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Analysis of the 3X3 Basketball Technique Women Team at the Olympic Games 2022

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Abstract
Background and Aim: Basketball competitions were now being statistically analyzed to study the elements that contribute to their success, prepare teams, and understand the strengths and weaknesses of opposing teams for effective training. Data analysis in basketball provides important insights into game-play characteristics, team performance, and competition results. Therefore, the research objectives were to study the 3x3 basketball techniques women's team in the Olympic Games 2022 and to compare the 3x3 basketball techniques team between the winning team with the losing team.
Materials and Methods: This study was a research and development study. Subjects were a purposive sampling of 32 players from eight teams that competed in women's 3x3 basketball at the 32nd Tokyo Olympic Games, such as China, Romania, the Russian Olympic Committee, Italy, France, Japan, the United States of America, and Mongolia. Data were collected and analyzed for the mean and standard deviation of statistical score, team offense, team defense, and technique team. Mean comparisons of statistical score, team offense, and team defense between the winning with losing teams were conducted using an independent t-test. Multiple regression was conducted with the winning team on competition statistics. The significance level was set to 0.05.
Results: The results found that: 1) In the comparison of statistics in basketball competitions, classified according to the results between the winning and losing teams, it was found that PTS, %1PT, and %FT showed significant differences, while other %2PT showed no significant differences. 2) A comparison of group statistics on offense and defense teams, broken down by competitive scores between winning and losing teams, found that all variables did not significantly differ. 3) The results of the multiple regression analysis of statistical values occurring during the competition, when considered against the competition outcomes. It was found that the competition statistical values able to predict the competition outcomes of the winning team consist of the statistics PT1_S, PT2_S, and FT_S.
Conclusion: The statistical values from the competition that can predict the outcomes for the winning team include PT1_S, PT2_S, and FT_S. These values can be used to create a prediction equation based on raw scores: Winning Team = 2.27 + 0.92(PT1_S) + 1.67(PT2_S) + 0.69(FT_S).
Keywords: The 3x3 Basketball; The Olympic Games 2022

Introduction

The 3x3 basketball was a new type of sports of 3x3 in the hall of the court, developed based on the futsal basketball. The 3x3 basketball originated from street basketball and has evolved into a formal sport that distinguishes it from street basketball over the years. It was an important part of the modern basketball discipline, and now it was one of the official Olympic Games. In 2011, the International Basketball Federation (FIBA) officially established 3x3 basketball as an official competition. In June 2017, the International Olympic Committee established 3x3 basketball as one of the official Olympic games. With the continuous improvement of the rules and the level of athletes, the standardization of 3x3 basketball was getting higher and higher. Because of its highly entertaining, interesting, confrontational, collective, easy-to-organize, and widely participatory characteristics, the 3x3 basketball was extremely popular among the youth. At present, more than 30 million people have participated in this sport. In the context of China's gradual emphasis on the three big-balls sports, the 3x3 basketball has naturally become a major item in the recent breakthrough. However, the old 3x3 basketball was changing, from mass participation to competitive competition, which requires players to have stronger competitive ability. Compared with the traditional futsal-basketball system, the 3x3 basketball has great differences in the limits of the playing field, time, number, and rules, and the players' offensive ways are more complex and varied. As the first Olympic Games in which 3x3 basketball was included in the Olympic Games, the video and data of the games in the

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Tokyo Olympic Games are representative and valuable for research. In the women's 3x3 basketball match of the 32nd Olympic Games, the Chinese team defeated Romania, Italy, France, Japan, Mongolia and other substantial countries in succession and defeated France 16-12 in the bronze medal match, getting the first Olympic basketball medal and making a historic breakthrough in China's basketball career. Such achievement was of epoch-making significance and has not only promoted the confidence of our country's basketball fans but also inspired generations of basketball players. It directly promotes the development of the 3x3 basketball sport in China. Although there were many domestic references about basketball technique and game analysis, the studies of women's 3x3 basketball Olympic games were less (International Basketball Federation (FIBA, 2017).

Basketball competitions have evolved in terms of strategic planning, physical fitness, and skills. Statistical analysis of match data was now being used to study the factors contributing to success, prepare teams, and identify weaknesses and strengths of opposing teams for designing effective training programs (Bilokon & Anikeienko, 2022; García et al., 2022). Basketball competitions were now being statistically analyzed to study the elements that contribute to their success, prepare teams, and understand the strengths and weaknesses of opposing teams for effective training. Data analysis in basketball provides important insights into game-play characteristics, team performance, and competition results (Zheng, 2022). Historical statistical data was used to track the evolution of the game, examine dominance per geographic area, analyze scoring pluralism and possessions in finals, and understand the impact of top scorers on team performance. The selection of basketball players in competitive activities was analyzed based on genetic traits, physical development, coordination, mobility, intelligence, and psychological stability (Bilokon & Anikeienko, 2022). Data analysis in NBA games has shown that it can effectively promote the development of basketball by analyzing game data and predicting outcomes (Wang, 2022). Statistical analysis of NBA game-related parameters has also revealed changes in teams' style of play during the regular and postseason periods, with field goal percentage and defensive rebounding being key factors in discriminating between winning and losing game outcomes (Cabarkapa, D., et al., 2022).

Due to the aforementioned reasons and importance, the researcher was therefore interested in studying the analysis of the 3x3 basketball technique for the women's team at the 2022 Olympic Games and expected that the results from this analysis would be used as guidelines for the development of the Chinese basketball team, enhancing their ability to meet international standards further.

Objectives

The purpose of this research was to find out as follows:

1. To study the 3x3 basketball techniques women's team in the 2022 Olympic Games.
2. To compare the 3x3 basketball techniques between the winning with losing teams.

Literature review

1. Basketball 3x3

3x3 basketball was regarded as the top urban team sport, with FIBA having a grand vision for the game since its official debut at the 2010 Youth Olympic Games. 3x3 basketball was straightforward and adaptable, suitable for play anywhere by anyone. All that's required was a hoop, a half court, and six players. Events can be organized both indoors and outdoors in notable locations, directly engaging with basketball enthusiasts. The rules of 3x3 basketball were intentionally simple to create a fast-paced, thrilling game. It serves as a platform for newcomers, organizers, and nations to transition from local play to global recognition. Top players participate in professional tours and prestigious multi-sport events. Notably, on June 9th, 2017, 3x3 basketball was included in the Olympic Program, commencing from the 2020 Tokyo Games. The integration of 3x3 basketball into the Olympic Games came after FIBA organized the inaugural national team world competition in 2011 and introduced the professional FIBA World Tour in 2012. Since then, 3x3 has rapidly gained recognition as one of the most dynamic and thrilling sports globally. Originating from street play worldwide, it has now ascended to the pinnacle of the sporting arena. For nearly as long as 5v5 basketball has been played, 3x3 has been utilized as a component of teams'

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preparation. The skills required in 3x3 were synonymous with those in traditional basketball. It's considered a game driven by the players themselves, and any innovations in its gameplay emerge from the athleticism and creativity of those participating (Fédération International de Basketball (FIBA, 2017).

Offensive ability refers to the attacking ability of the offensive players to purposefully use their skills and tactics to score a goal in a 3X3 basketball game according to the requirements of the basketball rules. The main indicators include: scoring ability (total points, 1-point points and percentage, 2-point points and percentage, free throw points and percentage), assist ability, offensive rebound ability, foul making ability, turnover control ability; Individual mobile attack ability, cover, coordination, sudden division, cutting and coordination ability. Scoring ability (total score, 1 minute, score the ball and shooting, 2 points and shooting, penalty goal and shooting), offensive rebounds ability, ability to draw fouls to refer to the Tokyo Olympic Games official website statistics, ability to control errors, personal mobile offensive capability, screen, coordination, and the sudden points, through-ball capacity of video observation statistics (Savaş et al, 2022).

Defensive ability refers to the ability of defensive skills and tactics adopted by defensive players in 3X3 basketball matches to prevent the opponent from scoring and seize the ball according to the requirements of basketball rules. The main indicators include: steal, play, breaking ability, defensive rebound ability, shot blocking ability; Squeeze through, through, around, exchange, defense, nip, close cooperation, man - to - man defense ability. Among them, the ability of grabbing, hitting, breaking the ball, defensive rebound, and shot blocking were collected by consulting the official website of the Tokyo Olympic Games. The ability of crowding, passing, bypassing, exchanging, filling defense, clamping, closing cooperation, and man-to-man defense were observed by video (Selmanovic et al, 2023). Moreover, the research results of Selmanovic et al (2023) examined how different offensive strategies impact the outcomes of basketball games at an elite level. By analyzing a wide range of games, the research identifies patterns in offensive play styles, including fast breaks, set plays, and pick-and-roll strategies, and assesses their effectiveness in scoring and securing wins. The study employs statistical analysis to correlate specific offensive approaches with winning probabilities, contributing valuable insights into optimizing game strategies in professional basketball.

2. The rules and technique of 3x3 basketball

Li (2009) believed that the rules of 3x3 basketball properly adjust the pace of the game and play a vital role in the game, but it still follows the basic rules of futsal basketball, and based on maintaining the principle of fairness and impartiality of the basketball game, it also greatly increases the enjoyment of the game. Zhu (2011) believed that 3x3 basketball was simpler than five-player basketball in terms of players, venues, techniques, tactics, and rules. The evolution of rules increases the players' desire for performance, and the intensity of the game does not decrease as the game becomes more interesting. Therefore, 3x3 basketball was easier to carry out in the public community.

Ma (2016) believed that the 3x3 basketball lineup was mainly equipped with two inside lines, or two outside lines, and an inside line. The attacking tactics of the three-player system were mainly based on the basic attacking coordination, among which the screen coordination had the highest utilization rate, the single screen had the most, and the cutting coordination had the least usage times. However, the success rate of the coordination was very high once it was played. The coordination was mainly based on the high position, and the sudden distribution of the combined ball to the outside was the most common. Song et al.(2018) believed that the appropriate use of screen cooperation and sudden cooperation was beneficial to improve the success rate of attack in a 3x3 basketball game. The application effect of screen coordination was better, while the application effect of pass coordination was the worst. Sudden distribution and combination can create better opportunities for open shots. In post coordination, players with strong individual offensive ability have a higher success rate of attack.

Hai (2017) believed that the lineup mainly has two inside and one outside, as well as one inside and two outside. 3x3 basketball was limited in terms of space and players. There were no fast breaks in the game. The attacking tactics of the 3x3 basketball game were mainly based on the basic attacking principles.

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There was no fast break in the game, and the conversion speed of attack and defense was very fast. Usually, it was composed of one interior lineman and two outside linemen, or one outside lineman and two inside linemen.

Zhao (2014) believed that breakthrough ability was a very important personal offensive means in ball-holding offense. Breakthrough ability was a very purposeful technique in which offensive players with the ball use footwork and dribbling techniques to get rid of defenders. It was one of the important means of basketball offensive technique. Breakthrough ability was a very practical technique in basketball. Using breakthrough tactics can not only score successfully but also disrupt the defense line of defenders, assist teammates, and obtain indirect scoring opportunities. The level of breakthrough success rate directly affects the level of attack efficiency. In basketball, excellent players can directly use the opponent's defensive position and formation to score breakthroughs and create scoring opportunities for teammates.

In summary, 3x3 basketball, based on futsal basketball rules, offers a simplified, faster-paced version of traditional basketball, emphasizing fairness and heightened enjoyment. With fewer players, smaller venues, and adjusted rules, it was easier to play in public settings. The typical 3x3 basketball lineup features two inside players or a combination of two outside players with one inside player, favoring screen coordination and high-position plays to maximize scoring opportunities. Tactics focus on coordinated, quick ball movement, with single screens and sudden distributions being highly effective, while passing is less utilized. Due to the limited space, the game lacks fast breaks, and the transition between offense and defense is rapid. Breakthrough ability is essential, as it allows players to score, disrupt defenses, and support teammates, directly impacting offensive efficiency and enabling skilled players to capitalize on defensive positioning.

3. Related research

Canuto and de Almeida (2020) conducted a systematic review and meta-analysis titled "Determinants of basketball match outcome based on game-related statistics." The research aimed to identify the key statistical indicators that influence the outcome of basketball matches. By reviewing numerous studies, they found that variables such as field goal percentage, rebounds (both offensive and defensive), assists, turnovers, and free throws were significant predictors of game outcomes. The study also highlighted that these determinants could vary depending on the level of competition (e.g., professional vs. amateur) and the region of play. The analysis provided coaches and analysts with insights into how specific game-related statistics can be used to improve performance and strategy formulation.

Savaş et al (2022) conducted a shot analysis of basketball matches across four Olympic Games (2004, 2008, 2012, and 2016). The research focused on examining shot-related statistics such as shot attempts, shot success rates, and types of shots (two-point vs. three-point shots and free throws) to understand how these factors contributed to the outcomes of the matches. The study aimed to reveal trends in shooting efficiency over time and differences between winning and losing teams. It was found that successful teams typically had higher shooting percentages in both two-point and three-point shots, as well as a greater number of free throw attempts and successes. The research provided valuable insights into the evolution of offensive strategies and shooting performance in Olympic basketball competition.

Yuanjing et al (2022) explored the application of a multiple regression analysis model in table tennis competition. The research aimed to identify key performance indicators (KPIs) that predict success in table tennis matches by applying statistical techniques. Through the use of multiple regression analysis, the study analyzed various game-related statistics, such as rally lengths, types of shots, serve and return effectiveness, and point differentials, to determine which factors most significantly influence match outcomes. The results highlighted those certain variables, such as the effectiveness of serves and returns, and the ability to maintain longer rallies, were significant predictors of winning matches. The study concluded that the multiple regression model provided a useful framework for coaches and athletes to identify and improve performance areas that directly contribute to winning strategies in competitive table tennis.

Raisa et al (2020) have studied Specific features of 3×3 basketball: factor analysis of the key performance indicators and their impact on game performance in the elite leagues. This study analyzed 11

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Master's stages and the final of the FIBA 3×3 World Tour (November 2–3, 2019, Utsunomiya, Japan), in which 56 teams participated. To assess the factors with the greatest impact on the percentage of wins of teams in the tournament, a regression analysis was performed. The percentage of wins (W%) in the total number of games played was taken as a performance indicator. To build a regression model, various game indicators were chosen, which were factorial manifestations. The obtained results revealed that W% was most influenced by the average turnovers and average rebounds per game. It was determined that the difference between the number of shots made per game under the basket and beyond the arc was insignificant (only 1-2 shots for some teams). In addition, a shooting map showed that some teams were more successful at shooting from outside the arc than from the middle range or behind the basket. To assess shooting activity, all final games were analyzed by video review. The turnovers per game (TOPG) have the greatest influence on the share of wins, i.e., 56.40%. Nevertheless, the rebounds per game (REBPG) factor also has a significant influence, i.e., 23.7%. If we increase TOPG by 1%, W% decreases by 0.30%. Moreover, if REBPG increases by 1%, W% increases by 0.12%. The TOP-10 3×3 teams (according to FIBA 3×3 World Tour 2019) perform an average of 15.50 ± 1.70 attacks in the paint and from an average distance (one-point shots), 12.30 ± 1.70 2 2-point shooting attacks, and 3.84 ± 0.60 free throws per game. On average, 8.90 ± 0.90 attacks from the paint zone and an average distance were successful per game in the league (one-point goals). Our findings highlight the importance of long-range shots to win games in 3×3 basketball and improve our understanding of how teams offensively prepare themselves to beat their opponents.

Conceptual Framework

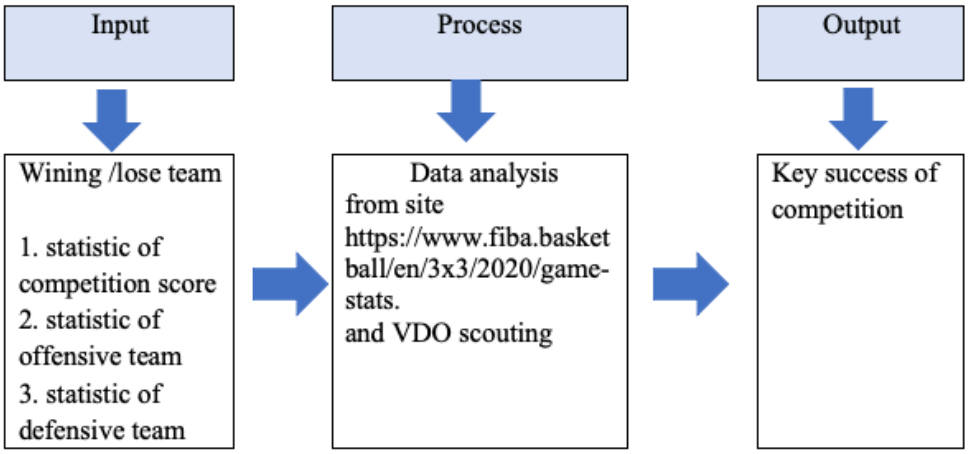

Figure 1 Conceptual Framework

Methodology

The research methodology employed in this study aimed to investigate the impact of specific technical factors on winning in women's 3x3 basketball at the 32nd Tokyo Olympic Games. The research focused on analyzing statistical data from all games in the competition.

1. Research Tools

This research was used to analyze of statistical competition of 3X3 basketball from the site https://www.fiba.basketball/en/3x3/2020/game-stats.

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2. Population and Sample

Population specification and size

The population for this research consisted of eight teams competing in the women's 3x3 basketball event at the 32nd Tokyo Olympic Games.

Sample

A purposive random sampling of 32 players from eight teams that competed in women's 3x3 basketball at the 32nd Tokyo Olympic Games was selected. The teams included China, Romania, the Russian Olympic Committee, Italy, France, Japan, the United States of America, and Mongolia in the 32 games of the competition.

3. Data Collection

The study's methodology involved several key steps as follows:

1. A comprehensive literature review was conducted to explore existing research on 3x3 basketball competition statistics. This review helped identify relevant factors that could potentially influence winning outcomes.

2. Following the literature review, the research defined three groups of event factors for analysis:

- Statistics of competition score: This group included metrics such as total points made (PTS) and success percentages for different types of shots.
- Statistics of offensive team: This group encompassed key assists (KAS), drives (DRV), turnovers (TO), and rebounds (REB).
- Statistics of defensive team: This group focused on blocked shots (BS) and rebounds (REB).

3. To collect the necessary data, the researchers contacted the organizers of the women's 3x3 basketball competition at the Tokyo Olympics and requested access to game statistics. They utilized secondary data from the official FIBA website, specifically the game stats section for the 2020 Olympics.

4. The data collection process involved gathering statistics from the first match to the final match of the competition. The collected data was then analyzed using a specialized software package designed for basketball statistics analysis.

4. Data Analysis

1. The analysis included calculating the mean, standard deviation, and percentages for various statistical measures.

2. The researchers compared means between winning and losing teams to identify potential differences in performance with an t-test independent.

3. To explore the relationship between team techniques and winning outcomes, this research employed multiple regression correlation analysis. This analysis aimed to determine the key factors that significantly contributed to a team's success in winning games.

Results

In this research, various symbols were utilized to represent the following meanings.

Symbols used in data analysis

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Symbols	Meanings
PTS	Total points made
%1PT	Success percentage of 1 point made/attempted
%2PT	Success percentage of 2 points made/attempted
%FT	Success percentage of Free throws made/attempted
KAS	Key assists
DRV	Drives
BS	Blocked shots
TO	Turnover
REB	Rebounds

Part 1 The results of the comparison of the statistics of basketball competitions, broken down by the results between the winning and losing teams, with an independent sample t-test. The results were as follows:

Table 1 Comparison of Group Statistics on Competitive Scores, broken down by Competitive Scores between Winning and Losing Teams

Statistic	Group	X± SD	t	P
PTS	Wining	19.35±2.36	8.09	.00*
	Losing	13.00±3.43		
%1PT	Wining	56.21± 12.90	4.30	.00*
	Losing	43.22±11.98		
%2PT	Wining	31.82± 18.70	1.82	.07
	Losing	24.77±12.73		
%FT	Wining	68.84± 28.64	2.48	.02*
	Losing	46.47± 44.07		

*p<.05

From table 2 found that PTS, %1PT, and %FT showed significant differences (*p<.05), but the %2PT showed no significant difference.

Table 3 Comparison of Group Statistics on offensive team, broken down by Competitive Scores between Winning and Losing Teams

Statistic	Group	X± SD	t	P
KAS	Wining	2.47±2.06	-1.82	.07
	Losing	3.35±1.94		
DRV	Wining	2.59±1.84	-.95	.35
	Losing	3.03±1.98		
BS	Wining	1.12±1.15	-1.13	.26
	Losing	1.44 ±1.21		
TO	Wining	4.06±2.28	-.28	.78
	Losing	3.91±2.01		
REB	Wining	12.97±4.57	-.37	.72
	Losing	13.32±3.31		

*p< .05

From table 2 found all of the variables showed no significant difference.

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Part 2 The results of the multiple regression analysis of statistical values occurring during the competition, when considered against the competition outcomes. The results were as follows:

Table 4 The results of the multiple regression analysis of competition statistical values occurring during the competition, when considered against the outcomes of matches where the winning team scored

Variables	B	Std Error	Beta	t	p
Constant	2.72	2.23		1.22	0.24
PT1_S	0.92	0.12	1.08	7.63	0.00*
PT2_S	1.67	0.20	1.31	8.51	0.00*
FT_S	0.69	0.15	0.54	4.47	0.00*
KAS	-0.03	0.13	-0.03	-0.22	0.83
DRV	0.08	0.14	0.06	0.56	0.58
BS	0.32	0.23	0.15	1.39	0.18
TOV	0.10	0.12	0.09	0.79	0.44
REB	-0.04	0.06	-0.08	-0.72	0.48

*p< .05 R= .89 R^2 = .80

From table 4, it was found that the competition statistical values able to predict the competition outcomes of the winning team consist of the statistics PT1_S, PT2_S, and FT_S. These can be used to formulate the prediction equation in terms of raw scores as follows.

"Winning team =2.27+.92(PT1_S) +1.67(PT2_S) +0.69(FT_S)"

From the equation in raw scores, it was found that an increase of 1 unit in the PT1_S competition statistic results in the winning team scoring with a higher likelihood of 0.92 points. An increase of 1 unit in the PT2_S statistic leads to the winning team scoring with a higher likelihood of 1.67 points. Additionally, an increase of 1 unit in the FT_S statistic leads to the winning team scoring with a higher likelihood of 0.69 points.

Conclusion

In comparing basketball competition statistics between winning and losing teams, significant differences were observed in PTS, S-VAL, %1PT, and %FT, while no significant differences were found in S-EFF, HGL, and %2PT. Additionally, when comparing offensive and defensive group statistics based on the competition scores of winning and losing teams, no significant differences were found across all variables.

The results of the multiple regression analysis of competition statistics about outcomes revealed that certain statistical values could effectively predict the winning team's performance. The key predictive statistics identified were PT1_S, PT2_S, and FT_S. These variables were used to create a prediction equation based on raw scores, as follows: Winning team = 2.27 + 0.92(PT1_S) + 1.67(PT2_S) + 0.69(FT_S)

Discussion

The comparison of statistics in basketball competitions, classified according to the results between the winning and losing teams, it was found that PTS, S-VAL, %1PT, and %FT were significant differences. In comparing statistics between winning and losing teams in basketball competitions, significant differences were found in total points made, shooting value, success percentage of 1-point shots made/attempted, and success percentage of free throws made/attempted (Cabarkapa, D., et al., 2022). These statistics were identified as important factors in discriminating between winning and losing game outcomes (Selmanovic

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et al., 2023). Additionally, defensive rebounds and assists were found to be good discriminant factors, with winning teams having more defensive rebounds and assists than losing teams (Canuto and de Almeida). Coaches should focus on improving defensive rebounding and assisting skills in practice planning to increase the likelihood of winning games (Savaş et al., 2022).

In point of the results of the multiple regression analysis of statistical values occurring during the competition, when considered against the competition outcomes. It was found that the competition statistical values able to predict the competition outcomes of the winning team consist of the success percentage of 1 point made and attempted, the success percentage of 2 points made and attempted, and the success percentage of free throws made and attempted. These can be used to formulate the prediction equation in terms of raw scores. Multiple regression analysis was used to predict competition outcomes in various sports. In the NBA, field goal percentage and defensive rebounding were found to be key statistics in discriminating between winning and losing game outcomes (Yuanjing et al., 2022)

Recommendation

Recommendation for current research

1. Training activities should be adjusted to be challenging to motivate the trainees to achieve goals and achieve training goals.
2. Activities should focus on fitness recovery during the post-cooling period.

Recommendation for further research

1. Researchers interested in basketball statistics analysis should explore various aspects in greater depth, including scoring intervals, scoring patterns, and the statistical data generated during each specific time frame.
2. Analyzing various statistics in domestic or Asian-level competitions can uncover differences between countries, offering valuable insights for adjusting strategies for athletes.

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