative Analysis in Sports*. 2007, 3(3), 1-22.