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The Influence of Game-Related Statistics on the Final Results in FIBA Global and Continental Competitions

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Abstract: Sport, particularly in the realm of professional competition, is a domain of human endeavor that is increasingly dependent on the use of analytical statistical information. Consequently, mathematics and statistics are becoming increasingly crucial elements in sports. Although experts recognize the importance of analytics in women's basketball, the literature addressing this subject remains limited. The objective of this study is to employ quantitative methodologies to discover prevailing patterns in global women's basketball representation. The entities examined in this article were the games contested during the 2021 Olympic Games, the 2022 World Cup, and the 2023 continental championships. Two regression models were created for the research, using thirteen standard variables observed in the game. The evaluation of the regression model was conducted using the stepwise regression method, incorporating dimensionality reduction based on the outcomes of factor analysis. Among the 14 models that were observed, 13 of them exhibited strong and moderate linkages, while only 1 displayed weak connections and lacked statistical significance. The primary factors that account for the disparity between winning and losing teams in games are primarily associated with shooting accuracy toward the basket. When examining individual championships, the percentage surpassed 50% in all cases except for AfroBasket. However, when considering the overall results, the significance of shooting rose to 86%. The variable representing offensive rebound efficiency had a significant influence on the outcome, being present in all individual competitions, whereas defensive rebound efficiency was only considered in the overall results.

Keywords: basketball; national teams; quantitative analysis; team sports

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1. Introduction

The science of specific technical and tactical requirements of basketball players has advanced in recent decades, leading to a rise in studies measuring these aspects during games. Historically, basketball was introduced at Smith College in 1892 by instructor Senda Berenson, shortly after its invention by James Naismith in December 1891. The first official women's basketball game at Smith College occurred in March 1893. The inaugural international women's basketball tournament, the European Women's Basketball Championship, was held in Rome in October 1938 [1,2]. The first official men's national competition was the South American Championship, held in Santiago de Montevideo in December 1930 [3]. Additionally, several early studies on game-related statistics (GRS) in basketball used data from women's basketball games [4–7], with one study specifically examining disparities in the data collected from men's and women's games [8].

Some of the studies concentrating on GRS examined the performance of players and teams in games and their effectiveness [9]. Research on GRS often focuses on identifying the factors that differentiate winning teams from losing teams. This analysis of indicators is crucial in determining the distinction between winners and losers in a game or competition. Data science is an influential instrument that aids decision-makers in making informed judgments by utilizing a vast amount of accessible information. Essentially, sports analytics is a strong partnership between sports professionals and data scientists. This collaboration aims to give decision-makers and coaches a competitive edge. The current decision-making processes rely on the outcomes of data science as well as the expertise and knowledge of experts [10]. There is no disagreement that these evaluations offer coaches significant information on the effectiveness of players or teams during a game or full tournament [11]. Nevertheless, it is important to note that relying solely on analytics does not guarantee that a team will reach optimal outcomes, as shown by the statistics [12].

While Miguel-Ángel Gòmez et al. [13] highlighted the significance of studying women's basketball using game-related statistics, there remains a lack of research publications on this subject [14]. The source of this phenomenon remains uncertain, as the evidence indicates that women have not fallen behind men in this particular athletic pursuit.

Prior research on GRS in women's basketball has analyzed situational parameters, including differences between domestic and foreign players in the Women's Basketball EuroLeague [15], as well as between starters and substitutes [13]. Studies have also focused on GRS in national championships [16–20] and comparisons between men's and women's basketball [21,22].

Most published works on gender role stereotypes (GRST) in women's basketball have examined representative games, such as the Olympic Games [23–27], continental championships [14,28–33], Youth Olympic Games [34], and World Championships [35]. Only two studies have compared outcomes in various representative competitions [31,32], and two others have compared disparities between representative competitions and national championships [23,35]. This study aims to analyze the Global Ranking System (GRSY) of key international women's basketball competitions from 2021 to 2023 to detect current trends in women's representative basketball internationally and women's basketball overall.

2. Materials and Methods

2.1. Data

The sample entities for this study included games from the 2021 Summer Olympics women's basketball competition, the 2022 Women's Basketball World Cup, and the 2023 FIBA continental championships. Table 1 describes essential information about these competitions.

Table 1. Basic information about women's basketball national team's competitions 2021–2023.

Competition	Number of Games	Place and Time	Teams (World Ranking)
39th EuroBasket 2023	39 games	Israel–Tel Aviv and Slovenia–Ljubljana 15–25 June	(n = 16): Belgium (6), Czech Republic (22), France (7), Germany (25), Great Britain (21), Greece (17), Hungary (18), Israel (49), Italy (15), Latvia (29), Montenegro (24), Serbia (10), Slovenia (26), Spain (4), Slovakia (28), and Turkey (14).
17th AmeriCup 2023	28 games	Mexico–León 1–9 July	(n = 10): Argentina (31), Brazil (8), Canada (5), Columbia (30), Cuba (40), the Dominican Republic (35), Mexico (43), Puerto Rico (12), the USA (1), and Venezuela (42).
26th AfroBasket 2023	28 games	Rwanda–Kigali 25 July–5 August	(n = 12): Angola (41), Cameroon (39), Congo DR (71), Egypt (38), the Ivory Coast (45), Guinea (83), Mali (16), Mozambique (32), Nigeria (11), Rwanda (74), Senegal (20), and Uganda (57).
30th Asia Cup 2023 (A)	20 games	Australia–Sydney 26 June–2 July	(n = 8): Australia (3), China (2), Chinese Taipei (33), Japan (9), Lebanon (47), New Zealand (23), the Philippines (37), and South Korea (13).
30th Asia Cup 2023 (B)	20 games	Thailand–Bangkok 13–19 August	(n = 8): Jordan (59), Indonesia (51), Iran (52), Kazakhstan (70), Malaysia (72), Mongolia (91), Sri Lanka (115), and Thailand (62).
Olympic Games 2020 (2021)	26 games	Japan–Saitama 25 July–8 August	(n = 12): Australia (3), Belgium (6), Canada (5), China (2), France (7), Japan (9), Nigeria (11), Puerto Rico (12), Serbia (10), South Korea (13), Spain (4), and the USA (1).
19th Word Cup 2022	38 games	Australia–Sydney 22 September–1 October	(n = 12): Australia (3), Belgium (6), Bosnia and Herzegovina (17), Canada (5), China (2), France (7), Japan (9), Mali (16), Puerto Rico (12), Serbia (10), South Korea (13), and the USA (1).

These competitions included sixty-eight women's national teams representing all five FIBA zones. According to the official FIBA website, the organization has 211 national federations. This means that the competitions included 32.23% of national federations. If we look at the Women's Ranking (WR) following the FIBA Women's World Cup Qualifying Tournaments (last updated: 21 August 2023) on the same page, we can see that 116 ranked teams competed, with Sri Lanka finishing 115th in the WR. This indicates that, according to the official FIBA team ranking, 58.6% of national teams competed in monitored competitions over the last two years.

When we look at the continental championship participants, we can see that Israel (WR 49) is the lowest-ranked team from FIBA Europe competing in the 38th EuroBasket Women 2023, but if we exclude the fact that this team qualified for the championship as the host, Latvia (WR 29) is the lowest-ranked. Only two higher-ranked teams were absent: Bosnia and Herzegovina (WR 17) and Sweden (WR 27). The same goes for the remaining FIBA zones. Mexico (WR 43) was the lowest-ranked team in the 17th FIBA Women's AmeriCup 2023, with no higher-ranked team absent. Regarding the 30th FIBA Women's Asia Cup, if we analyze Division A and Division B individually, in the highest-quality Asian tournament (Division A), no team was absent because Lebanon (WR 47) was the lowest-ranked participant, and no higher-ranked team was absent.

Rwanda (WR 74) was the lowest-ranked team competing in the 26th AfroBasket Women, with Kenya (WR 63) being the only higher-ranked team absent. Comparing these data to the current WR, we may deduce that these representative competitions were attended by 94% of the highest-ranked teams, omitting the Asia Cup B Division. It is worth noting that, starting in 2017, the Asian Championships and the FIBA Oceania Championship have amalgamated to form the FIBA Asia Cup.

South Korea (WR 13) was the lowest-ranked women's national team at the Tokyo Olympics; hence, only the top 13 teams competed, except Brazil (WR 8). In other words, 92.3% of the highest-ranked teams competed, with no team finishing lower than 13th place.

The Bosnia and Herzegovina national team (WR 17) finished last at the 19th FIBA Women's Basketball World Cup in 2022. When studying this championship, we must exercise caution because, instead of the two teams who qualified through qualifying (Russia WR 12 from 2022 and Nigeria WR 11), Puerto Rico and Mali were given wild cards. Five higher-ranked teams were absent from this competition (Spain WR 4, Brazil WR 8, Nigeria WR 11, Turkey WR 14, and Italy WR 15), resulting in a participation rate of 70.6% among the top teams.

During the observation era, one team could compete in three championships: the continental, the Olympic competition, and the World Cup. Australia, Belgium, Canada, China, France, Japan, Puerto Rico, Serbia, South Korea, and the United States each made three appearances. Mali and Spain had two outings each. All of the information shown above indicates that the sample in this study is representative.

The first model includes characteristics that are commonly tracked during basketball games. Gilles Celeux and Valérie Robert [36] stated that, following each game, a box score is available, which provides each player and team with measurable data on 15 criteria. These are the manifest variables extracted from the FIBA official website, where the data are housed. The first model's variables indicate the disparities between the winning and losing teams in the game: ΔPTS represents total points. X1 = ΔA2 (two points attempted), X2 = ΔM2 (two points made), X3 = ΔA3 (three points attempted), X4 = ΔM3 (three points made), X5 = ΔAFT (free throws), X6 = ΔMFT (free throws made), X7 = ΔDR (defensive rebounds), X8 = ΔOR (offensive rebounds), X9 = ΔAS (assists), X10 = ΔPF (personal fouls), X11 = ΔTO (turnovers), X12 = ΔST (steals), and X13 = ΔBS (block shots).

The second model is based on variables from the first model and was created by authors who studied GRS in basketball [37–40].

The second model has variable efficiency and focuses on the interaction of time and space. X1 = Δ2% (two-point efficiency, =(M2/A2) × 100), X2 = Δ3% (three-point efficiency, = (M3/A3) × 100), X3 = ΔFG% (field goal efficiency, = [((M2 + M3))/((A2 + A3))] × 100), X4 = ΔFT% (two free throw efficiency, =(FTM/AFTA) × 100), X5 = ΔDR% (efficiency of defensive rebound, =[DR/(DR + OR_opp)] × 100), X6 = ΔOR% (efficiency of offensive rebound, =[OR/(OR + DR_opp)] × 100), X7 = ΔAS% (efficiency od assist, =[AS/(M2 + M3)] × 100), X8 = ΔTO% (inefficiency of turnover, =(TO/POSS) × 100), X9 = ΔST% (efficiency of steal, =(ST/POSS_opp) × 100), and X10 = ΔBS% (efficiency of block shot, =(BS/A2) × 100). Possessions were calculated by the formula POSS = A2 + A3 + 0.44 × AFT + TO-OR.

The regression models used in this analysis are given by the expression:

$$\Upsilon_i = \beta_0 + \sum_{i=1}^{j} \beta_j X_{ji} + \varepsilon_j$$

For the purpose of this research, two regression models have been formed. The first model is as follows:

ΔPTS = f(ΔA2, ΔM2, ΔA3, ΔM3, ΔAFT, ΔMFT, ΔDR, ΔOR, ΔAS, ΔPF, ΔTO, ΔST, ΔBS)

The second model is as follows:

ΔPTS = f(Δ2%, Δ3%, ΔFG%, ΔFT%, ΔDR%, ΔOR%, ΔAS%, ΔTO%, ΔST%, ΔBS%)

2.2. Statistical Analysis

Data were analyzed using the program SPSS 25.0 (Statistical Package for the Social Sciences Inc., Chicago, IL, USA). According to basketball rules, a team that scores the highest number of points emerges victorious. In our research, we adhered to this rule by employing the difference in points scored (ΔPTS) as the dependent variable in regression models. This discrepancy is the consequence, or rather a function, of all the game parameters being tracked. Thus, the difference in the game's final result is due to all observable game characteristics. One of the challenges of modeling is determining the best set of independent variables to include. The coefficients of simple linear correlation provide preliminary information about the relationships between observable variables. However, because these coefficients cannot capture the complicated links between several observed variables, this information can only be used as a starting point for further investigation into complex correlation relationships.

The regression models were evaluated using the Stepwise Regression Method. Before the regression approach, outliers with z-scores greater than 3.3 were discovered and eliminated from further research. Outliers were found during the stepwise regression approach using Cook's distance (values greater than 1) and removed from the analysis, following which the model parameters were re-evaluated. Confidence intervals were determined using a 95% confidence level. In stepwise regression, the F level = 0.05 was used to include a variable and F = 0.10 to exclude it. Diagnostic tests were performed to assess multicollinearity, heteroskedasticity, and autocorrelation. Furthermore, multiple correlation coefficients, multiple determination coefficients, modified multiple determination coefficients, and partial correlation coefficients were computed.

Given the sample size and number of variables involved, dimensional reduction was carried out for each game using factor analysis results. This was accomplished by regressing the generated factors, or their factor scores, on the relevant subsets of independent original variables, using the standardized regression coefficients from the regressions and the accompanying partial correlation coefficients.

Dimensional reduction in the indicated way was not conducted for all contests studied jointly because the sample size was sufficient to incorporate all independent variables in the assessed models. Based on the decreased number of variables, appropriate regression models were developed, and the statistical significance of the resulting models as a whole and for individual parameters was determined using the t-test and analysis of variance. Based on the estimated regression models, i.e., the standardized values of the regression coefficients from those models, as well as the corresponding values of the partial correlation coefficients, the statistical significance of the included variables and their level of importance in determining the dependent variable, i.e., the achieved differences in the number of points scored, were calculated.

It is also significant to highlight that all steps in the quantitative analysis were accompanied by continuous qualitative analysis, taking into account the postulates of theoretical foundations in basketball, as well as empirical experiences in this field.

3. Results

When all contests were combined, six outliers were found, three for each model. When looking at the individual events, only one outlier was found: the FIBA Asia Cup Women. During the regression analyses, three outliers were discovered using COOK's distance. All of these games were excluded from further investigation.

Based on the partial correlation coefficient, it is possible to deduce that the variables that had the biggest influence on the final result in the monitored competitions, in the first model, were ΔM2—two points made ($\beta = 0.892$; $p < 0.001$) with partial correlation $r_p = 0.996$; ΔM3—three points made ($\beta = 0.769$; $p < 0.001$) with partial correlation $r_p = 0.996$; and ΔMFT—free throws made ($\beta = 0.426$; $p < 0.001$) with partial correlation $r_p = 0.979$. In the second model, the variables that had the largest influence on the final outcome were as follows: ΔFG%—field goal efficiency (β = 0.334; $p < 0.001$) with partial correlation $r_P = 0.262$; ΔTO%—inefficiency of turnover (β = −0.445; $p < 0.001$) with partial correlation $r_P = -0.833$; ΔDR%—efficiency of defensive rebound (β = 0.400; $p < 0.001$) with partial correlation r_P = 0.802; Δ3%—three-point efficiency (β = 0.308; $p < 0.001$) with partial correlation $r_P = 0.438$; and Δ2%—two-point efficiency (β = 0.305; $p < 0.001$) with partial correlation $r_P = 0.273$. In addition to standardized betas and significance, the value of partial correlation (r_P) is highlighted, which expresses the influence of certain variables on the game's final outcome. In the first model, all three obtained variables have a very high correlation. In the second model, two acquired variables have a strong correlation (ΔTO% and ΔDR%), with ΔTO% having a negative correlation. The variable Δ3% has a substantial correlation, while two other variables (ΔFG% and Δ2%) have a minor correlation.

Figures S1 (Model 1) and S2 (Model 2) (Supplementary Materials) display the final models for each competition, with ΔPTS as the dependent variable and independent variables obtained through factor and regression analysis to reduce dimensionality.

Table 2 shows 10 models with R^2 values over 0.640, indicating a high level of determination of ΔPTS in relation to the independent variables. Three models demonstrate moderate relationships, while one model displays poor associations. The analysis of variance and F-statistic results indicate that all regression models are highly significant ($p <$ 0.05), with the exception of the 17th AmeriCup 2023 model ($p > 0.05$).

Table 2. Number of iterations, value of adjusted coefficient of multiple determination, analysis of variance result (F-test and accompanying *p*-value), and maximum Cook's distance between Model 1 and Model 2 in the observed competitions.

Competition	Stepwise Iteration	R^2	F	*p*	Cook's
		MODEL 1			
Competitions 2021–2023	5	0.999	540.069	0.000	0.545
Olympic Games 2020 (2021)	2	0.598	19.628	0.000	0.676
19th Word Cup 2022	5	0.953	150.791	0.000	0.161
26th AfroBasket 2023	1	0.592	8.843	0.000	0.368
17th AmeriCup 2023	1	0.154	1.821	0.143	0.737
30th Asia Cup 2023	1	0.794	25.466	0.000	0.242
39th EuroBasket 2023	4	0.745	28.721	0.000	0.291
		MODEL 2			
Competitions 2021–2023	6	0.907	0.907	309.733	0.000
Olympic Games 2020 (2021)	2	0.384	0.384	8.801	0.001
19th Word Cup 2022	5	0.960	0.960	176.610	0.000
26th AfroBasket 2023	3	0.784	0.784	33.574	0.000
17th AmeriCup 2023	4	0.902	0.902	62.901	0.000
30th Asia Cup 2023	3	0.723	0.723	33.993	0.000
39th EuroBasket 2023	7	0.910	0.910	77.817	0.000

Table 3 shows the findings for the occurrence of multicollinearity in the observed competitions. The reported values of VIF (Variance Inflation Factor) and tolerance indicate no deleterious multicollinearity in the obtained regression models. It should be noted that Model 2 for competitions 2021–2023 had a VIF rating greater than 10. After eliminating the variable ΔFG%, the regression was re-run, resulting in a model without deleterious multicollinearity.

Table 3. Analysis of multicollinearity in the observed competitions in Models 1 and 2.

	MODEL 1			MODEL 2		
	Variable	Analysis of the Presence of Multicollinearity		Variable Tolerance	Analysis of the Presence of Multicollinearity	
		Tolerance	VIF		Tolerance	VIF
Competitions 2021–2023	ΔM2	0.916	5.733	Δ2%	0.972	1.029
	ΔM3	0.856	3.765	Δ3%	0.905	1.105
	ΔMFT	0.902	7.120	ΔDR%	0.962	1.039
				ΔTO%	0.973	1.028
Olympic Games	ΔAS	0.983	1.017	Δ2%	0.989	1.011
	ΔMFT	0.983	1.017	ΔOR%	0.989	1.011
World Cup	ΔDR	0.632	1.583	Δ2%	0.899	1.112
	ΔTO	0.923	1.084	Δ3%	0.813	1.230
	ΔM3	0.424	2.360	ΔOR%	0.944	1.060
Afro Basket	ΔAS	0.832	1.202	ΔFG%	0.996	1.004
	ΔTO	0.832	1.202	ΔST%	0.947	1.056
				ΔOR%	0.943	1.060
Ameri Cup	ΔMFT	1.000	1.000	Δ2%	0.929	1.077
				ΔOR%	0.828	1.208
				Δ3%	0.605	1.652
				ΔST%	0.620	1.614
Asia Cup	ΔAS	0.587	1.704	Δ2%	0.908	1.101
	ΔMFT	0.892	1.121	ΔOR%	0.862	1.160
	ΔM3	0.468	2.139	ΔST%	0.876	1.142
	ΔA2	0.755	1.324			
Euro Basket	ΔM2	0.641	1.560	ΔTO%	0.961	1.041
	ΔA3	0.830	1.204	ΔOR%	0.968	1.033
	ΔDR	0.743	1.345	Δ3%	0.942	1.062
	ΔST	0.612	1.634	Δ2%	0.977	1.024

Model I: standard parameters; Model II: efficiency parameters; VIF—Variance Inflation Factor; ΔA2—2 points attempted; ΔM2—2 points made; ΔA3—3 points attempted; ΔM3—3 points made; ΔMFT—free throws made; ΔDR—defensive rebounds; ΔAS—assists; ΔTO—turnovers; ΔST—steals; Δ2%—2-point efficiency; Δ3%—3-point efficiency; ΔFG%—field goal efficiency; ΔDR%—efficiency of defensive rebound; ΔOR%—efficiency of offensive rebound; ΔTO%—inefficiency of turnover; and ΔST%—efficiency of steal.

4. Discussion

This study was not influenced by disparities in rules and competition systems, which are frequently emphasized as an issue in comparable studies, because all competitions were planned and executed under the auspices and rules of FIBA. Furthermore, the conclusions were unaffected by the effects of the game venue, sometimes known as the home advantage effect. This study involves an extreme sort of sample selection as well as the importance of the competitions themselves, which were held at a single site over a short period of time.

When we look at the overall results from these events, we can see that six of the ten extracted variables that separate winners and losers in these competitions come from the shooting efficiency space. When we look at individual events, the percentage drops from 60% of the extracted variables in the AmeriCup to only 20% at the AfroBasket (Asia Cup

57%, Olympics, World Cup, and EuroBasket 50%). Even at the AfroBasket, shooting efficiency variables were extracted in the first iteration of Model 2, ΔFG% ($\beta = 0.671$; $p < 0.000$; $r_P = 0.671$) with $R^2 = 0.428$ in the first iteration. This means that the field goal percentage explains 43% of the difference between winners and losers in the competition.

Research indicates that shooting efficiency is a crucial factor in determining game outcomes [41–47]. Shooting accuracy is an important aspect of basketball performance since it measures both individual and collective offensive efficiency [48,49]. In basketball, shooting is the primary weapon of attackers; it is the means by which players turn their team's offensive activities into points [50].

Teams can only win the game if they have more field goal attempts, free throw attempts, or a higher free throw percentage than their opponents, even if their shooting percentage is the same or worse. Although other basketball abilities (passing, dribbling, defense, and rebounding) might increase a player's shooting %, they must also be able to score [51,52]. All of this confirms basketball coaches' well-known empirical, experiential stance that successful team offense, as well as the final result, are dependent on "the quality of player decision-making and shot execution as well as upon team coordination" [18]. Research in women's basketball has shown a correlation between shooting efficiency parameters and game outcomes [14,18,25,26,34,53].

As regards the structure of shooting efficiency recorded by standard parameters in the observed competitions, the results show that the two-point field goal percent appears as a variable affecting the final result in six of them (AfroBasket being an exception). The difference in points scored from two-point field goals was retrieved in the second iteration of Model 1 for all observable competitions ($\beta = 0.421$; $p < 0.000$; $r_P = 0.552$) with $R^2 = 0.683$ and in the first iteration at EuroBasket ($\beta = 0.727$; $p < 0.000$; $r_P = 0.727$) with $R^2 = 0.529$. The first iteration of Model 2 extracted the two-point field goal percentage at the Olympic Games ($\beta = 0.517$; $p < 0.007$; $r_P = 0.517$) with $R^2 = 0.237$, the World Cup ($\beta = 0.676$; $p < 0.007$; $r_P = 0.676$) with $R^2 = 0.443$, and the AmeriCup ($\beta = 0.674$; $p < 0.000$; $r_P = 0.674$) with $R^2 = 0.433$. In other words, variables affecting two-point field goal shooting efficiency in women's representative competitions accounted for 23.7% to 52.9% of the observed occurrences. Furthermore, the difference in the two-point field goal percent was derived in the fifth iteration of the observed contests and the fourth iteration of the EuroBasket. The difference in the number of two-point field goal attempts (ΔA2) was retrieved in the fourth version of the Asia Cup. This study collected forty situational efficiency characteristics, nine (22.5%) of which were from the two-point field goal space.

Other studies have demonstrated the relevance of two-point field goals in women's basketball [13,14,20,25,54,55]. Previous research has found that the difference between men's and women's basketball is primarily due to female players preferring to shoot from positions inside the paint rather than behind the three-point line [56], as well as their greater inefficiency in two-point field goal shooting [57]. According to Kreivyte et al. [58], attacking teams that are tactically disciplined have a higher number and accuracy of successful shoots from close and mid-range areas. According to Gasperi et al. [16] and Reina, García-Rubio, and Ibáñez [59], scoring from the paint and mid-range requires greater offensive action and physical contact with defensive players. Meanwhile, points scored on two-pointers imply poor defense by the losing team's interior players (centers) [60]. Studies on game-related statistics in women's basketball have proven the continued relevance of two-point field goals [43,55]. Research on women's national team tournaments has also indicated that winning teams score more points in the paint, points off opponent turnovers (fast breaks), and second-chance points following successful offensive rebounds [29].

Aside from the Olympic Games and AfroBasket, three-point field goal differential variables had a huge impact on the final result. Although no three-point field goal difference variables were recovered in the first iterations of any observed competitions, eight (20.0%) were subsequently identified. This contradicts previous research, which found no relationship between three-point field goal efficiency variables and game outcome [20], whereas, in men's basketball, three-point attempts have increased at an annual rate of

0.6% over the last 40 years in the National Basketball Association (NBA) [61]. As a result, most NBA teams have increased their three-point shooting practice in preparation for games [62]. These discrepancies in three-point shooting between male and female basketball players can be explained in part by anthropometric differences [63], as well as female players' lesser strength [20].

Our data show that the three-point shot is becoming increasingly important in women's basketball, which is consistent with trends in men's basketball. Why is this the case, given that the likelihood of making a shot diminishes with increasing distance from the basket in professional basketball [64–67]? Have we found that space–time coordination across the longitudinal axis is crucial for players' game success? Following open passes, this synchronization boosts the number of shot attempts, both close to the hoop and from long range. Studies have indicated that passing the ball near the hoop improves offensive effectiveness [65]. An exploration of defensive strategies can elucidate the reason behind this contradiction [68].

Research indicates a link between shooting efficiency and defensive players' pressure and aggression toward shooters [69,70]. Most basketball coaches center their defensive philosophy on stopping shots close to the basket, which encourages players to shoot from long range and behind the three-point line after receiving passes outside following drives or kick-out passes from low-post positions. It is possible that women's basketball will continue to follow men's basketball trends in the future, particularly those from the NBA, and that the ability to shoot from mid-range will gradually give way to the ability to layup and shoot three-pointers. However, it is vital to remember the findings of a study conducted in women's basketball, which show that a shift in game speed (scoring successfully in three or more consecutive possessions) reduces three-point shot attempts by 10%. Conversely, with a bad offensive rhythm, the amount of two-point shot attempts drops by 5–15% [71].

Shooting free throws in basketball is a distinct ability that is always performed at the same distance from the basket during game breaks [72]. Research in women's basketball [18,25,26,33] has shown that free-throw efficiency has a significant impact on game outcomes. In this study, only Model 1 was used to extract free throws as the difference in the amount of points scored from them. Only in the continental championship AmeriCup, was this variable extracted in the first iteration (β = 0.379; $p < 0.047$; r_p = 0.379) with R^2 = 0.111. It was the only variable extracted in Model 1 in this competition. The variable of free throw point difference was also retrieved from the Olympic Games, Asia Cup, and overall tournament outcomes. It is worth noting that research has verified the significance of free throws, particularly in the last minutes of hotly contested games [37,73].

Mandić et al. [45] found that the efficiency gap between NBA and Euroleague teams and players has decreased over time. Similarly, we can see that women's basketball, at least in important events, follows the same tendencies as men's basketball. According to this study, in women's basketball, aside from the effectiveness of shooting for two points, the efficacy of shooting for three points also plays a role in determining the outcome between the winning and losing teams. This is consistent with the trend of basketball teams increasing the number of three-pointers [62,74].

The characteristic that significantly influenced the final outcome, though unrelated to shooting efficiency, is offensive rebound efficiency. This variable was collected in all observed competitions in Model 2, except when we analyzed the outcomes for all competitions collectively. Contrary to previous research findings, which emphasized the significance of defensive rebounds and defensive rebound efficiency in determining the outcome of women's basketball games [14,18,24,25,33], this study presents different conclusions.

Only a single study, conducted by Yi et al. [20], has demonstrated the importance of offensive rebounding in women's basketball. However, it should be noted that this study is relatively recent and may suggest a shift in the prevailing trend for this game characteristic. The disparity in defensive rebounds was measured solely during the initial iteration of the World Cup (β = 0.737; $p < 0.000$; $r_P = 0.737$) with an R^2 value of 0.531. At the EuroBasket, only the joint outcomes of all competitions were used to determine defensive rebound efficiency. Offensive rebounding is widely regarded as the most crucial statistical factor in basketball. It enables the team to score effortless points from proximity and also hinders the opponent's transition attack. Research has indicated that a team that deploys a larger number of players to retrieve missed shots greatly enhances the total number of rebounds. This is because, when the number of offensive players involved in rebounding equals the number of defensive players, the defensive team does not have a higher overall rebound count than the offensive team [75]. Furthermore, the act of sending an additional player to retrieve the ball after a missed shot had a notable impact based on statistical analysis. Deploying an excessive number of players is inefficient due to the lack of proportionate rewards compared to the potential risk of a swift counterattack [75]. Coaches now prioritize this facet of women's basketball more than they did in the past.

By examining each competition separately, it becomes evident that the key factors for achieving success in the matches in the 2021 Olympic Games were changes in (ΔAS, ΔMFT, Δ2%, and ΔOR). These parameters suggest that teams in this competition had limited chances to score straightforward points and that coaches chose to regulate the offensive strategy. The average number of possessions per game in this competition is significantly lower (M = 59.822) compared to the other five competitions, where this figure varies from M = 71.650 for EuroBasket to M = 81.876 for AfroBasket. Naturally, this is to be expected since, on one side, it is undeniably the most significant and influential competition. Conversely, the competition had a high concentration of quality because 92.31% of the top-ranked teams took part. All 12 participants in the competition achieved a ranking of at least 13th place, except Brazil, which was ranked eighth and did not participate.

In continental competitions and the World Cup, the percentage of offensive rebounds and the percentage of two-point and three-point shots are important factors in individual championships. These variables are present in all five competitions, except for AfroBasket. The significance of defensive rebounds in determining the ultimate outcome was evident in major basketball tournaments such as the World Cup, EuroBasket, and the Olympic Games. When examining the rankings of national teams, these two competitions, along with the Olympic Games, are notable for the high caliber of the teams involved. Defensive rebounding facilitates a swift transition from defense to offense along with creating opportunities for fast breaks or semi-fast breaks, typically leading to effortless scoring [76], while also increasing the tempo of the game. Nevertheless, certain authors have attributed the success in rebounding among women to the higher number of players in guard and forward positions on winning teams, as opposed to teams that lost games [77].

In the initial iterations of Model 1, assists were identified as a significant variable affecting the final outcome in the Olympic Games (β = 0.755; $p < 0.000$; $r_P = 0.784$) with a R^2 value of 0.523, AfroBasket (β = 0.754; $p < 0.000$; $r_P = 0.754$) with a R^2 value of 0.552, and Asia Cup (β = 0.803; $p < 0.000$; $r_P = 0.803$) with a R^2 value of 0.636. To clarify, assists account for 52.3% of the total events at the Olympics, 55.2% at the AfroBasket, and an impressive 63.6% at the Asia Cup. The significance of assists in these events may suggest enhanced collaboration in offensive play [78], as well as effective shooting following quick offensive maneuvers [79]. Analyzing the results of the African Championship is particularly intriguing, as it includes not just assists but also turnovers and steals. Considering that this championship was played at a very fast pace (81.87 possessions per game) and had an average margin of victory of 20.11 points, it suggests a significant disparity in the quality of teams in terms of both offense and defense. Additionally, it indicates there were games where teams did not rely heavily on organized offensive strategies. Regarding the Asian Championship, it is important to note that our research includes data from both Division 1 and Division 2. In both divisions, the average margin of victory is much higher, specifically at M = 30.85.

Steals are a notable factor in determining the final outcome in all four continental championships, but they are not considered in the Olympic Games, World Cup, or overall results. Steals typically result in advantageous scoring opportunities in close proximity to the hoop. Undoubtedly, steals serve as a reliable measure of effective defense that compels adversaries to commit passing mistakes. Nevertheless, they might also signify a disparity in the caliber of teams. Steals result in turnovers for the opponent, which decreases their shooting efficiency and at the same time increases the shooting efficiency of the opponent. This leads to a double failure [80]. According to Stavropoulos [81], opposing teams in high-level contests can score 10–25 points easily following turnovers made by their opponents. Studies have demonstrated that turnovers occur more frequently in women's basketball compared to men's basketball, with the primary reason for turnovers being attributed to inadequate passing skills [17]. Therefore, while discussing turnovers in women's basketball, we are specifically referring to passing turnovers. These mistakes are a crucial aspect of player collaboration and are used almost as frequently as shooting techniques during a game [82]. The occurrence of turnovers through passing can be attributed to either a higher volume of passes aimed at controlling the offensive strategy or a deliberate intention to swiftly advance the ball into the opposing team's court.

Pit Riley, a renowned American coach, asserted in 1993 [83] that while basketball talents cannot be evaluated mechanically, they are measurable and quantifiable. Currently, it is understood that analyzing efficiency indicators that distinguish between wins and losses is precisely what establishes the limits between triumph and defeat [84], and that it aids in distinguishing successful teams from others [85]. Additionally, performance analysis provides valuable insights for making adjustments to the training process. These analyses of team performance provide a wealth of valuable insights into current dynamics in basketball as well as future trends in its advancement [58]. The area of sports analytics has experienced significant expansion due to the development of notational analytical tools [86]. Joze Martinéz [87] cites more than 200 methods for assessing the effectiveness of players in different situations, as of 2010. The ability to rapidly access large quantities of data has facilitated the collection and storage of information. However, there is a challenge in efficiently transforming this data into valuable insights [88].

Occasionally, these quests are likened to the pursuit of the "Holy Grail" [87], mainly because of the intricate nature of relationships in sports, especially within each game. Models struggle to capture the complex interactions of all the factors being observed due to the varied impact they have in terms of strength, direction, and timing. Furthermore, there are undoubtedly other variables that impact the ultimate outcome but are not being tracked due to their perceived insignificance, inability to be quantified, or other unspecified reasons. Merely excelling in statistical metrics during a sports game, such as basketball, is insufficient for achieving victory [89]. This study also exhibits a weakness that has been underscored in other comparable research [20,53]. Notational analysis is still a crucial method for coaches in team sports, particularly basketball, to obtain accurate and dependable information about their own team and their opponents [90]. Therefore, the quest for objective methods of evaluating athletes' performance in team sports will persist [91–93].

5. Conclusions

This study focused on the most recent high-level global contests. The variables tracked in the research were gathered impartially and standardized across all observed championships. All championships adhered to the same regulations and included a comparable structure and duration of competition. The results showed that (1) both regression models in all six competitions had a high determination of the dependent variable compared to the independent variables; (2) only one regression model, the continental championship of America, showed weak relationships and was not statistically significant; (3) when considering the overall results of the seven extracted variables, six were from the field goal space, and similar results were obtained when considering individual championships; (4) the importance of the two-point field goal was established as the most important, consistent with previous research; (5) the significance of the three-point field goal, previously unacknowledged in prior research, has now been recognized, suggesting that women's basketball is mirroring trends observed in men's competitions; (6) the importance of offensive rebound efficiency was established in all competitions, which is also a new trend compared to previous research; (7) the importance of assists appeared in three competitions, and assists were a variable extracted in the first iteration; and (8) among other variables, the defensive rebound variable was notably less emphasized compared to previous research, while the steals variable was included in all continental championships but omitted in the Olympics and World Championships, as well as in the overall findings.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/app14125357/s1, Figure S1: The variables in Model 1 that significantly influenced the outcome of women's basketball representative events at the Olympic Games, World Championships, and continental championships.; Figure S2: The variables in Model 2 that significantly influenced the outcome of women's basketball representative events at the Olympic Games, World Championships, and continental championships.

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References

1. 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. *Biol. Sport* **2018**, *35*, 137–143, https://doi.org/10.5114/biolsport.2018.71602.
2. Canuto, S.C.; de Almeida, M.B. Determinants of Basketball Match Outcome Based on Game-related Statistics: A Systematic Review and Meta-Analysis. *Eur. J. Hum. Mov.* **2022**, *48*, 4–20, https://doi.org/10.21134/eurjhm.2022.48.2.
3. Zuccolotto, P.; Manisera, M.; Sandri, M.; Messina, E. *Basketball Data Science: With applications in R*; CRC Press: New York, NY, USA, 2020. https://doi.org/10.1201/9780429470615.
4. Mikołajec, K.; Maszczyk, A.; Zając, T. Game Indicators Determining Sports Performance in the NBA. *J. Hum. Kinet.* **2013**, *37*, 145–151, https://doi.org/10.2478/hukin-2013-0035.
5. Simović, S.; Komić, J. *Modeling the Impact of Basketball Game Parameters on the Final Result*; University of Banja Luka: Banja Luka, Bosnia and Herzegovina, 2021.
6. Gòmez, M.; Lorenzo, A.; Ortega, E.; Sampaio, J.; Ibàñez, S.-J. Game Related Statistics Discriminating Between Starters and Nonstarters Players in Women's National Basketball Association League (WNBA). *J. Sports Sci. Med.* **2009**, *8*, 278–283.
7. Simović, S.; Komić, J.; Guzina, B.; Pajić, Z.; Vojvodić, M. Influence of game-related statistical elements on final results in FIBA Eurobasket Women 2017. *Facta Univ. Ser. Phys. Educ. Sport* **2018**, *16*, 709–723. https://doi.org/doi.10.22190/FUPES181204063S.
8. Colbeck, L.A.; Jones, W.R.; Busnel, R.; Szeremeta, W.; Martin, L. *The Basketball World*; International Basketball Federation: Munich, Germany, 1972.
9. Colombo, D.; Eleni, O. *100 Years of Basketball*; International Basketball Federation: Munich, Germany, 1991.
10. Simović, S.; Pavlović, P. *Basketball in the Territories of the Former Yugoslavia Until May 1945*; University of Banja Luka: Banja Luka, Bosnia and Herzegovina, 2013. https://doi.org/10.5550/97899938234.001.0001.
11. Hodgson, P. Studies in the Physiology of Activity: I. On Certain Reactions of College Women to Measured Activity. *Res. Q. Am. Phys. Educ. Assoc.* **1936**, *7*, 3–25, https://doi.org/10.1080/23267402.1936.10761753.
12. Hodgson, P. Studies in the physiology of activity: II. On certain reactions of College Women following participation in two-court basketball. *Res. Q. Am. Phys. Educ. Assoc.* **1936**, *7*, 45–55.
13. Hodgson, P. Studies in the Physiology of Activity: III. On Certain Reactions of College Women following Participation in Three-Court Basketball. *Res. Q. Am. Assoc. Health Phys. Educ. Recreat.* **1939**, *10*, 53–60, https://doi.org/10.1080/10671188.1939.10622494.

14. Miner, N.; Hodgson, P.; Espenschade, A. A Study of the Distance Traversed and the Time Spent in Active Play in Women's Basketball. *Res. Q. Am. Assoc. Health Phys. Educ. Recreat.* **1940**, *11*, 94–101, https://doi.org/10.1080/10671188.1940.10624632.
15. Messersmith, L.; Laurence, J.; Randels, K. A Study of Distances Traversed by College Men and Women in Playing the Game of Basketball. *Res. Q. Am. Assoc. Health Phys. Educ. Recreat.* **1940**, *11*, 30–31, https://doi.org/10.1080/10671188.1940.10627262.
16. Gasperi, L.; Conte, D.; Leicht, A.; Gómez-Ruano, M. Game Related Statistics Discriminate National and Foreign Players According to Playing Position and Team Ability in the Women's Basketball EuroLeague. *Int. J. Environ. Res. Public Health* **2020**, *17*, 5507, https://doi.org/10.3390/ijerph17155507.
17. Dimitros, E.; Garopoulou, V.; Bakirtzoglou, P.; Maltezos, C. Differences and discriminant analysis by location in A1 Greek women's basketball league. *Sport Sci.* **2013**, *6*, 33–37.
18. Fylaktakidou, A.; Tsamourtzis, E.; Zaggelidis, G. The Turnovers Analysis to the Women's National League Basketball Games. *Sport Sci. Rev.* **2011**, *20*, 69–83, https://doi.org/10.2478/v10237-011-0055-2.
19. Gómez, M.A.; Lorenzo, A.; Sampaio, J.; Ibáñez, S.J. Differences in game-related statistics between winning and losing teams in women's basketball. *J. Hum. Mov. Stud.* **2006**, *51*, 357–369.
20. Şentuna, M.; 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. *Phys. Educ. Stud.* **2018**, *22*, 146–150, https://doi.org/10.15561/20755279.2018.0306.
21. Yi, Q.; Zhang, S.; Fang, W.; Gómez-Ruano, M.Á. Modeling the keys to team's success in the women's Chinese basketball association. *Front. Psychol.* **2021**, *12*, 671860. https://doi.org/10.3389/fpsyg.2021.671860.
22. Ratgeber, L.; Markoski, B.; Pecev, P.; Lacmanović, D.; Ivanković, Z. Comparative review of statistical parameters for Men's and Women's basketball leagues in Serbia. *Acta Polytech. Hung.* **2013**, *10*, 151–170.
23. Gómez, M.-A.; Lorenzo, A.; Ibañez, S.-J.; Sampaio, J. Ball possession effectiveness in men's and women's elite basketball according to situational variables in different game periods. *J. Sports Sci.* **2013**, *31*, 1578–1587, https://doi.org/10.1080/02640414.2013.792942.
24. Badea-Miss, G. Comparison of game parameters for Romanian Women's Basketball League and London 2012 Olympic Games. *Nigde Univ. J. Phys. Educ. Sport Sci.* **2014**, *8*, 29–42.
25. Leicht, A.S.; Gomez, M.A.; Woods, C.T. Team Performance Indicators Explain Outcome during Women's Basketball Matches at the Olympic Games. *Sports* **2017**, *5*, 96, https://doi.org/10.3390/sports5040096.
26. Milanović, D.; Štefan, L.; Sporiš, G.; Vuleta, D. Effects of game-related statistics parameters on final outcome in female basketball teams on the Olympic games in London 2012. *Int. J. Curr. Adv. Res.* **2016**, *5*, 1186–1189.
27. Milanović, D.; Štefan, L.; Škegro, D. Differences in situational efficiency parameters between successful and unsuccessful female basketball teams on the Olympic Games in London 2012. *Sport Sci.* **2016**, *9*, 38–43.
28. Milanović, L.; Štefan, L.; Selmanović, A. Difference among male and female top level basketball teams in competition efficiency parameters. In Proceedings of the 8th International Scientific Conference on Kinesiology, Opatija, Croatia, 10–14 May 2017; Milanović, D., Sporiš, G., Šalaj, S., Škegro, D., Eds.; Faculty of Kineziology, University of Zagreb: Zagreb, Croatia, 2017; pp. 380–383.
29. Bazanov, B.; Rannama, I. Analysis of the offensive teamwork intensity in elite female basketball. *J. Hum. Sport Exerc.* **2015**, *10*, 47–51. https://doi.org/10.14198/jhse.2015.101.05.
30. Conte, D.; Lukonaitiene, I. Scoring Strategies Differentiating between Winning and Losing Teams during FIBA EuroBasket Women 2017. *Sports* **2018**, *6*, 50, https://doi.org/10.3390/sports6020050.
31. Madarame, H. Game-related statistics which discriminate between winning and losing teams in Asian and European men's basketball championships. *Asian, J. Sports Med.* **2017**, *8*, 42727. https://doi.org/10.5812/asjsm.42727.
32. Madarame, H. Basketball Game-Related Statistics that Discriminate among Continental Championships for Under-18 Women. *Sports* **2018**, *6*, 114, https://doi.org/10.3390/sports6040114.
33. Madarame, H. Regional Differences in Women's Basketball: A Comparison among Continental Championships. *Sports* **2018**, *6*, 65, https://doi.org/10.3390/sports6030065.
34. Simović, S.; Komić, J.; Guzina, B.; Pajić, Z.; Karalić, T.; Pašić, G. Difference-based analysis of the impact of observed game parameters on the final score at the FIBA Eurobasket Women 2019. *J. Hum. Sport Exerc.* **2021**, *16*, 373–387, https://doi.org/10.14198/jhse.2021.162.12.
35. Teck, K.K.; Wang, C.; Mallett, C. Discriminating Factors between Successful and Unsuccessful Elite Youth Olympic Female Basketball Teams. *Int. J. Perform. Anal. Sport* **2012**, *12*, 119–131, https://doi.org/10.1080/24748668.2012.11868588.
36. Chen, L.; Zhao, T. Research on the attack and defense techniques of Chinese women's basketball team and the top four teams in the first women's basketball world cup. In Proceedings of the 4th International Conference on Contemporary Education, Social Sciences and Humanities (ICCESSH 2019), Moscow, Russia, 17–19 May 2019; Zhang, Y., Rumbal, I., Green, R., Volodina, T., Eds.; Atlantis Press: Amsterdam, The Netherlands, 2019; pp. 1808–1813. https://doi.org/10.2991/iccessh-19.2019.388.
37. Celeux, G.; Robert, V. Towards an objective team efficiency rate in basketball. *J. De La Société Française De Stat.* **2015**, *156*, 51–68.
38. Ferreira, A.P.; Volossovitch, A.; Sampaio, J. Towards the game critical moments in basketball: A grounded theory approach. *Int. J. Perform. Anal. Sport* **2014**, *14*, 428–442, https://doi.org/10.1080/24748668.2014.11868732.
39. Ferreirós, A.P. Performance Analysis in Basketball: Reliability and Applications of the Game Related Statistics. Ph.D. Thesis. Univetsity de Vigo, Vigo, Spain, 2019. Available online: https://www.investigo.biblioteca.uvigo.es/xmlui/bitstream/handle/11093/1326/PerezFerreiros_Alexandra_TD_2019_AA.pdf?sequence=4&isAllowed=y (accessed on 14 October 2022).

40. Kubatko, J.; Oliver, D.; Pelton, K.; Rosenbaum, D.T. A Starting Point for Analyzing Basketball Statistics. *J. Quant. Anal. Sports* **2007**, *3*, 1. https://doi.org/10.2202/1559-0410.1070.
41. Trninić, S. *Analysis and Teaching of the Basketball Game*; Vitka: Pula, Croatia, 1995.
42. Cabarkapa, D.; Deane, M.A.; Fry, A.C.; Jones, G.T.; Cabarkapa, D.V.; Philipp, N.M.; Yu, D. Game statistics that discriminate winning and losing at the NBA level of basketball competition. *PLoS ONE* **2022**, *17*, e0273427, https://doi.org/10.1371/journal.pone.0273427.
43. Cabarkapa, D.; Deane, M.A.; Ciccone, A.B.; Jones, G.T.; Cabarkapa, D.V.; Fry, A.C. The home-court advantage in NCAA Division-I men's basketball. *J. Hum. Sport Exerc.* **2023**, *18*, 420–427. https://doi.org/doi: 10.14198/jhse.2023.182.13.
44. Cabarkapa, D.; Deane, M.A.; Cabarkapa, D.V.; Jones, G.T.; Fry, A.C. Differences in game-related statistics between winning and losing teams in NCAA Division-II men's basketball. *J. Appl. Sports Sci.* **2022**, *2*, 3–10. https://doi.org/10.37393/JASS.2022.02.1.
45. Mandić, R.; Jakovljević, S.; Erčulj, F.; Štrumbelj, E. Trends in NBA and Euroleague basketball: Analysis and comparison of statistical data from 2000 to 2017. *PLoS ONE* **2019**, *14*, e0223524, https://doi.org/10.1371/journal.pone.0223524.
46. Mateus, N.; Gonçalves, B.; Abade, E.; Leite, N.; Gomez, M.A.; Sampaio, J. Exploring game performance in NBA playoffs. *Kinesiology* **2018**, *50*, 89–96, https://doi.org/10.26582/k.50.1.7.
47. Zhang, S.; Lorenzo, A.; Gómez, M.-A.; Liu, H.; Gonçalves, B.; Sampaio, J. Players' technical and physical performance profiles and game-to-game variation in NBA. *Int. J. Perform. Anal. Sport* **2017**, *17*, 466–483, https://doi.org/10.1080/24748668.2017.1352432.
48. García, J.; Ibáñez, S.J.; De Santos, R.M.; Leite, N.; Sampaio, J. Identifying Basketball Performance Indicators in Regular Season and Playoff Games. *J. Hum. Kinet.* **2013**, *36*, 161–168, https://doi.org/10.2478/hukin-2013-0016.
49. Malarranha, J.; Figueira, B.; Leite, N.; Sampaio, J. Dynamic Modeling of Performance in Basketball. *Int. J. Perform. Anal. Sport* **2013**, *13*, 377–387, https://doi.org/10.1080/24748668.2013.11868655.
50. Raiola, G.; D'Isanto, T. Descriptive shot analysis in basketball. *J. Hum. Sport Exerc.* **2016**, *11*, S259–S266. https://doi.org/10.14198/jhse.2016.11.proc1.18.
51. Oliver, D. *Basketball on Paper: Rules and Tools for Performance Analysis*; Potomac Books, Inc.: Washington, DC, USA, 2011.
52. Piette, J.; Anand, S.; Zhang, K. Scoring and Shooting Abilities of NBA Players. *J. Quant. Anal. Sports* **2010**, *6*, https://doi.org/10.2202/1559-0410.1194.
53. Simović, S.; Jovanović, F.; Komić, J.; Matković, B.; Pajić, Z. Quantitative analysis of 2017 Fiba Zone Championships based on a discriminant regression model. *Int. J. Recent Sci. Res.* **2019**, *10*, 34607–34617. https://doi.org/10.24327/ijrsr.2019.1009.3933.
54. Kreivytė, R.; Čižauskas, A. Alternation of indices of shots made by the best world women's basketball teams. *Ugdym. Kūnokultūra Sport.* **2007**, *2*, 30–36.
55. Madarame, H. Age and sex differences in game-related statistics which discriminate winners from losers in elite basketball games. *Mot. Rev. De Educ. Física* **2018**, *24*, e1018153. https://doi.org/10.1590/s1980-6574201800010001.
56. Mavridis, G.; Laios, A.; Taxildaris, K.; Tsiskaris, G. Developing offense in basketball after a return pass outside as crucial factor of winning. *Inq. Sport Phys. Educ.* **2004**, *2*, 81–86.
57. Sampaio, J.; Godoy, S.I.; Feu, S. Discriminative Power of Basketball Game-Related Statistics by Level of Competition and Sex. *Percept. Mot. Ski.* **2004**, *99*, 1231–1238, https://doi.org/10.2466/pms.99.3f.1231-1238.
58. Kreivyte, R.; Emeljanovas, A.; Sporiš, G.; Knjaz, D.; Vučković, G.; Milanović, Z. Shooting performance did not change in elite women's national basketball teams from 1995 to 2011. *Ann. Kinesiol.* **2013**, *4*, 45–56.
59. Reina, M.; García-Rubio, J.; Ibáñez, S.J. Training and Competition Load in Female Basketball: A Systematic Review. *Int. J. Environ. Res. Public Health* **2020**, *17*, 2639, https://doi.org/10.3390/ijerph17082639.
60. Escalante, Y.; Saavedra, J.M.; García-Hermoso, A. Game-related statistics in basketball by player position and final game score differences in European Basketball Championship 2007. *Fit. Perform. J.* **2010**, *9*, 50–56. https://doi.org/10.3900/fpj.9.2.50.p.
61. Zhang, M.; Miao, X.; Rupčić, T.; Sansone, P.; Vencúrik, T.; Li, F. Determining the Relationship between Physical Capacities, Metabolic Capacities, and Dynamic Three-Point Shooting Accuracy in Professional Female Basketball Players. *Appl. Sci.* **2023**, *13*, 8624, https://doi.org/10.3390/app13158624.
62. Jaguszewki, M. Increasing role of three-point field goals in National Basketball Association. *Trends Sport Sci.* **2020**, *27*, 5–11. https://doi.org/10.23829/TSS.2020.27.1-1.
63. Garcia-Gil, M.; Torres-Unda, J.; Esain, I.; Duñabeitia, I.; Gil, S.M.; Gil, J.; Irazusta, J. Anthropometric Parameters, Age, and Agility as Performance Predictors in Elite Female Basketball Players. *J. Strength Cond. Res.* **2018**, *32*, 1723–1730, https://doi.org/10.1519/JSC.0000000000002043.
64. Harmon, M.; Ebrahimi, A.; Lucey, P.; Klabjan, D. Predicting shot making in basketball learnt from adversarial multiagent trajectories. *arXiv* **2016**. arXiv:1609.04849.
65. Courel-Ibáñez, J.; McRobert, A.P.; Toro, E.O.; Vélez, D.C. Collective behaviour in basketball: A systematic review. *Int. J. Perform. Anal. Sport* **2017**, *17*, 44–64, https://doi.org/10.1080/24748668.2017.1303982.
66. Gomez, M.A.; Gasperi, L.; Lupo, C. Performance analysis of game dynamics during the 4th game quarter of NBA close games. *Int. J. Perform. Anal. Sport* **2016**, *16*, 249–263, https://doi.org/10.1080/24748668.2016.11868884.
67. Lapresa, D.; Alsasua Santos, R.; Arana Idiakez, J.; Anguera Argilaga, M.T.; Garzón Echevarría, B. Análisis observacional de la construcción de las secuencias ofensivas que acaban en lanzamiento en baloncesto de categoría infantil. *Rev. De Psicol. Del Deporte* **2014**, *23*, 365–376.
68. Csataljay, G.; O'donoghue, P.; Hughes, M.; Dancs, H. Performance indicators that distinguish winning and losing teams in basketball. *Int. J. Perform. Anal. Sport* **2009**, *9*, 60–66, https://doi.org/10.1080/24748668.2009.11868464.

69. Lvarez, A.; Ortega, E.; Gómez, M.Á.; Salado, J. Study of the defensive performance indicators in peak performance basketball. *Rev. De Psicol. Del Deporte* **2009**, *18*, 379–384.
70. Ibáñez, S.J.; García, J.; Feu, S.; Lorenzo, A.; Sampaio, J. Effects of Consecutive Basketball Games on the Game-Related Statistics that Discriminate Winner and Losing Teams. *J. Sports Sci. Med.* **2009**, *8*, 458–462.
71. Palmer, J.A.; Bini, R.; Wundersitz, D.; Kingsley, M. On-Court Activity and Game-Related Statistics during Scoring Streaks in Basketball: Applied Use of Accelerometers. *Sensors* **2022**, *22*, 4059, https://doi.org/10.3390/s22114059.
72. Goldschmied, N.; Raphaeli, M.; Moothart, S.; Furley, P. Free throw shooting performance under pressure: A social psychology critical review of research. *Int. J. Sport Exerc. Psychol.* **2022**, *20*, 1397–1415, https://doi.org/10.1080/1612197x.2021.1979073.
73. Gómez, M.; Lorenzo, A.; Jiménez, S.; Navarro, R.M.; Sampaio, J. Examining Choking in Basketball: Effects of Game Outcome and Situational Variables during Last 5 Minutes and Overtimes. *Percept. Mot. Ski.* **2015**, *120*, 111–124, https://doi.org/10.2466/25.29.pms.120v11x0.
74. Gómez, M.; Medina, R.; Leicht, A.S.; Zhang, S.; Vaquera, A. The Performance Evolution of Match Play Styles in the Spanish Professional Basketball League. *Appl. Sci.* **2020**, *10*, 7056, https://doi.org/10.3390/app10207056.
75. Ribas, R.L.; Navarro, R.M.; Tavares, F.; Gómez, M.A. An analysis of the side of rebound in high level basketball games. *Int. J. Perform. Anal. Sport* **2011**, *11*, 220–226, https://doi.org/10.1080/24748668.2011.11868543.
76. Sampaio, J.; Janeira, M. Statistical analyses of basketball team performance: Understanding teams' wins and losses according to a different index of ball possessions. *Int. J. Perform. Anal. Sport* **2003**, *3*, 40–49, https://doi.org/10.1080/24748668.2003.11868273.
77. Carter, J.; Ackland, T.; Kerr, D.; Stapff, A. Somatotype and size of elite female basketball players. *J. Sports Sci.* **2005**, *23*, 1057–1063, https://doi.org/10.1080/02640410400023233.
78. Remmert, H. Analysis of group-tactical offensive behavior in elite basketball on the basis of a process orientated model. *Eur. J. Sport Sci.* **2003**, *3*, 1–12, https://doi.org/10.1080/17461390300073311.
79. Ibañez, S.J.; Garcia-Rubio, J.; Gómez, M.-Á.; Gonzalez-Espinosa, S. The Impact of Rule Modifications on Elite Basketball Teams' Performance. *J. Hum. Kinet.* **2018**, *64*, 181–193, https://doi.org/10.1515/hukin-2017-0193.
80. Trninić, S. *Selection, Preparation and Leadership of Basketball Players and Teams*; Vikta-Marko d.o.o.: Zagreb, Croatia, 2006.
81. Stavropoulos, N. Relevant statistical observations in the basketball competitions of 2014 and 2019 Men's Basketball World Cups. *J. Phys. Educ. Sport* **2020**, *20*, 267. https://doi.org/10.7752/jpes.2020.04267.
82. Nunes, H.; Iglesias, X.; Daza, G.; Irurtia, A.; Caparrós, T.; Anguera, M.T. Influencia del pick and roll en el juego de ataque en baloncesto de alto nivel. *Cuad. De Psicol. Del Deporte* **2016**, *16*, 129–142.
83. Spizman, J. *Coach: The Greatest Teachers in Sports and Their Lessons for Us All*; WW Norton: New York, NY, USA, 2022.
84. Lupo, C.; Tessitore, A. How Important is the Final Outcome to Interpret Match Analysis Data: The influence of scoring a goal, and difference between close and balance games in elite soccer: Comment on Lago-Penas and Gomez-Lopez (2014). *Percept. Mot. Ski.* **2016**, *122*, 280–285, https://doi.org/10.1177/0031512515626629.
85. Dogan, I.; Ersoz, Y. The Important Game-Related Statistics for Qualifying Next Rounds in Euroleague. *Montenegrin J. Sports Sci. Med.* **2019**, *8*, 43–50, https://doi.org/10.26773/mjssm.190307.
86. Gerrard, B. Analytics, technology and high-performance sport. In *Critical Issues in Global Sport Management*; Schulenkorf, N., Frawley, S., Eds.; Routledge: New York, NY, USA, 2016; pp. 227–240.
87. Martínez García, J. Una revisión de los sistemas de valoración de jugadores de baloncesto (III). Discusión general. *Rev. Int. De Derecho Y Gestión Del Deporte* **2010**, *12*, 44–79.
88. Haghighat, M.; Rastegari, H.; Nourafza, N.; Branch, N.; Esfahan, I. A review of data mining techniques for result prediction in sports. *Adv. Comput. Sci. Int. J.* **2013**, *2*, 7–12.
89. Yalçin, Y.G.; Altin, M.; Demir, H. Comparison of basketball performance and efficiency scores between Turkish basketball league players who are Turkish, American and other nations origin. *Eur. J. Phys. Educ. Sport Sci.* **2016**, *2*, 153–163. https://doi.org/10.5281/zenodo.164890.
90. Sampaio, J.; Drinkwater, E.J.; Leite, N.M. Effects of season period, team quality, and playing time on basketball players' game-related statistics. *Eur. J. Sport Sci.* **2010**, *10*, 141–149, https://doi.org/10.1080/17461390903311935.
91. Sporiš, G.; Barišić, V.; Fiorentini, F.; Ujević, B.; Jovanović, M.; Talović, M. *Situational Efficiency in Football*; Lena sport d.o.o.: Glina, Croatia, 2014.
92. Bărbăcioru, I.C.; Sakizlian, E.R. An example of statistical analysis used in studying sports performance improvement. *Fiability Durab.* **2023**, *1*, 247–255.
93. Sakizlian, E.R. *Optimizing Handball Training through Biomechanical Analysis of the Upper Limb*; Universitaria Publishing House: Craiova, Romania, 2024; pp. 174–181.