International Journal of Human Movement and Sports Sciences 13(2): 336-348, 2025 http://www.hrpub.org
DOI: 10.13189/saj.2025.130211

Comparative Analysis of the Implementation of Technical and Tactical Actions by High-Qualification Teams in 3x3 and 5x5 Basketball

Mykola Bezmylov[1], Oksana Shynkaruk[1], Liu Yang[1], Wang Hanpeng[2], Liang Xiao[2], Grygoriy Griban[3,*], Inna Asauliuk[4], Svitlana Dmytrenko[4], Larysa Pustoliakova[5], Alimia Osmanova[6], Oleksandr Lohvynenko[7], Liudmyla Pohasii[8]

[1]Department of Esports and Information Technologies, National University of Ukraine on Physical Education and Sport, Ukraine
[2]Department of History and Theory of the Olympic Sport, National University of Ukraine on Physical Education and Sport, Ukraine
[3]Department of Physical Education and Sport Improvement, Zhytomyr Ivan Franko State University, Ukraine
[4]Department of Theory and Methods of Physical Education, Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University, Ukraine
[5]Department of Physical Education and Health, National Bogomolets Medical University, Ukraine
[6]Department of Psychology and Sociology, East Ukrainian Volodymyr Dahl National University, Ukraine
[7]Department of Theory and Methods of Physical Education and Sports, Drohobych Ivan Franko State Pedagogical University, Ukraine
[8]Department of Physical Training, Sports and Rehabilitation, State University of Trade and Economics, Ukraine

Received November 16, 2024; Revised February 5, 2025; Accepted April 14, 2025

Cite This Paper in the Following Citation Styles

(a): *[1] Mykola Bezmylov, Oksana Shynkaruk, Liu Yang, Wang Hanpeng, Liang Xiao, Grygoriy Griban, Inna Asauliuk, Svitlana Dmytrenko, Larysa Pustoliakova, Alimia Osmanova, Oleksandr Lohvynenko, Liudmyla Pohasii , "Comparative Analysis of the Implementation of Technical and Tactical Actions by High-Qualification Teams in 3x3 and 5x5 Basketball," International Journal of Human Movement and Sports Sciences, Vol. 13, No. 2, pp. 336 - 348, 2025. DOI: 10.13189/saj.2025.130211.*

(b): *Mykola Bezmylov, Oksana Shynkaruk, Liu Yang, Wang Hanpeng, Liang Xiao, Grygoriy Griban, Inna Asauliuk, Svitlana Dmytrenko, Larysa Pustoliakova, Alimia Osmanova, Oleksandr Lohvynenko, Liudmyla Pohasii (2025). Comparative Analysis of the Implementation of Technical and Tactical Actions by High-Qualification Teams in 3x3 and 5x5 Basketball. International Journal of Human Movement and Sports Sciences, 13(2), 336 - 348. DOI: 10.13189/saj.2025.130211.*

Abstract The aim of the study is to identify the distinctive characteristics of technical and tactical activities of high-qualification teams in 3x3 and 5x5 basketball and to determine their priority impact on achieving successful outcomes in prestigious international competitions. Data were collected from 20 men's and 20 women's teams (3x3) and 32 men's (2023) and 12 women's (2022) teams (5x5). Performance indicators (field goals, free throws, rebounds, etc.) were normalized per minute of play and analyzed using standard FIBA match protocols. Normality was checked via Shapiro–Wilk test; comparisons were performed with ANOVA or the Kruskal–Wallis H test as appropriate. The research examined the competitive activity of national teams in 3x3 and 5x5 basketball at the 2022 and 2023 World Championships, analyzing data on technical and tactical activities from men's and women's 5x5 and 3x3 teams. Results show that 3x3 basketball teams had a higher percentage ($p<0.01$) of successful close-range shots (61.1±1.624 and 52.50±1.243) compared to 5x5 teams (54.05±1.04 and 44.87±1.736). However, 3x3 basketball teams had lower percentages in successful long-range shots compared to 5x5 teams ($p<0.05$). The 3x3 teams showed a statistically significant advantage in the frequency of close-range and long-range shot attempts. Women's 3x3 teams nearly doubled these shooting parameters compared to 5x5 teams (0.912±0.039 vs. 0.513±0.031, $p<0.001$), and scored similar points per minute (1.763±0.080 in 5x5 vs. 1.630±0.052 in 3x3). In men's competitions, 5x5 teams recorded a statistically significant higher number of points per minute than 3x3 teams (2.08±0.037 vs. 1.755±0.051, $p<0.001$). Among the men's teams that took top places,

successful long-range shots correlated with higher rankings ($r = -0.510$, $p<0.01$ in 5x5 and $r = -0.774$, $p<0.001$ in 3x3). In women's competitions, close-range shot quality significantly impacted overall success ($r = -0.705$, $p<0.01$ in 5x5 and $r = -0.482$, $p<0.05$ in 3x3). The findings of this study confirm the value of analyzing teams in both 3x3 and 5x5 formats, as it reveals universal patterns and specific differences in competitive performance, but also shows that accounting for gender differences facilitates more precise training planning and tactical decisions.

Keywords 3x3 and 5x5 Basketball, Competitive Activity, Technical and Tactical Actions, Training Activity, Long-Term Preparation, Management

1. Introduction

Modern basketball is evolving rapidly, highlighted by the growing popularity of the 3x3 format, which differs substantially from the traditional 5x5 in terms of intensity, offensive and defensive structure, and the specificity of technical-tactical actions. At the same time, teams exhibit particular differences in how they prepare for and execute game elements, influenced by varying levels of physical conditioning and tactical decisions [1, 2, 3]. A scientifically grounded comparison in 3x3 and 5x5 basketball can reveal universal mechanisms of successful competitive performance (for example, the importance of accurate shooting or efficient team interactions), as well as unique traits tied to each format. This approach is crucial for refining training methodology, as it allows coaches and sports scientists to focus on specific priorities and adjust preparations based on the competition format. Consequently, more effective development programs can be devised by accounting not only for fundamental basketball characteristics but also for nuances distinct to 3x3 or 5x5.

In modern sports, a detailed study of competitive activity is particularly relevant for new or reformed disciplines that have recently gained international recognition and been included in the Olympic program [4, 5, 6]. The introduction of 3x3 basketball at the 2020 Tokyo Olympic Games has drawn heightened attention from researchers and coaches, as this dynamic format differs fundamentally from the classic 5x5 [7, 8]. Organizations such as FIBA are increasingly prioritizing the growth of 3x3, enhancing the visibility of 3x3 competitions and promoting new training strategies, ultimately strengthening basketball on a global scale.

Its high intensity, smaller court, and reduced number of players create a unique combination of speed and power demands, requiring greater defensive aggressiveness and more precise execution of individual technical and tactical actions [9]. Unlike 5x5, where players can rely on help defense, the 3x3 format often precludes effective support, thus necessitating constant improvement of one-on-one skills and quick decision-making [10, 11]. According to Montgomery and Maloney [12] and Conte et al. [13], the intensity of physical exertion in 3x3 can be nearly twice that of traditional basketball due to more frequent bursts of movement, faster transitions between defense and offense, and more physically demanding contact.

At the same time, a positive transfer of skills from 3x3 to 5x5 has been observed: increased focus on individual play, rapid decision-making, and accurate shooting from various distances ultimately boost competitiveness in the classic format [4, 5, 6, 9]. Nevertheless, it remains crucial to investigate how the structural distinctions between 3x3 and 5x5 manifest in overall team performance. Some scholars (e.g., Frane Erculj [4], Herrán [14]) emphasize the need to study format-specific characteristics, since physical conditioning and tactical approaches can vary significantly. Consequently, a comprehensive analysis of 3x3 and 5x5 will enable the development of more tailored training methods, thereby fostering the effective growth of both basketball formats on the international stage.

At the same time, according to several experts [10, 11], fully transferring (or copying) the existing theoretical and methodological knowledge accumulated in traditional basketball to the training process of athletes in 3x3 basketball is not entirely correct. The increased international status of 3x3 basketball and its inclusion in the Olympic Games program should serve as a powerful catalyst for thorough research into various aspects of the athlete training system, considering the significant differences between the two formats.

A substantial body of research today is dedicated to exploring the structural differences in competitive activities between traditional and 3x3 basketball. Studies conducted by Montgomery & Maloney [12, 13] demonstrated that physical exertion in 3x3 basketball is twice as intense as in traditional basketball. The authors calculated the "dose" of exertion that athletes receive per minute of game time based on various motor activities (acceleration, jumps, changes in movement direction, total distance covered, etc.).

These findings align with previous research by Herrán et al. [14], who used modern GPS motion analysis systems ("Catapult Sport") to determine the specific kinematic parameters of athletes' movements during competitive activities in both traditional and 3x3 basketball. Despite covering a shorter total distance per match (m), 3x3 basketball players received a higher "dose" of physical load per minute of game time (u.o.). Moreover, the number of accelerations exceeding 1.5 and 2 m/s among 3x3 basketball players was nearly three times higher than in traditional basketball. In 5x5 basketball, there was a greater number of slow movements (under 0.5 m/s), which occurred twice as often compared to 3x3 basketball.

The higher intensity of motor activity in 3x3 basketball

is also accompanied by shorter playing periods and relatively brief rest intervals. According to Conte et al. [15], the ratio of playing time (LT) to rest time (ST) during game pauses in 3x3 basketball is close to one – 0.92±0.13. In traditional basketball, the length of playing segments is one and a half to two times longer than the duration of breaks.

Significant differences are also observed in the structure of various shots taken during a match. Research conducted by Slovenian specialists led by Frane Erculj [4] showed that during a 3x3 basketball game, players attempt a significantly higher number of long-range (6.75 m) and free throws, with a lower success rate compared to traditional basketball. The authors attribute this shot distribution to the unique conditions of competitive activity in 3x3 basketball, which intensifies motor actions. The points scored by the top-ranked FIBA 3x3 players at the World and European Championships in 2018 comprised 43% from beyond the arc and 42% from the inside perimeter [7]. According to Sarah et al. [16], the continuous increase in game speed on a limited court in 3x3 will likely lead to more player contact, giving actions a more physical nature.

During competitive activity, basketball players perform a wide variety of technical and tactical actions, each of which can impact the outcome of the game [17]. A crucial task, in our opinion, is to identify the distinctive features of competitive activity in 3x3 and 5x5 basketball, systematize the key components that support and execute complex team actions, and determine the primary factors that directly influence successful performances by teams in the most prestigious FIBA international competitions.

A comparative analysis allows us to pinpoint key differences that warrant separate approaches in training. Simultaneously, common trends (e.g., the impact of shooting accuracy or certain tactical combinations) may be integrated into universal training programs. While male and female athletes have inherent differences, studies confirm that analyzing the structure of competitive activity—such as shooting ratios or rebound patterns—can be conducted in a way that yields valuable insights for both groups. This approach uncovers mechanisms that have a similar effect on performance outcomes while highlighting unique nuances for each gender. Examining both men's and women's teams helps identify universal and specific patterns in technical-tactical readiness, physical demands, and stylistic features across two formats (3x3 and 5x5). This broader perspective benefits coaches and researchers in adapting training methods for various qualification levels. Thus, comparing male and female teams in 3x3 and 5x5 basketball provides a comprehensive view of the sport's development and identifies key determinants of success.

1.1. The Aim

The aim of the research is to identify the distinctive characteristics of technical and tactical activities of high-qualification teams in 3x3 and 5x5 basketball and to determine their priority impact on achieving successful outcomes in prestigious international competitions.

2. Materials and Methods

2.1. Participants

The competitive data of male and female national teams in 3x3 and 5x5 basketball were analyzed in matches from the 2022-2023 World Championships. A total of 20 men's and 20 women's basketball teams from the 2023 3x3 World Championship, as well as competitive data from 32 men's (2023) and 12 women's (2022) 5x5 basketball teams in World Cup matches, were analyzed.

2.2. Research Methods

The study utilized methods of theoretical analysis, pedagogical observation, and analysis of competitive activity. To determine the effectiveness of the competitive activity of the national basketball team, their performance in World Cup tournament matches was analyzed using traditional parameters of the standard FIBA match protocol: field goals – attempts, made, shooting percentage; two-point field goals – attempts, made, shooting percentage; three-point field goals – attempts, made, shooting percentage; free throws – attempts, made, shooting percentage; defensive and offensive rebounds; steals; turnovers; assists; personal fouls; blocked shots; and points scored in the match. The statistical analysis of data included verification of the observed data for normal distribution, using the Shapiro-Wilk test. If the indicators of the basketball team in their role were normally distributed, the equality of variances of characteristics in comparison groups was assessed by the Levene's test and, since the conditions were met, there was a comparative analysis of the indicators.

2.3. Statistical Analysis

For objective analyzing, the quantitative and qualitative parameters of technical and tactical activities were standardized to a conditional minute of game time. This approach allowed for a comparison of basketball teams across different game formats (in 3x3, the game lasts 10 minutes, whereas in 5x5, it lasts 40 minutes). Within the study, correlation analysis was conducted to explore the relationships between various technical-tactical actions and final standing of each team in World Cup. High correlation coefficients, such as r = - 0.811 for the relationship between points per game and final standing for men's team, and r = - 0.838 for the effectiveness of defensive rebounds final standing for women's team, indicate strong positive relationships. These correlations

were found to be statistically significant with p-values less than 0.001 and 0.01, respectively, confirming that these associations are not merely coincidental. In the case when the indicators did not meet the necessary conditions for using the one-way ANOVA, its non-parametric analogue was used, namely the KruskalWallis H test. Post hoc comparisons were performed with the help of the Mann-Whitney U test [18]. The level of statistical significance was set at $\alpha = 0.05$. Very low p-values (< 0.01) indicate high statistical significance. Statistical processing of empirical data was implemented using the statistical analysis package STATISTICA 10.0 (StatSoft, USA).

2.4. Ethical Approval

This work is carried out within the framework of the Consolidated Plan of Scientific Research on the topic "Improving preparation for the main competitions of the macrocycle of Ukraine's national teams in sports games" (State registration number 0121U108185). The research was carried out according to the ethical standards of the Act of Ukraine "On Higher Education" No. 1556-VII dated 01.07.2014 and the Letter from the Ministry of Education and Science of Ukraine "On the Academic Plagiarism Prevention" No. 1/11-8681 dated 15.08.2018. Informed consent was received from all individuals who took part in this research and who could refuse participation at any time.

3. Results

The data obtained indicate a significant advantage for 3x3 basketball teams in executing both close-range and long-range shots (Tables 1, 2). This advantage is particularly notable, as teams in 3x3 often nearly double certain shooting parameters per minute of game time compared to 5x5 (for instance, 0.912±0.039 vs. 0.513±0.031 close-range shots, $p<0.001$). However, in terms of long-range shooting accuracy (%), 3x3 basketball teams can be less successful than their 5x5 counterparts ($p<0.05$).

Table 1. Efficiency of Technical and Tactical Actions by High-Qualification Men's Teams in 3x3 and 5x5 Basketball (per minute of game time)

Technical and Tactical Actions	5x5 Basketball Teams			3x3 Basketball Teams			p<
	Mean±m	σ	V, %	Mean±m	σ	V, %	
Two-point field goals made (1-2 PTM)*	0.501±0.012	0.066	13.2	**0.853±0.028**	0.125	14.68	0.001
Two-point field goal attempts (2 PTA)	0.929±0.017	0.099	10.6	**1.408±0.052**	0.233	16.57	0.001
Two-point field goal percentage (2PT %)	54.05±1.04	5.90	10.92	**61.1±1.624**	7.261	11.88	0.001
Three-point field goals made (2-3 PTM)	0.237±0.009	0.051	21.59	**0.316±0.020**	0.089	28.28	0.001
Three-point field goal attempts (3 PTA)	0.690±0.015	0.087	12.64	**1.058±0.045**	0.200	18.87	0.001
Three-point field goal percentage (3 PT %)	34.20±0.930	5.26	15.38	**30.10±1.624**	7.261	24.12	0.05
Free throws made (FTM)	**0.371±0.014**	0.079	21.2	0.268±0.027	0.122	45.68	0.001
Free throw attempts (FTA)	**0.494±0.017**	0.079	20.0	0.375±0.032	0.143	38.13	0.001
Free throw percentage (FT %)	**75.06±0.984**	5.57	7.42	69.75±2.55	11.40	16.35	0.05
Offensive rebounds (OREB)	0.280±0.009	0.056	20.08	**0.466±0.040**	0.179	38.47	0.001
Defensive rebounds (DREB)	0.625±0.010	0.060	9.73	**0.837±0.036**	0.163	19.55	0.001
Total rebounds (TREB)	0.905±0.014	0.077	8.53	**1.303±0.059**	0.263	20.24	0.001
Assists (AS)	**0.509±0.013**	0.071	13.97	0.317±0.019	0.084	26.50	0.001
Blocked shots (BLK)	0.070±0.005	0.027	37.80	0.079±0.009	0.080	38.47	-
Turnovers (TOV)	0.342±0.008	0.045	13.20	**0.508±0.032**	0.141	27.85	0.001
Team fouls (PF)	0.505±0.009	0.052	10.30	**0.735±0.020**	0.089	12.09	0.001
Points per game (PPG)	**2.08±0.037**	0.213	10.23	1.755±0.051	0.228	13.0	0.001

Note: In 5x5 basketball, a long-range shot (beyond the arc) counts for three points, while a close-range shot (inside the arc) counts for two points. In 3x3 basketball, a long-range shot is worth two points, and a close-range shot is worth one point.

Table 2. Efficiency of Technical and Tactical Actions by High-Qualification Women's Teams in 3x3 and 5x5 Basketball (per minute of game time)

Technical and Tactical Actions	5x5 Basketball Teams			3x3 Basketball Teams			p<
	Mean±m	σ	V, %	Mean±m	σ	V, %	
Two-point field goals made (1-2 PTM)	0.513±0.031	0.107	20.87	**0.912±0.039**	0.174	19.11	0.001
Two-point field goal attempts (2 PTA)	1.041±0.065	0.224	21.48	**1.737±0.052**	0.234	13.45	0.001
Two-point field goal percentage (2PT %)	44.87±1.736	6.015	13.40	**52.50±1.243**	5.558	10.59	0.01
Three-point field goals made (2-3 PTM)	0.178±0.009	0.032	18.0	**0.228±0.016**	0.072	31.54	0.05
Three-point field goal attempts (3 PTA)	0.563±0.024	0.083	14.77	**0.880±0.049**	0.218	24.18	0.001
Three-point field goal percentage (3 PT %)	32.0±1.571	5.442	17.0	26.15±1.441	6.442	24.64	0.05
Free throws made (FTM)	0.243±0.023	0.080	33.05	0.260±0.025	0.111	42.84	-
Free throw attempts (FTA)	0.317±0.027	0.094	29.67	0.334±0.030	0.132	39.51	-
Free throw percentage (FT %)	76.30±1.437	4.978	6.52	77.25±1.605	7.180	9.29	-
Offensive rebounds (OREB)	0.282±0.020	0.071	25.33	**0.483±0.028**	0.125	26.04	0.001
Defensive rebounds (DREB)	0.675±0.028	0.100	14.83	**0.959±0.044**	0.199	20.78	0.001
Total rebounds (TREB)	0.958±0.039	0.135	14.11	**1.442±0.058**	0.262	18.19	0.001
Assists (AS)	0.434±0.034	0.119	27.36	0.325±0.024	0.108	33.12	0.05
Blocked shots (BLK)	0.087±0.009	0.032	37.10	0.110±0.012	0.055	50.54	-
Turnovers (TOV)	0.364±0.015	0.051	13.95	**0.498±0.041**	0.183	36.72	0.05
Team fouls (PF)	0.377±0.014	0.047	12.44	**0.684±0.011**	0.051	7.41	0.001
Points per game (PPG)	1.763±0.080	0.280	15.89	1.630±0.052	0.232	14.24	-

Note: In 5x5 basketball, a long-range shot (beyond the arc) counts for three points, while a close-range shot (inside the arc) counts for two points. In 3x3 basketball, a long-range shot is worth two points, and a close-range shot is worth one point.

The observed imbalance can be explained by the specific conditions for executing close and long-range shots in different game formats. In traditional 5x5 basketball, teams have more time for preparatory tactical interactions that position a player in an optimal spot for an open long-range shot. In 3x3 basketball, long-range shots are often unprepared, taken under extreme time constraints, aggressive opponent defense, and evident fatigue due to the high intensity of play and limited substitutions.

Analyzing the data also reveals that increasing the number of long-range attempts in 3x3 is associated with a decrease in shooting accuracy, compared to traditional 5x5 basketball.

The "value" of a successful long-range shot in 3x3 basketball is higher than in 5x5, as long-range shots in 3x3 yield twice as many points as close-range and mid-range shots, while in traditional basketball, this difference is only 66.6%.

On average, 5x5 basketball teams attempt significantly more free throws ($p<0.01$) due to fouls committed by the opposing team. Additionally, 3x3 teams commit more fouls per minute of game time (0.735±0.020 and 0.684±0.011 in 3x3, compared to 0.505±0.009 and 0.377±0.014 in 5x5).

The significantly higher percentage of successful one-point shots in 3x3 (compared to two-point shots in 5x5) may be due to players' efforts to complete shots in close proximity to the basket (such as layups, floaters, etc.).

Additionally, the conditions of outdoor basketball matches (such as wind gusts) can also influence performance. In traditional 5x5 basketball, the number of mid-range shots (within the three-point arc) is significantly higher. Naturally, the success rate for these mid-range shots from 4.5 or 5 meters will be lower compared to shots taken near the basket. The higher frequency of mid-range shots in traditional 5x5 basketball can be attributed to the greater density of players inside the key (three-second area) and various help defense strategies in response to penetration attempts.

An increase in shot attempts (including missed shots) is accompanied by a rise in the number of offensive and defensive rebounds. 3x3 basketball teams have a significant advantage ($p<0.001$) in these metrics compared to 5x5 teams.

It is also noteworthy that teams in 5x5 basketball perform a greater number of assists (0.509±0.013 and 0.434±0.034, respectively, compared to 0.317±0.019 and 0.325±0.024 in 3x3 basketball). This highlights the importance of team interactions in traditional basketball and the need to continuously find open teammates for scoring opportunities. In 3x3 basketball, players often focus more on individual duels with their defenders. Beating a defender typically prevents help defense from teammates, as switching to another opponent can create an

opportunity for an open long-range shot, which poses a significant threat in 3x3 basketball.

In 5x5 basketball, a large proportion of assists occur during defensive switches, when the ball-handler passes to an open teammate. Women's teams in both 5x5 and 3x3 basketball score a similar number of points per minute (1.763±0.080 in 5x5 vs. 1.630±0.052 in 3x3). In men's competitions, 5x5 teams score significantly more points per minute than 3x3 teams (2.08±0.037 in 5x5 vs. 1.755±0.051 in 3x3, $p<0.001$).

An analysis of the percentage "value ratio" of different types of shots for scoring points in a match shows that close-range shots contribute to more than half of the total points for women's teams in both 5x5 and 3x3 basketball (55.72±1.48% vs. 55.96±1.50%) (Table 3). In the competitive activities of men's teams, three-point shots have a significantly higher value for scoring points (34.02±1.04% in 5x5 and 35.84±1.88% in 3x3). It is also noteworthy that significant differences between 5x5 and 3x3 teams in the percentage contribution were observed only for free throws among men (17.82±0.60 in 5x5 vs. 14.87±1.28 in 3x3, $p<0.05$).

The correlation analysis indicates that in the 3x3 format, long-range shooting exerts a more direct impact on overall performance, as each successful attempt yields a double value (2 points). Meanwhile, in 5x5, three-point shots amount to only a 66.6% difference compared to a standard two-point shot, making long-range success somewhat less critical for many teams. Additionally, the shorter attack time and limited number of players in 3x3 produce higher game dynamics, leading to a stronger emphasis on individual outside shots. The correlation coefficients confirm that in 3x3, the percentage of long-range conversions can decisively influence a team's final tournament standing. In contrast, traditional 5x5 places a greater premium on systemic plays, positional offense, and a range of other technical-tactical indicators, including effective mid-range shots and extended team interactions.

Comparing 5x5 and 3x3 reveals significant differences in the importance and impact of certain technical-tactical actions on the final outcome. In 3x3, shooting efficiency in fast-paced conditions and the absence of elaborate team structures are critical factors, whereas in 5x5, success more often hinges on coordinated team interplay, ample time to set up shots, and the strategic use of mid- and close-range opportunities. (Table 4).

The higher the ranking achieved by a men's team in 3x3 basketball, the greater the number of successful long-range shots they averaged ($r = -0.510$, $p<0.01$ in 5x5 and $r = -0.774$, $p<0.001$ in 3x3) (Figure 1).

Strong correlations were observed between the accuracy (%) of two-point and three-point shots by teams and their final tournament results ($r = -0.760$, $p<0.001$; $r = -0.510$, $p<0.01$ for men, and $r = -0.705$, $p<0.01$; $r = -0.774$, $p<0.01$ for women). This trend, however, was not found in 3x3 basketball.

The importance of successful field goals in traditional 5x5 basketball is likely related to preventing the opponent from quickly organizing offensive actions (fast breaks or transitions). Many fast attacks begin after a failed shot attempt is rebounded by the opposing team. An immediate transition to offense allows the team to disrupt the opponent's organized retreat to defense, securing so-called "easy points." High-level teams aim to avoid such rapid transition attacks from their opponents, supporting the well-known adage that defense begins with one's own successful shot.

One effective strategy to prevent a quick counterattack is contesting the rebound after one's own shot (offensive rebounds). This aggressive approach effectively forces the opponent back under their own basket, compelling them to focus on preventing the rebound rather than quickly transitioning to offense. However, our correlation analysis did not support this coaching theory. The number of offensive rebounds did not show a statistically significant correlation with the final performance of high-level teams in 5x5 and 3x3 basketball in prestigious international competitions.

In 3x3 basketball, after securing a defensive rebound, the team must bring the ball beyond the arc, which takes time (especially if the opponent immediately applies pressure within the rules). This process usually allows the team to organize their defense and mark their players.

A similar trend was observed for turnovers. In traditional 5x5 basketball, turnovers are critical technical errors that lead to immediate counterattacks by the opponent. Fast, successful attacks not only result in points but also negatively impact the opposing team's morale, disrupt their game structure, and often lead to further errors.

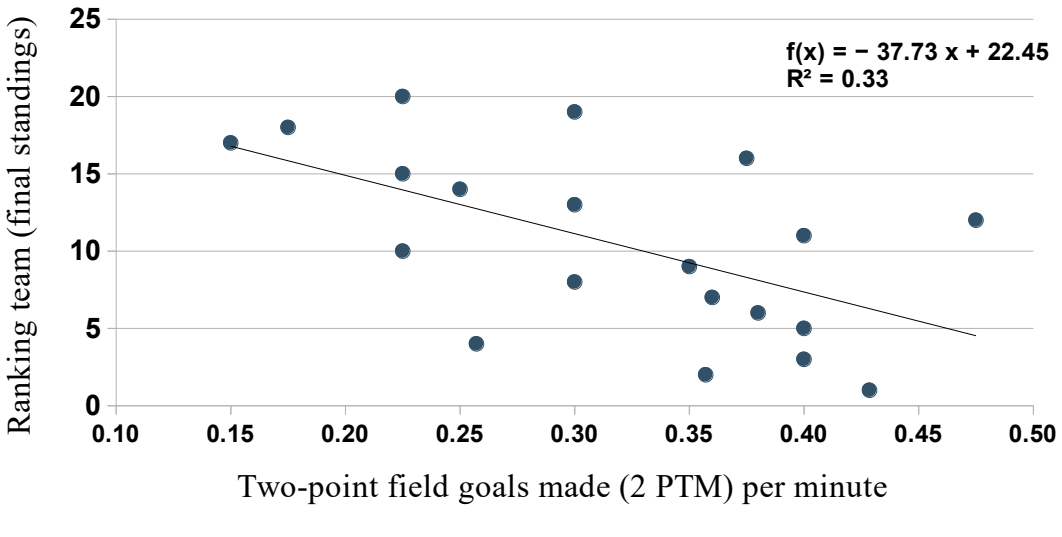
Interestingly, in the 3x3 format, neither defensive nor offensive rebounds showed a statistically significant correlation with final team rankings, whereas in 5x5, teams with a higher number of defensive rebounds generally secured better tournament standings ($r = -0.463$, $p<0.05$). This may indicate that the more extended and tactically rich possessions in 5x5 heighten the importance of battling for rebounds, which directly influences overall success (Figure 2).

Table 3. Percentage Contribution of Different Types of Shots to Total Points Scored in a Match by High-Qualification Teams in 5x5 and 3x3 Basketball

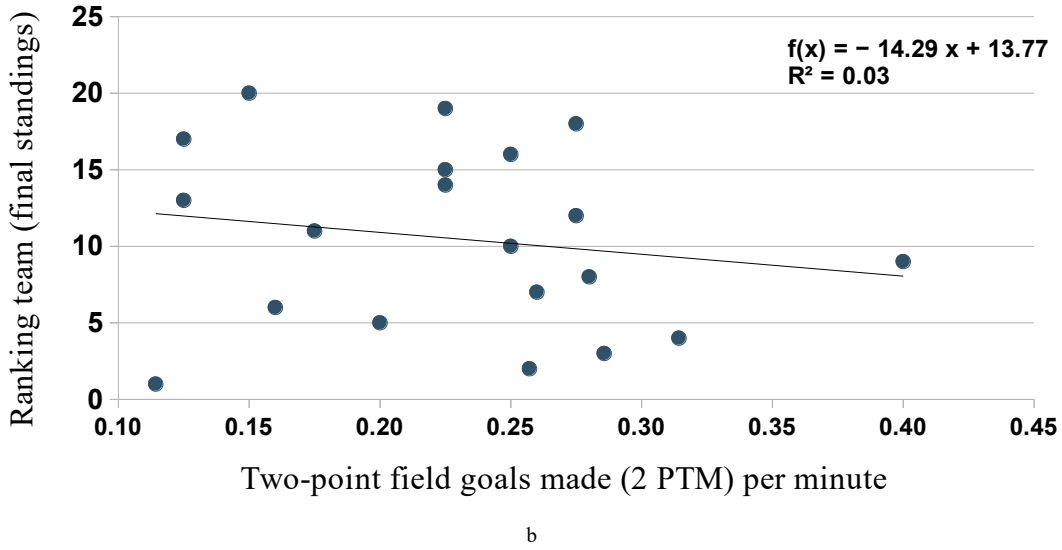
Technical and Tactical Actions	5x5 Basketball teams			3x3 Basketball teams			p<
	Mean±m	σ	V, %	Mean±m	σ	V, %	
	men's teams						
Two-point field goals made (1-2 PTM), %	48.18±0.92	5.22	10.84	49.21±1.92	8.60	17.48	-
Three-point field goals made (2-3 PTM), %	34.02±1.04	5.90	17.33	35.84±1.88	8.42	23.50	-
Free throws made (FTM), %	**17.82±0.60**	3.40	19.12	14.87±1.28	5.75	38.71	0.05
	women's teams						
Two-point field goals made (1-2 PTM), %	55.72±1.48	5.15	9.24	55.96±1.50	6.73	12.02	-
Three-point field goals made (2-3 PTM), %	30.60±1.46	5.08	16.61	28.27±1.88	8.44	29.86	-
Free throws made (FTM), %	13.67±0.96	3.34	24.45	15.69±1.31	5.86	37.33	-

Table 4. The Impact of Specific Technical and Tactical Actions by High-Qualification Teams in 5x5 and 3x3 Basketball on Final Ranking in International Competitions

Technical and Tactical Actions	5x5 Team	3x3 Team	5x5 Team	3x3 Team
	Men (n=32) p<0,05, a=0,349, p<0,01, a=0,449, p<0,001, a=0,554	Men (n=20) p<0,05, a=0,423, p<0,01, a=0,537, p<0,001, a=0,652	Women (n=12) p < 0,05, a=0,532, p<0,01, a=0,661, p<0,001, a=0,780	Women (n=20) p<0,05, a=0,423, p<0,01, a=0,537, p<0,001, a=0,652
Two-point field goals made (1-2 PTM)	**-0.493**	-0.232	-0.426	**-0.482**
Two-point field goal attempts (2 PTA)	0.178	-0.117	**-0.683**	-0.324
Two-point field goal percentage (2PT %)	**-0.760**	-0.145	**-0.705**	-0.399
Three-point field goals made (2-3 PTM)	**-0.548**	**-0.571**	-0.221	-0.174
Three-point field goal attempts (3 PTA)	-0.312	-0.301	0.587	0.180
Three-point field goal percentage (3 PT %)	**-0.510**	-0.403	**-0.774**	-0.371
Free throws made (FTM)	-0.309	**-0.475**	**-0.666**	**-0.574**
Free throw attempts (FTA)	-0.193	**-0.464**	**-0.619**	**-0.562**
Free throw percentage (FT %)	-0.346	-0.253	-0.381	-0.338
Offensive rebounds (OREB)	0.130	-0.353	-0.340	-0.271
Defensive rebounds (DREB)	**-0.422**	-0.177	**-0.838**	**-0.463**
Total rebounds (TREB)	-0.238	-0.350	**-0.801**	**-0.482**
Assists (AS)	**-0.544**	-0.051	**-0.797**	-0.226
Blocked shots (BLK)	-0.197	-0.181	**-0.650**	-0.099
Turnovers (TOV)	**0.539**	0.326	**0.639**	0.166
Team fouls (PF)	0.337	**0.436**	0.312	0.377
Points per game (PPG)	**-0.811**	**-0.827**	**-0.831**	**-0.744**

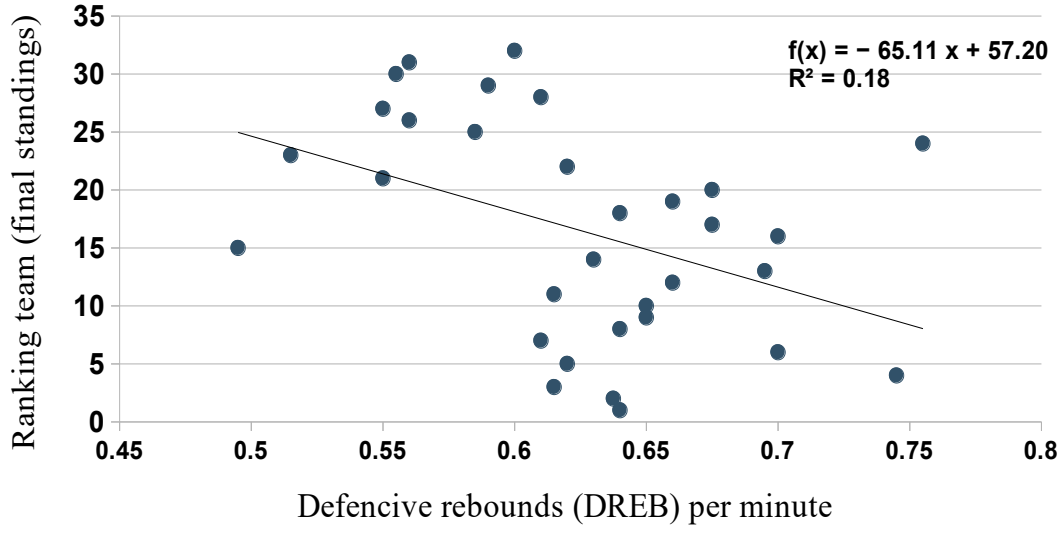


a

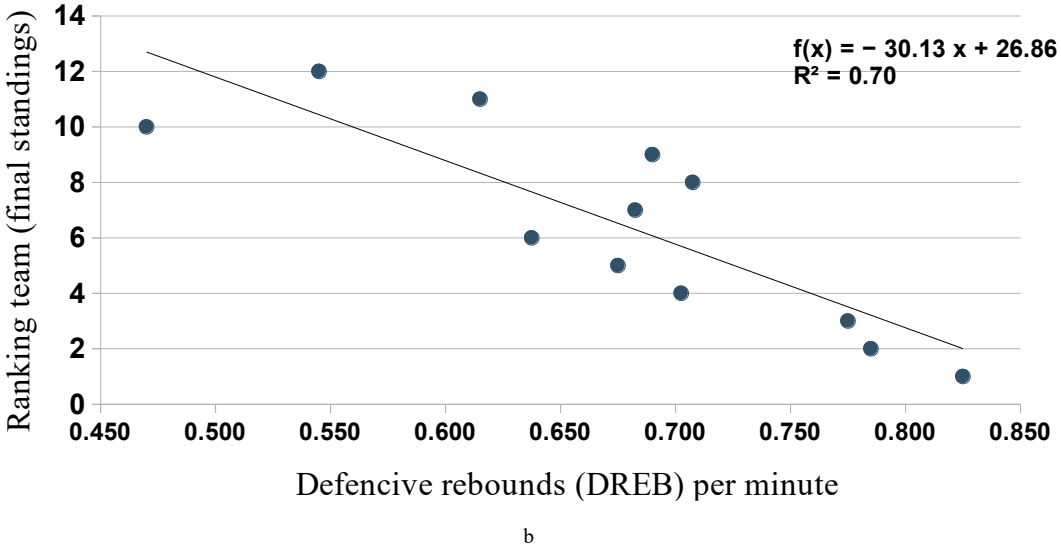


b

Figure 1. The Impact of Long-Range Shot Attempts on Final Ranking for Men's Team (**a**, n=20) and Women's Team (**b**, n=12) in 3x3 Basketball (World Cup 2023)



a



b

Figure 2. The Impact of Long-Range Shot Attempts on Final Ranking for Men's Team (**a**, n=32) and Women's Team (**b**, n=12) in 3x3 Basketball (World Cup 2023)

4. Discussion

Comparing the two basketball formats (5x5 and 3x3) is fully justified. It broadens the analytical possibilities and deepens our understanding of the structure of competitive performance under different conditions. The inherent differences between formats (fewer players in 3x3, specific rules, smaller court size, etc.) naturally introduce variability. However, this diversity enables a more detailed investigation of how different game formats impact key components of performance.

Several researchers (e.g., Frane Erculj [4], Herrán [14], Lukic et al. [20]) emphasize that simultaneously analyzing teams in 3x3 and 5x5 reveals unique patterns. For instance, such comparisons can uncover distinct roles of long-range shooting, variations in physical loads, or differences in defensive strategies according to gender and game format. This, in turn, makes it possible to more accurately adapt training programs and develop player development strategies suited to each format. Additionally, findings from this approach can facilitate the transition of athletes between 5x5 and 3x3, as well as assist coaches in assembling more balanced rosters.

By encompassing the characteristics of two formats, a multifactorial analysis helps avoid oversimplified conclusions about the structure and dynamics of competitive activity. Even though differences in 3x3 and 5x5 implementations indeed introduce variability, this variability is not a drawback; instead, it represents a source of new scientific insights and expands the practical applications of the findings.

Improving the competitive performance of high-qualification basketball teams is unlikely to be effective without accurate and, most importantly, objective data that reflects the specific behaviors of athletes and teams during the game. In competitive play, basketball players perform a wide range of technical and tactical actions in both defense and offense, which change rapidly under the dynamic conditions of sports rivalry and have a continuous cyclical nature. These actions serve as tools for accomplishing the objectives of the match and act as informative criteria that capture the behaviors of the team and its individual players [1].

The rapid development of 3x3 basketball over the past decade is attributed by specialists to the proactive efforts of FIBA, which has effectively established an international hierarchical system of competitions at both national and professional levels. FIBA's efforts have included creating criteria for athlete eligibility, implementing a ranking system, and continually expanding the geographic reach and participant base of prestigious tournaments.

For a considerable time, 3x3 basketball competitions were primarily viewed as supplementary training activities and a tool for preparing players in traditional basketball [19]. This likely explains the significant lack of specific scientific and applied knowledge, as well as foundational methodological developments addressing the pressing issues of training athletes in this form of basketball, observed until the early 2010s.

The elevation of 3x3 basketball's international status and its inclusion in the Olympic Games program led to increased activities in leading countries worldwide, focused on systematically preparing national teams. This shift has acted as a catalyst for exploring the most effective training technologies suited to the high-intensity, short-duration nature of competitive activity in 3x3 basketball.

One of the key challenges in training 3x3 teams is the attempt to apply the existing theoretical and methodological foundation of traditional basketball directly to 3x3. It is difficult to disagree with researchers [9, 11] who highlight the strategic limitations of this approach for long-term development.

The rise in 3x3 basketball's status and the desire of many countries to compete for medals at prestigious international tournaments have led to the emergence of two contrasting approaches to national team preparation.

The first approach involved recruiting professional 5x5 basketball players after their season had concluded. Major international 3x3 tournaments for national teams are held between June and September (excluding the club season events like the Masters Series, Women's Series, etc.), a period when many traditional basketball leagues are on a break for rest and preseason preparation. At the initial stages of international 3x3 competitions, players of such high caliber held a significant advantage over amateurs who focused exclusively on 3x3 basketball.

For 5x5 players, a few weeks of preparation and a series of preparatory tournaments were sufficient to achieve the required level of performance. This approach was actively adopted in the early 2010s by many countries in Eastern Europe (including Ukraine), the Netherlands, and others, allowing these national teams to consistently win medals in prestigious international competitions (World Championships, European Championships, European Games, etc.).

The advantage of this "exploitative" approach is quite evident, as it eliminates the need for year-round targeted preparation in 3x3 basketball. After completing a long season in traditional basketball, players are typically in excellent physical condition and, after a brief rest, can transition to the specific demands of 3x3. The skill level of these players often remains higher than that of amateur-level athletes who may have participated exclusively in 3x3 competitions at the national level throughout the year.

A significant drawback of such "summer retraining" for athletes to play 3x3 basketball is that these players are often also involved in the preparation of national 5x5 teams (in various age categories), which are also preparing for major international competitions during the summer. Specialists [11] point out the potential risk posed by surface changes for athletes, which could lead to serious injuries during such transitions (in traditional basketball, the surface is hardwood, whereas in 3x3, it is rubberized plastic).

The second approach to 3x3 basketball training involves fully separating it from traditional basketball, focusing year-round preparation solely on 3x3 competition success within the professional season. Different variations of such annual periodization have been extensively discussed in the work of Serbian specialists Lukic et al. [20]. Athletes who compete from April to November in prestigious international 3x3 tournaments (such as the Masters Series) are at an advantage compared to those who, after a break from traditional basketball and brief preparation, aim to participate in national team competitions. So far, this approach has been successfully implemented only in men's 3x3 basketball.

FIBA 3x3 officials also recognize the need for such competitive differentiation and have introduced additional requirements for players eligible to represent national teams in prestigious championships (such as a minimum player rating achieved through prior participation in 3x3 tournaments). These measures are intended to separate the two forms of basketball, prevent countries from manipulating the recruitment of traditional basketball players for 3x3 national teams, and lay the groundwork for the next stage of 3x3 development. This evolution will involve the full specification of training methods for 3x3 basketball and the expansion and deepening of a unique knowledge system for the sport.

Unlike traditional basketball, in 3x3 competitions, the current ranking of national teams (determined by the points accumulated from team and individual performances in 3x3 tournaments) plays a significant role in qualifying for the most prestigious international tournaments (World Championships, Continental Championships, etc.). This ranking system further encourages specialists to differentiate players between the two forms of basketball and to deepen the specialization of the training process. There is currently active discussion regarding the advisability of specializing players in either 3x3 or 5x5 basketball as early as youth levels.

We find the opinions of Adrianova et al. [21], Boros et al. [22], and Snoj et al. [23] entirely reasonable, as they argue that performance effectiveness in modern sports depends on objective knowledge of the structure of competitive activities and the key components of their implementation and support. One of the primary steps in forming a specialized knowledge system should involve a clear understanding of the critical components that have a decisive influence on effective competitive performance in both traditional basketball and 3x3 basketball.

In competitive play, basketball players perform numerous technical and tactical actions in both defense and offense. Unlike traditional basketball, 3x3 basketball has a more dynamic flow, as the phases of transition between defense and offense are essentially absent. After completing their own offensive action, the team must immediately defend, and then quickly regain possession to organize further offensive plays. In such competitive conditions, transitional game organization actions, which are a major focus in traditional basketball preparation, are eliminated in 3x3.

This rapid shift from offense to defense is one of the primary factors that intensifies player actions on the court. Our analysis of the number of technical and tactical actions per minute of game time revealed a significant advantage (in some cases at the level of $p<0.001$) for teams in 3x3 across nearly all main game actions. These findings indirectly confirm the results of studies by Montgomery & Maloney [12, 13], which showed that the physical load ("load dose") per minute of game time in 3x3 basketball is almost twice as high as in traditional

basketball.

It has been shown that in the 3x3 format, the number of rebounds has no a statistically significant correlation with the final team results, whereas in the 5x5 format, teams with higher defensive rebound metrics generally achieved better tournament standings. We hypothesized that in 5x5 teams, the attacks are longer and more tactically complex.

An analysis of the percentage contribution of different types of shots to the total points scored in a match did not reveal significant differences between the two forms of basketball. Only in the contribution of free throws did we observe a significant difference between teams in 5x5 and 3x3. The vast majority of points scored by basketball teams in both 3x3 and 5x5 come from close and long-range shots (accounting for nearly 85% of total points).

Our findings support previous studies by Madarame et al. [24] and Ortega et al. [25]. The strong correlations we found between long-range shot accuracy and the final tournament ranking for teams emphasize the importance of this element, particularly in 3x3 basketball. This largely explains the selection principles of 3x3 professional team coaches, who aim to recruit players with intermediate body size and a consistent, effective long-range shot. A player capable of scoring from any distance forces the opponent to play tight defense and exerts constant pressure throughout the game. Additionally, an intermediate body size (198–203 cm for men and 179–184 cm for women) allows for effective use of the pick-and-roll (PNR) during the primary defense type in 3x3—switching—without sacrificing speed against "small players" or strength against "big players."

The higher number of fouls committed by teams in 3x3 per minute of game time indicates a more physical style of defense and increased contact between players. These findings are consistent with the conclusions of Lenart et al. [9] and Wenpeng et al. [26], who noted the specific nature of competitive play in 3x3. Help defense in response to penetration is highly risky, as it creates a substantial threat of an open long-range shot, which has twice the scoring value. This may also explain the significantly lower number of assists per minute observed in 3x3 compared to traditional basketball.

A characteristic feature of 3x3 basketball is the emphasis on the quality of individual player actions within the team. Complex multi-player interactions are impractical due to the limited time allocated for each attack (12 seconds). In these conditions, all organizational and tactical actions must be highly coordinated and executed almost reflexively. Teams that achieve this level of mutual understanding among the three players on the court (often developed through long-term teamwork) frequently outperform opponents with comparable individual skill levels. Mysienko et al. [19] indicate that high-level teams conduct a majority of their attacks through organized three-player interactions (e.g., off-ball screen, on-ball screen) rather than individual play (1v1, man-to-man).

The identified features of technical and tactical activities of teams in both forms of basketball point to a fundamental difference in the key components that support and execute competitive actions. This, in our view, requires further in-depth study and systematic analysis of the complex structure of competitive activities, especially in 3x3 basketball, which has recently gained Olympic status and requires foundational scientific research. The results of the research expand the conclusions of many scientists [3, 12, 19, 27, 28] and complement them.

5. Conclusions

The comparison of the 3x3 and 5x5 basketball formats reveals that 3x3 places a heightened emphasis on rapid individual actions, a faster overall tempo, and shooting efficiency from various distances. This occurs partly because every successful long-range shot in 3x3 yields twice as many points as a close-range attempt. Consequently, teams must develop quick-release shooting techniques and agile decision-making skills to capitalize on limited possession time and seize scoring opportunities. In contrast, 5x5 is characterized by more elaborate team interactions, with well-structured positional offense and the strategic use of assists and defensive rebounds. These elements allow teams to maintain ball control, switch defensive roles more effectively, and create diverse pathways to scoring.

Moreover, 3x3's high-intensity environment, smaller court, and truncated shot clock encourage players to refine their one-on-one skills and maximize offensive momentum before the defense can fully organize. Under these conditions, quick transitions from defense to offense also play a major role, since players have minimal time to regroup. Conversely, 5x5 provides a broader tactical framework, where longer offensive possessions and more players on the court enable intricate passing sequences and systematic exploitation of defensive gaps. This fosters a more methodical style of play, where controlling the pace and optimizing spacing become pivotal for success.

The results of our analysis underscore that these contrasting demands between 3x3 and 5x5 carry important implications for training programs. In 3x3, drills that sharpen individual skills — such as contested shooting, rapid ball handling, and high-intensity defensive drills — take precedence. Players must be comfortable executing accurate shots off the dribble under substantial pressure. Meanwhile, in 5x5, group-based drills that emphasize structured set plays, collective rebounding strategies, and multifaceted defensive rotations become more critical. An emphasis on communication, spacing, and adaptability to complex in-game scenarios is key to maintaining an advantage in the longer, more strategically diverse 5x5 matchups.

Overall, the findings confirm the necessity of tailoring

practice sessions and conditioning programs to the inherent characteristics of each format. By integrating both individual and team-focused elements — be it in 3x3 or 5x5 — coaches can foster well-rounded player development. These insights not only enhance on-court performance but also provide a roadmap for transitioning from one format to another, for instance when players compete in 5x5 leagues during the primary season and then shift to 3x3 tournaments in the off-season. Adapting training methods in accordance with the specific structural features of 3x3 and 5x5 promises a more efficient allocation of practice time and a deeper strategic understanding, ultimately bolstering overall competitiveness in modern basketball.

Disclosure Statement

No author has any financial interest or received any financial benefit from this research.

Conflict of Interest

The authors state no conflict of interest.

REFERENCES

[1] Bezmylov M., Shynkaruk O., Zhigong Sh., Yang L., Hanpeng W., Xiao L., Griban G., Semeniv B., Otravenko O., Zhukovskyi Ye., Denysovets A., Onufrak A., "Specific Game Abilities and their Significance for Determining the Prospects of Youth National Basketball Team Players," International Journal of Human Movement and Sports Sciences, vol. 12, no. 4, pp. 699–708, 2024. doi: 10.13189/saj.2024.120412.

[2] Mitova O., Griban G., Oleniev D., Yakovenko A., Onyshchenko V., Mozolev O., Semeniv B., Lytvynenko A., Khurtenko O., Zamrozevuch-Shadrina S., Kozibroda L., Hres M., "The Impact of Mini-Basketball Training Sessions on the 6-7-Year-Old Boys' Physical Fitness and Physical Development," International Journal of Human Movement and Sports Sciences, vol. 10, no. 4, pp. 754–767, 2022. doi: 10.13189/saj.2022.100416.

[3] Kostiukevych V., Lazarenko N., Konnov S., Vozniuk T., Shynkaruk, O., Asauliuk I., Shchepotina N., Voitenko S., Svirshchuk N., "Integral Assessment of the Technical and Tactical Activity of a Highly Qualified Football Team," Physical Education Theory and Methodology, vol. 22, no. 3, pp. 85–93, 2022. doi: 10.17309/tmfv.2022.3s.12.

[4] Erculj F., Vidic M., Leskošek B., "Shooting efficiency and structure of shooting in 3x3 basketball cooperated to 5v5 basketball," International Journal of Sports Science and Coaching, vol. 15, no. 1, pp. 91–98, 2019. doi: 10.1177/1747954119887722.

[5] McGown R.B., Ball N.B., Legg J.S., Mara J.K., "The perceptual, heart rate and technical-tactical characteristics of 3 x 3 basketball," International Journal of Sports Science and Coaching, vol. 15, no, 5-6, pp. 772–782, 2020. doi: 10.1177/1747954120930916.

[6] Doroshenko E., Sushko R., Shamardin V., Prykhodko V., Shapovalova, I., Yelisieieva D., Demidova O., Yakovenko A., "Analysis of the Competitive Activity Structure of Skilled Female Basketball Players," Physical Education Theory and Methodology, vol. 20, no. 4, pp. 219–227, 2020. doi: 10.17309/tmfv.2020.4.04.

[7] Honghe Lou, Hui Li, Xianfeng Huang, Hu Zhou, "Technical Analysis of Chinese Men's Basketball 3x3 Defeat in Tokyo Olympic Games Based on Statistical Analysis of Internet Data," Proceedings of the 2023 2nd International Conference on Educational Innovation and Multimedia Technology, 2023. doi: 10.2991/978-94-6463-192-0_5.

[8] Snoj L., "The Rise of 3x3 and Its History. In 3x3 Basketball: Everything You Need to Know," Meyer & Meyer Sport (UK) Ltd. pp. 34–72, 2021.

[9] Lenart J., "Košarka 3×3: Magistrsko Delo," Ljubljana, Univerza v Ljubljani, 100, 2019.

[10] Ferioli D., Rampinini E., Conte D., Rucco D., Romagnoli M., Scanlan A., "Physical demands during 3×3 international male and female basketball games are partially impacted by competition phase but not game outcome," Biology of Sport, vol. 40, no. 2, pp. 377–387, 2022. doi: 10.5114/biolsport.2023.116012.

[11] Kholopov V., Bezmylov M., "Features of Implementing Set Plays from the "Check-Ball" Position by High-Qualification Teams in 3x3 Basketball," Theory and Methods of Physical Education and Sports, vol. 4, pp. 43–52, 2020.

[12] Montgomery P.G., Maloney B.D., "3×3 Basketball: Performance Characteristics and Changes During Elite Tournament Competition," International Journal of Sports Physiology and Performance, vol. 13, no. 10, pp. 1349–1356, 2018. doi: 10.1123/ijspp.2018-0011.

[13] Montgomery P.G., Maloney D.B. "3x3 Basketball Competition: Physical and physiological characteristics of elite players," Journal of Physical Fitness, Medicine & Treatment in Sports, vol. 5, no. 3, 555664, 2018. doi: 10.19080/JPFMTS.2018.05.555664.

[14] Herrán A., Usabiaga O., Castellano J., "Physical Profile Comparison Between 3x3 and 5x5 Basketball Training," Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, vol. 17, no. 67, pp. 435–447, 2017.

[15] Conte D., Straigis F., Clemente F., Gómez M., Tessitore A., "Performance profile and game-related statistics of FIBA 3x3 Basketball World Cup 2017," Biology of Sport, vol. 36, no. 2, pp. 149–154, 2019. doi: 10.5114/biolsport.2019.83007.

[16] Bredt S. G. T., Morales J. C. P., Andrade A. G. P., Torres J. O., Peixoto G. H., Greco P. J., Praça G. M., Chagas M. H. "Space Creation Dynamics in Basketball Small-Sided Games," Perceptual and Motor Skills, vol. 125, no. 1, pp. 162–176, 2018. doi: 10.1177/0031512517725445.

[17] Shutova S., Serebryakov O., Prokopenko A., Tkachenko M. "Effectiveness of Competitive Activity of High-

Qualification Women's Teams in Modern 3x3 Basketball," Sports Science and Human Health, vol. 2, no. 8, pp. 138–150, 2022. doi: 10.28925/2664-2069.2022.210.

[18] Byshevets N., Denysova L., Shynkaruk O., Serhiyenko K., Usychenko V., Stepanenko O., Syvash I., "Using the methods of mathematical statistics in sports and educational research," Journal of Physical Education and Sport, vol. 19, no. 3, pp. 1030–1034, 2019. doi: 10.7752/jpes.2 019.s3148.

[19] Musiienko A. V., Nesen O. O., Tsymbaliuk, Zh. O., "Analysis of indicators of technical and tactical interactions in 3x3 basketbal," Sports Games, vol. 1, no. 27, pp. 40–50, 2023. doi: 10.15391/si.2023-1.04.

[20] Lukic D., Kamasi F., "Physical preparation of professional 3x3 athletes. International Basketball Federation FIBA," Switzerland, 2019. Available from: https://fiba3x3.com/docs/physical-preparation-of-professional-3x3-athletes.pdf

[21] Andrianova R, Guimaraes, Fedoseev D, Isakov M., "Specific features of 3×3 basketball: factor analysis of the key performance indicators and their impact on game performance in the elite leagues," Journal of Physical Education and Sport, vol. 22, no. 10, pp. 2575–2581. doi: 10.7752/jpes.2022.10326.

[22] Boros Z., Toth K., Csurilla G., Sterbenz T. A., "Comparison of 5v5 and 3x3 Men's Basketball Regarding Shot Selection and Efficiency," International Journal of Environmental Research and Public Health, vol. 19, no. 22, pp. 15137, 2022. doi: 10.3390/ijerph192215137.

[23] Snoj L., "Statistical Analysis and Advanced Data Analytics. In 3x3 Basketball: Everything You Need to Know". Meyer & Meyer Sport (UK) Ltd, pp. 140–173, 2021.

[24] Madarame H., "Age and sex differences in shot distribution and accuracy in international 3x3 basketball tournaments," Montenegrin Journal of Sports Science and Medicine, vol. 19, no. 1, pp. 11–16, 2023. doi: 10.26773/mjssm.230302.

[25] Ortega E., Ortin M., Gimenez-Egido J. M., Gomez-Ruano M., "Technical-Tactical Performance Indicators During the Phases of Play in 3x3 Basketball," Revista De Psicología Del Deporte (Journal of Sport Psychology), vol. 30, no. 2, pp. 187–194, 2021.

[26] Tsui Wenpeng, Bezmilov M. M., "Features of Modeling Competitive Activity in 3x3 Basketball," Scientific Journal of NPU named after M. P. Drahomanov. Series 15. Scientific and Pedagogical Problems of Physical Culture (Physical Culture and Sports), vol. 168, no. 8, pp. 170–174, 2023. doi: 10.31392/NPU-nc.series15.2023.8(168).

[27] Tymoshenko O., Domina Zh., Malechko T., Nesterova T., Korkh-Cherba O., Redkina M., Konovalska L., Poluliashchenko T., Soltyk O., Shkilna I., Prontenko K., Bloshchynskyi I., "Developing female students' motor skills and improving basketball playing techniques by means of special exercise machines," The Open Sports Sciences Journal, vol. 15, e1875399X2207140, 2022. doi: 10.2174/1875399X-v15-e2207140.

[28] Tymoshenko O., Arefiev V., Domina Zh., Malechko T., Bondar T., Tymchyk M., Pliushchakova O., Riabchenko V., Griban G., Prontenko, K., "Exercise machines in speed and coordination development among students playing basketball," International Journal of Human Movement and Sports Sciences, vol. 9, no. 2, pp. 347–355, 2021. doi: 10.13189/saj.2021.090224.