ORIGINAL ARTICLE

Key performance indicators for success in the 2024 Olympic men's basketball tournaments

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ABSTRACT

The purpose of the present study was to examine differences between winning and defeated basketball teams in the 2024 Men's Olympic Tournament (OT) (n = 26) and the 2024 Olympic Qualifying Tournaments (OQT) (n = 36). The differences were assessed in three selected indicators: 3-point percentage (3PT%), rebound percentage (REB%), and turnover percentage (TOV%). T test has shown significant differences in 3PT% (p < .01) and REB% (p < .01) at OT. In OQT, we found statistically significant differences between winning teams and defeated in all variables (p < .01). Binary logistic regression identified in OQT all three independent variables as significant predictors of winning. If 3PT% and REB% increased by one unit, the odds of winning increased by 13% and 29%, respectively. On the other hand, if TOV% increased by one unit, the odds of winning decreased by 24%. In the OT, the binary logistic regression identifies only REB% as a significant predictor of winning. One unit of increase in REB% was associated with a 25% greater chance of winning. Coaches should focus on 3-point shooting efficiency, rebounding control, and minimizing turnovers, as these factors significantly affect the likelihood of winning basketball games.

Keywords: Teams sports, Performance indicators, Binary logistic regression, 3PT%, REB%, TOV%.

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INTRODUCTION

3-point shooting has become one of the most important aspects of modern basketball, and its importance continues to grow. In recent years, basketball teams have increasingly focused on making as many attempts as possible from 3-point range, as several studies have shown that successful 3-point shooting can significantly affect the outcome of a game. Various studies show that 3-point shooting increases the total number of points scored and, in principle, expands the opponent's defence. Consequently, it can open up space in a defined territory (Sampaio & Janeira, 2003; Piras, 2024). 3-point shooting has become a key element of offensive strategies, and teams that can shoot effectively from this distance tend to dominate games. Today, 3-point shooting is considered an essential aspect of a successful game plan, with coaches and players needing to understand not only the shooting technique but also the psychology and visual aspects that affect the success of this shooting (Piras, 2024). It has been found that the team with a higher percentage of successful 3-point shooting is more likely to win (Cabarkapa et al., 2022; Conte et al., 2018; Garcia et al., 2013). Vencúrik et al. (2021) found that fatigue and defensive pressure significantly affect the kinematic parameters of the 3-point shot. Players exhibit kinematic differences, such as increases in jump height and changes in shooting technique, to maintain consistent performance under these conditions. In close games, 3-point shooting success rate and number of 3-point shots are key factors that influence the outcome (Csataljay et al., 2012). High 3-point shooting success rates have shown that teams that can maintain it consistently tend to dominate at crucial moments in the game (Cabarkapa et al., 2022). It has also been shown that players who focus on improving their 3-point shooting success rate tend to increase their overall offensive efficiency.

Each shot is followed by another game activity, which is rebounding. Rebounds, especially defensive rebounds, are critical factors in crucial moments of the game. Teams that perform better in rebounding have a higher probability of winning (Csataljay et al., 2012; Conte et al., 2018; Garcia et al., 2013; Urkovic et al., 2005). Studies suggest that defensive rebounds are among the most essential indicators differentiating a team's winning and defeating (Cabarkapa et al., 2022). Mikołajec et al. (2013) found that a team that can secure more defensive rebounds tends to have better game outcomes. It has also been shown that rebounding is vital for limiting the opponent's second chances of scoring, and so is the number of turnovers, as having a high number of turnovers allows the opponent to attack more often. Turnovers are considered one of the most crucial team performance indicators. In basketball, every possession of the ball is valuable. A high number of turnovers can lead to a potential loss of points and reduce the chances of winning. Scientific evidence suggests that a team that minimizes turnovers has more control over the game and can use its offensive capabilities more effectively (Mikołajec et al., 2013). Various factors, including poor decisions, lack of communication between players, and pressure from the defence, can cause turnovers. The players need to know what their weaknesses are offensively and make an effort to practice decision-making. Studies show that fewer turnovers are associated with a higher probability of winning (Mikołajec et al., 2013; Cabarkapa et al., 2022). In close games, it has been found that a higher turnover rate can significantly affect the outcome (Csataljay et al., 2012).

Based on the findings, this study aimed to investigate the differences between the winning and defeated teams by our selected two positive parameters: 3-point shooting (3PT%) and rebounds expressed using the advanced statistical method REB%, and one negative: turnovers expressed as TOV% in the 2024 Men's Basketball Olympic Tournament (OT) and the 2024 Men's Basketball Olympic Qualifying Tournaments (OQT). We assumed that if the number of positive indicators increases, the chance of winning increases; conversely, the chance of winning decreases as the number of negative indicators increases.

MATERIAL AND METHODS

Participants

The examined dataset included 26 games played in the OT, while 36 were played in the OQT. The overall number of observed games was 62. OQT took place in four host cities, where 24 teams were divided into four groups (group phase), with the top teams advancing to the play-off, where the winners of the semifinals played for the four qualifying spots in the OT. The total number of games played in the OQT was 36, the number of 3-point attempts was 2022, the number of 3-points made was 691, the number of rebounds was 2611, and the number of turnovers was 901. In the OT, the top 12 teams from all over the globe participated and were divided into three groups. The number of games was 26, where the number of 3-point attempts was 1547, the number of 3-points made was 566, the number of rebounds was 1942, and the number of turnovers was 706.

Procedures

From each game, we tracked 3PT%, REB%, and TOV% for both winning and defeated teams (Kubatko et al., 2007; Oliveira et al., 2024; Scrucca et al., 2024; Rowe et al., 2024). 3-point shooting was selected because it represents a current trend in global basketball, and as its efficiency increases, so does its impact on the overall outcome. Rebounds are directly related to shooting and ball possession. Turnovers represent a negative factor that deprives a team of ball possession.

Statistical data were obtained by analysing the game statistics of games played in the OT and in the OQT from the official FIBA websites (FIBA, 2024).

Formula for calculating TOV%:

$$TOV\% = (TOV / FGA + TOV – ORB * 0,44 + FTA) * 100$$

Note: TOV% – turnover percentage; FGA – field goal attempted; TOV – turnover; ORB – offensive rebound; FTA – free throws attempted.

Formula for calculating REB%:

$$REB\% = (REB_a / REB_a + REB_b) *100$$

Note: REB% – rebound percentage; REB_a – winning team; REB_b – defeated team.

Statistical analysis

Data are presented as mean ± standard deviation. Shapiro-Wilk's test checked the normality of distribution. Normality was not violated. Therefore, the parametric independent t test was used to identify differences in selected variables (3PT%, REB%, and TOV%) between winning and defeated teams. Cohen's d and 95% confidence intervals (95% CI) also expressed effect sizes for differences. Cohen's d was interpreted as a trivial (<0.2), small (0.2–0.5), medium (0.5–0.8), and large (>0.8) effect (Cohen, 1988).

The binary logistic regression (enter method) was used to predict the result of the game based on independent variables (3PT%, REB%, and TOV%) (Malek et al., 2018). Therefore, the game's outcome could acquire only two values, i.e., 0–lose or 1–win. The maximum likelihood method was used to estimate the regression coefficients. Wald's test verified the statistical significance of the regression coefficients, and 95%

confidence intervals were constructed for the likelihood ratio. Nagelkerke R-square was used to assess the proportion of variance in the dependent variable (game's outcome) explained by the predictors (3PT%, REB%, and TOV%). A significance level was set for $p \leq .05$. All statistical tests were calculated using IBM SPSS Statistics 29 (IBM Corp., New York, USA).

RESULTS

Descriptive statistics and differences between winning and defeated teams in 3PT%, REB%, and TOV% are shown in Table 1. In the OQT, we found statistically significant differences between winning and defeated teams in all variables, with medium to large effect sizes. There were substantial differences in 3PT% and REB% in OT, with medium and large effect sizes.

Table 1. Descriptive statistics and differences in selected variables between winning and defeating teams.

Variable	Winners	Defeated	*p*-value	ES (95% CI)
Olympic Qualifying Tournaments				
3PT%	37.8 ± 7.3	30.8 ± 8.6	<.001	0.89 (0.41; 1.37)
REB%	53.5 ± 6	46.5 ± 6	<.001	1.16 (0.65; 1.65)
TOV%	13.6 ± 4.3	15.9 ± 4.3	.03	-0.54 (-1.01; -0.07)
Olympic Games Tournament				
3PT%	39.5 ± 10.2	33.7 ± 5.3	.01	0.71 (0.15; 1.27)
REB%	52.8 ± 5.6	47.2 ± 5.6	<.001	1.02 (0.44; 1.59)
TOV%	15.3 ± 3.8	15.5 ± 3.7	.86	-0.05 (-0.59; 0.49)

Note. 3PT – 3-point shooting percentage; REB% – rebound percentage; TOV% – turnover percentage; p – level of statistical significance; ES – effect size; CI – confidence intervals

Table 2. Estimation of regression model parameters for winning with explanatory variables.

Variable	B	SE	Wald	df	*p*-value	OR	95% CI for OR	
							Lower	Upper
Olympic Qualifying Tournaments								
3PT%	0.12	0.05	6.59	1	.01	1.13	1.03	1.24
REB%	0.25	0.07	11.42	1	<.001	1.29	1.11	1.47
TOV%	-0.28	0.1	7.94	1	.005	0.76	0.63	0.92
Olympic Games Tournament								
3PT%	0.07	0.05	1.99	1	.16	1.07	0.98	1.17
REB%	0.23	0.08	7.09	1	.008	1.25	1.06	1.48
TOV%	-0.11	0.1	1.32	1	.25	0.9	0.74	1.08

Note. B – standardized beta weights; SE – standard error of the estimate; Wald – values of Wald's test; df – degrees of freedom; p – the statistical significance of regression coefficients; OR – odds ratio; CI – confidence interval

Binary logistic regression identified in OQT all three independent variables as significant predictors of winning. Higher 3PT% and REB% and lower TOV% are associated with a greater chance to win. If 3PT% and REB% increased by one unit, the odds of winning increased by 13% and 29%, respectively. On the other hand, if TOV% increased by one unit, the odds of winning decreased by 24%. Nagelkerke R-square has a value of .552; therefore, the predictor variables explain 55.2% of the variance in the dependent variable. In the OT, the binary logistic regression identified only REB% as a significant predictor of winning. One unit of increase in REB% was associated with a 25% greater chance of winning. Nagelkerke R-square for OT has a value of .383, which means that the predictor variable explains 38.3% of the variance in the dependent

variable. Estimation of regression model parameters with explanatory variables, their standard errors, and the odds ratios is given in Table 2.

DISCUSSION

Our study confirmed differences in 3PT% and REB% between winning and defeated teams, with medium and large effect sizes. In the OQT, we found statistically significant differences between winning and defeated teams in all variables, with medium to large effect sizes. Paulaskas et al. (2018) did not find significant differences in 3-point shooting efficiency between players competing in the NBA and the EuroLeague. However, 3-point shooting was identified as a key determinant in the NBA play-off (Mateus et al., 2018). Dogan et al. (2019) found that 3-point shooting efficiency significantly increased with each additional EuroLeague round, impacting game outcomes. A higher number of successful 3-point shots was observed in winning teams than in defeated teams (Ibáñez et al., 2008; Karipidis et al., 2001). Sampaio et al. (2010) analysed the 3-point shooting efficiency of Team USA at OT in Beijing in 2008 and found that it was a key factor in their gold medal run. In close games, 3-point shooting efficiency was identified as a decisive factor influencing game outcomes (Csataljay et al., 2009). Even in youth tournaments, such as the U16 category, the significance of 3-point shooting efficiency in determining game outcomes was confirmed. Teams improved their 3-point shooting accuracy in critical moments, contributing to their victories (Lorenzo et al., 2010). Milanović et al. (2016) show that a high percentage of 3-point shots is essential for achieving positive results. Teams that use 3-point shots effectively tend to win more games and have better point differentials. However, not all studies unanimously confirm the strong relationship between 3-point shooting efficiency and positive game outcomes. Various studies analysing different tournaments and age categories have not always supported this relationship (Ibáñez et al., 2009; Trninić et al., 2012; Mikołajec et al., 2013; Sampaio et al., 2009). Nevertheless, these studies agree that rebounding is one of the most critical factors in determining game outcomes.

Rebounding is one of the most important individual skills. While individual success in rebounding does not determine team success, collective rebounding effort significantly increases the chances of gaining possession after a missed shot. Comparing NBA and EuroLeague players revealed that NBA players had a significantly higher number of defensive rebounds (Sampaio et al., 2010). Mikołajec et al. (2013) found that winning NBA teams had more defensive rebounds. Similarly, in NBA play-off games, winning teams demonstrated significantly higher defensive rebounding numbers (Mateus et al., 2018). Defensive rebounds prevent second-chance scoring opportunities and control the game's tempo. Teams with a higher number of defensive rebounds tend to win more frequently (Csataljay et al., 2009; Ibáñez et al., 2009; Dogan et al., 2019; Trninić et al., 2002; Lorenzo et al., 2010; Mateus et al., 2018; Mikołajec et al., 2013; Sampaio et al., 2009; Ibáñez et al., 2008; Karipidis et al., 2001). Although these studies did not explicitly mention the REB% metric, they highlight the importance of rebounding for team success. Our study confirmed this relationship using the REB% indicator, including offensive and defensive rebounds.

Similarly, previous studies have not confirmed a strong relationship between turnovers and game outcomes (Paukauskas et al., 2018; Sampaio et al., 2010; Csataljay et al., 2009; Trninić et al., 2002; Mateus et al., 2013; Mikołajec et al., 2013; Karipidis et al., 2001). However, Dogan et al. (2019) found that minimizing turnovers was crucial for teams advancing from the Top 16 to the EuroLeague play-offs. This relationship was also confirmed by Ibáñez et al. (2009), Dogan et al. (2009), Lorenzo et al. (2010), Sampaio et al. (2009), and Ibáñez et al. (2008). While our study established a direct relationship between turnovers and game outcomes only in OQT, we still emphasize that reducing turnovers is a crucial aspect of the game at any level.

CONCLUSION

This study aimed to identify differences in three indicators for winning and defeated teams in OQT and OT. Our findings showed significant differences between winning and defeated teams in three parameters, 3PT%, REB%, and TOV% in OQT. These parameters also proved to be significant predictors of winning. Increased 3PT% and REB% increased a team's probability of winning, while increased TOV% decreased the likelihood of winning. In OT, we found that REB% is the only significant predictor of winning. These findings could help basketball coaches and performance analysts, providing concrete statistics to focus on when evaluating a team's performance over a game or tournament. In addition, it would be useful to examine the long-term trends of these parameters on the overall success of teams at different stages of tournaments. Our study emphasizes the importance of using advanced statistics rather than absolute numbers. While traditional analyses often rely on absolute values as predictors of team success, advanced statistics accurately reflect individual contexts within a given criterion, offering more profound insights into performance evaluation.

AUTHOR CONTRIBUTIONS

Lubor Tomanek and Tomas Vencurik and Aleksandar Selmanovic conceived and designed the investigation, Tomas Vencurik and Stefan Suja analysed and interpreted the data, Lubor Tomanek and Stefan Suja drafted the manuscript and management. Stefan Suja collected data. All authors read and approved this manuscript before publication.

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No potential conflict of interest was reported by the authors.

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