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A Decade of Evolution: Comparative Analysis of Shooting Trends and Offensive Efficiency in the NBA and EuroLeague

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Abstract

The evolution of basketball shooting strategies has become increasingly crucial in understanding the sport's development across different professional leagues. This study compares shooting trends and offensive efficiency between the National Basketball Association (NBA) and EuroLeague over a decade (2012-2013 to 2022-2023). To examine multiple shooting metrics, including two-point and three-point field goal attempts per 100 possessions, shooting percentages, and advanced efficiency indicators, box-score data from 14,688 professional games (12,150 NBA and 2,538 EuroLeague) was used. The Mann-Whitney U test identified significant differences in the offensive strategies between the EuroLeague and NBA. EuroLeague exhibited a higher reliance on three-point shooting, with a greater three-point attempt rate (3PA/FGA%) and more three-point attempts per 100 possessions, while the NBA showed higher two-point field goal attempt rates per 100 possessions. The EuroLeague outperformed the NBA in three-point makes, two-point percentage, and effective field goal percentage, while the NBA maintained an edge in two-point makes per 100 possessions. Both leagues exhibited increasing trends in shooting efficiency, with the NBA displaying a steeper upward trend in efficiency in recent seasons and an ongoing trend of offensive strategies focusing on three-point shooting. The findings suggest distinct strategic approaches to offensive basketball, potentially influenced by court dimensions, defensive schemes, and tactical philosophies. This research provides valuable insights for coaches, analysts, and basketball organizations in understanding the evolving nature of professional basketball across different continental contexts.

Keywords: *Shooting efficiency, NBA-EuroLeague comparison, offensive trends, performance analysis, basketball analytics*

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Introduction

The game of basketball has undergone significant transformations over the years, with the evolution of field goal shooting playing a central role in these changes. Historically, shooting efficiency has been the cornerstone of offensive strategies, with the introduction of the three-point field goal in the NBA and later in Europe considered a situational tactic rather than a primary scoring method (Goldsberry, 2019). Traditionally, offenses relied on a balanced mix of close-range and mid-range shots, which were associated with higher shooting

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percentages per attempt compared to three pointers, reflecting a more conservative approach to shot selection (Oliver, 2004).

However, with the rise of data-driven strategies, teams have re-evaluated the efficiency and optimized their scoring opportunities, reshaping the structure of offensive plays across all levels of competitive basketball and elevating the three-point shot to a central role (Gou & Zhang, 2022). Over the past decade, professional basketball has experienced a significant transformation in offensive strategy, particularly with an increased emphasis on three-point shooting in both the NBA and EuroLeague (Mandić et al., 2019). Although three-point field goals tend to have a lower accuracy rate than two-point field goals, their higher potential return has made them increasingly attractive to teams aiming to maximize points per possession (Goldsberry, 2019). This evolution in shot selection has redefined modern basketball's pace, spacing, and dynamics (Kubatko et., 2007).

In the NBA, the increase in three-point shooting over the last decade has been particularly pronounced (Gou & Zhang, 2022; Freitas, 2021; Jaguszewski, 2020; Rocha da Silva & Rodrigues, 2021). A recent study has revealed that between the 2011-2012 and 2020-2021 seasons, the proportion of three-point field goal attempts nearly doubled, while mid-range shots saw a corresponding decline (Wang & Zheng, 2022). This trend has been accompanied by increased game pace and scoring output, contributing to a more dynamic and high-scoring league (Zając et al., 2023). The influence of analytics has been pivotal, as teams now have access to detailed shot data that reveal the high potential value of the three-point shot (Burnett, 2023). At the team level, improvements in shooting efficiency, especially from beyond the arc, have been shown to correlate with better overall performance (Caporale & Collier, 2015; Gou & Zhang, 2022; Gkotsis, 2024; Hu, 2024).

The EuroLeague has also witnessed an evolution in shot selection. Recent studies suggest an increase in the frequency of three-point field goal attempts, underscoring their importance in basketball strategy (Durmuş & Erdeveciler, 2023). While the significance of shooting performance to game outcomes is well established, especially regarding the contributions of successful two and three-point field goals, as well as attempted three-pointers (Çene, 2018; Karipidis et al., 2001), research on EuroLeague shooting trends remains limited and, in some cases, contradictory. For example, Mandić et al. (2019) observed no significant changes in two-point shot attempts from 2000 to 2017, while Štrumbelj et al. (2013) reported a decline in both two-point field goal attempts and percentage during their analysis of the 2000 to 2011 seasons. More recent findings by Foteinakis and Pavlidou (2024) indicated a notable increase in three-point shooting frequency and efficiency, accompanied by a decline in two-point field goal attempts over the years.

Despite substantial shooting patterns and efficiency research, direct comparisons between the NBA and EuroLeague remain scarce. Most studies have examined these leagues in isolation, leaving a gap in understanding how different competitive environments influence shooting trends. This study seeks to address this gap by providing a comprehensive, longitudinal analysis of shooting metrics and efficiency across the NBA and EuroLeague, offering a holistic view of how different competitive environments shape shooting patterns and strategic priorities. Such comparisons are valuable due to key differences between the leagues, including variations in court dimensions, defensive rules and coaching philosophies. These differences influence offensive and defensive strategies, player development, and overall gameplay, making a comparative analysis essential for understanding how contextual factors shape shooting efficiency and decision-making in elite basketball.

This article aims to explore the evolution of shooting patterns and compares shooting metrics in the NBA and the EuroLeague. It will focus on the three-point field goal shooting trends and how analytics has shaped offensive strategies in these leagues.

Material and Methods

Sample and Data Collection

A total of 2,538 games were analyzed for the EuroLeague and 12,150 for the NBA. Statistical data were sourced from each team's official average box score in the EuroLeague's open-access website (www.euroleague.net) and for the NBA from the open-access official statistics page for NBA games (https://stats.nba.com). Both databases have been validated as reliable sources in prior research (Dogan & Ersoz, 2019; Jaguszewski, 2020). The dataset included 10 seasons, from 2012-2013 through 2022-2023, focusing exclusively on regular-season games for the NBA and the regular season and the top 16 rounds for the EuroLeague. The 2019-2020 season was omitted from the analysis for both leagues due to the COVID-19 pandemic, which caused significant disruptions, including shortened seasons, postponed games, and incomplete data. These irregularities make it difficult to draw consistent comparisons with other seasons, ensuring its exclusion maintains the integrity and reliability of the study.

Procedure and Variables

This study compared key shooting metrics between the EuroLeague and the NBA to assess the shooting patterns and the growing trends. Specifically, it was calculated the average number of two and three-point field goal attempts per 100 possessions (2PA and 3PA per 100 possessions) and the average number of two and three-point field goals made per 100 possessions (2PM and 3PM per 100 possessions). Utilizing field goal attempts per 100 possessions instead of raw totals ensures a more accurate and meaningful analysis by accounting for differences in game pace and standardizing comparisons across leagues. This approach aligns with established practices in basketball analytics, offering improved comparability and interpretability of results (Oliver, 2004; Kubatko et al., 2007).

Additionally, the proportion of three-point field goal attempts (3PA) relative to total field goal attempts (FGA) for each team in every game is represented as a percentage (3PA/FGA%). This coefficient measures the frequency of 3PA relative to total FGA, and it is more beneficial for the analysis because it is not influenced by variable factors such as game pace, rebounds, turnovers, free throws, and other statistics beyond field goal attempts (Jaguszewski, 2020). This makes it a more accurate way to assess the evolution of three-point field goal shooting compared to simply looking at three-point field goal attempts. The ratio of 3PM to total field goals made (FGM), represented as 3PM/FGM%, was also calculated. This allowed us to find different alterations and trends in the success rate of three-point field goals across the two leagues.

Moreover, the analysis included the following shooting efficiency metrics: two-point field goal percentage (2P%), three-point field goal percentage (3P%), and effective field goal per-

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centage (eFG%). Among these, eFG% provides a pace-independent measure of overall shooting efficiency by accounting for the added value of three-point field goals. The metric is calculated using the formula:

eFG%=(FGM+0.5*3PM)/FGA (Oliver, 2004), where FGM =field goals made, 3PM=3-point field goals made, and FGA=-field goal attempts.

This formula incorporates two and three-point field goals into a single measure, offering a comprehensive assessment of a team's shooting effectiveness (Oliver, 2004).

Statistical Analysis

All variables were presented as mean ± standard deviation (M±SD). The normality assumption was assessed using the Shapiro-Wilk test (Shapiro & Wilk, 1965) and revealed a non-normal data distribution for all the variables. The Mann-Whitney U test was utilized to evaluate the differences in the examined variables between the NBA and EuroLeague. This non-parametric test was chosen because the data did not meet the normality assumptions required for parametric tests, making it a robust alternative for comparing distributions across the two leagues. The analyses were conducted using JASP (version 0.19, University of Amsterdam, Netherlands), with the significance level set at p<0.05.

Results

The comparative analysis of shooting distribution and efficiency in the total of the examined games revealed significant differences between the EuroLeague and the NBA, as summarized in Table 1.

Shooting Distribution

EuroLeague demonstrated a greater reliance on 3PA

Table 1. Comparison of Shooting Distribution and Efficiency Between NBA and EuroLeague

Metric	EuroLeague (M±SD)	NBA (M±SD)	U Statistic	p	Rank-Biserial Correlation
3PA/FGA%	37.59%±8.17	32.44%±9.37	81.704	<0.001	0.325
3PM/FGM%	29.46%±10.04	25.26%±9.57	76.673	<0.001	0.243
2PM per 100 Possessions	28.67±6.00	29.57±5.20	55.511	<0.001	-0.100
3PM per 100 possessions	11.95±4.39	10.01±4.02	77.620	<0.001	0.259
2PA per 100 possessions	54.50±8.96	58.29±9.28	47.255	<0.001	-0.234
3PA per 100 possessions	32.79±7.69	27.94±8.20	82.366	<0.001	0.336
2P%	52.90%±8.64	51.11%±7.31	69.509	<0.001	0.127
3P%	36.38%±10.53	35.62%±9.56	64.091	<0.001	0.040
eFG%	53.95%±7.97	52.14%±6.72	69.827	<0.001	0.132

Note: mean (M) and standard deviation (SD), 3PA/FGA%: coefficient 3PA/FGA, 3PM/FGM%: coefficient 3PM/FGM, 2PM: 2-point field goal made, 3PM: 3-point field goal made, 2PA: 2-point field goal attempt, 3PA: 3-point field goal attempt, 2P%: 2-point field goal percentage, 3P%: 3-point field goal percentage, eFG%: effective field goal percentage.

than the NBA. The 3PA/FGA% was significantly higher in the EuroLeague (M=37.59%) than in the NBA (M=32.44%), U=81,704, p<0.001, with a moderate positive rank-biserial correlation (r=0.325). Both leagues showed significant increases in 3PA/FGA% over the decade. NBA demonstrated more intense growth, while the EuroLeague showed steady growth with higher initial values. Similarly, the EuroLeague recorded a higher 3PM/FGM% than the NBA (U=76.673, p<0.001, r=0.243), indicating a higher prominence on three-point scoring in the EuroLeague. Regarding the three-point attempt rate across the seasons, the EuroLeague maintained higher ratios, while the NBA demonstrated more dramatic growth and nearly closed the gap in recent years (Figure 1).

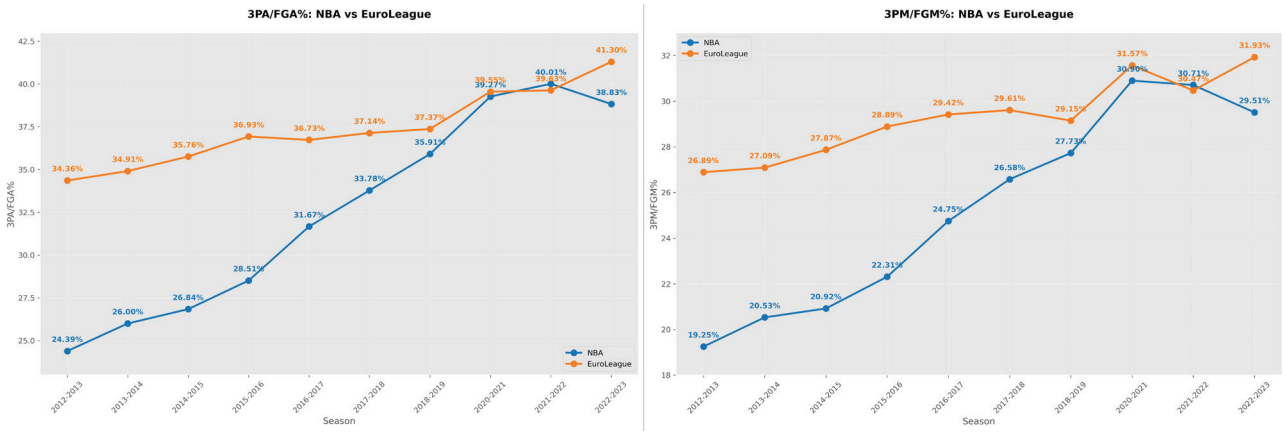

Figure 1. The proportion of 3PA to FGA and 3PM to FGM between NBA and EuroLeague across the seasons.

Moreover, the EuroLeague attempted more 3PA per 100 possessions, U=82.366, p <0.001, r=0.336, reflecting further its increased reliance on long-range shooting (Figure 2). The results across the seasons revealed a clear evolution in three-point shooting strategy across both leagues, with the NBA showing more intense growth and nearly closing the gap in recent seasons. At the same time, the EuroLeague maintained consistently higher but more stable rates (Figure 2).

Contrasting this, 2PA per 100 possessions was significantly higher in the NBA (M=58.29) than in the EuroLeague (M=54.50), U=47.255, p<0.001, with a small negative rank-biserial correlation (r=-0.234), emphasizing the NBA's greater focus on two-point scoring opportunities. Both leagues showed a decrease in 2PA per 100 possessions over the decade, with the NBA consistently having higher 2PA rates until recently, while the EuroLeague showed a steadier decline (Figure 2).

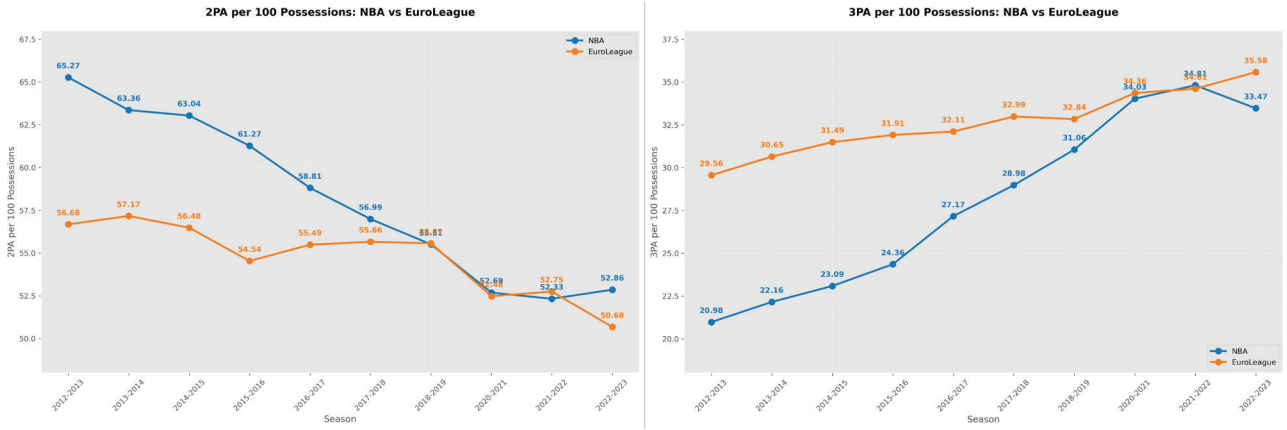

Figure 2. Shooting distribution per 100 possessions between NBA and EuroLeague across the seasons.

Shot Efficiency per 100 Possessions

Significant differences were observed (Table 1) in shot-making metrics per 100 possessions. NBA demonstrated a slight but significant advantage in 2PM per 100 possessions (U=55.511, p<0.001), with a small negative rank-biserial correlation (r=-0.100). On the other hand, EuroLeague had significantly higher 3PM per 100 possessions (U=77.620, p<0.001, r=0.259). Both leagues displayed a decrease in 2PM per 100 possessions over the decade, with the NBA consistently having higher values, while the EuroLeague showed a steadier decline (Figure 3).

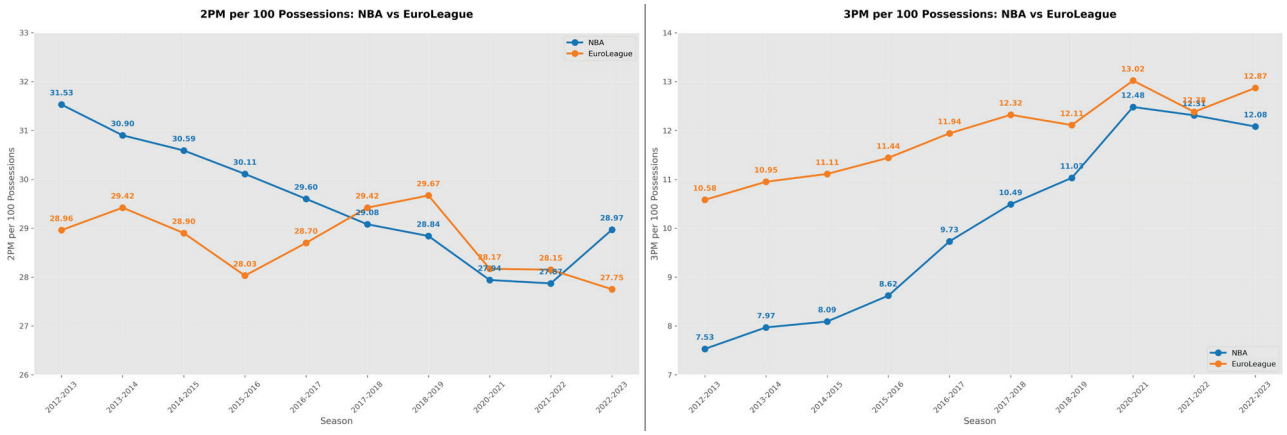

Figure 3. Shooting effectiveness per 100 possessions between NBA and EuroLeague across the seasons.

Shooting Efficiency

Regarding shooting efficiency, the EuroLeague demonstrated higher efficiency in 2P% (M=52.90%) compared to the NBA (M=51.11%), U= 69.509, p<0.001, with a small positive rank-biserial correlation (r=0.127). While the difference of 1.79 percentage points is statistically signif-

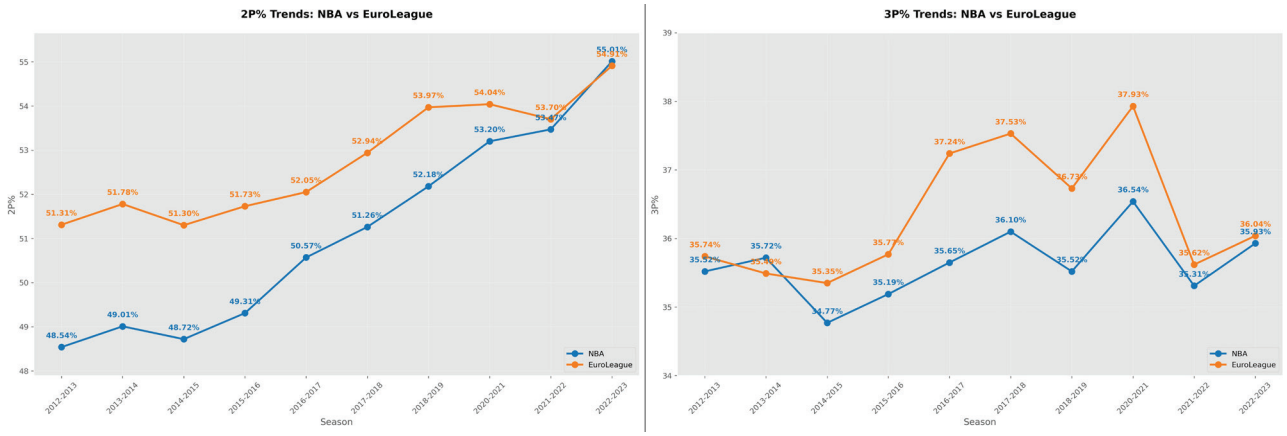

Figure 4. 2P% and 3P% between NBA and EuroLeague across the seasons.

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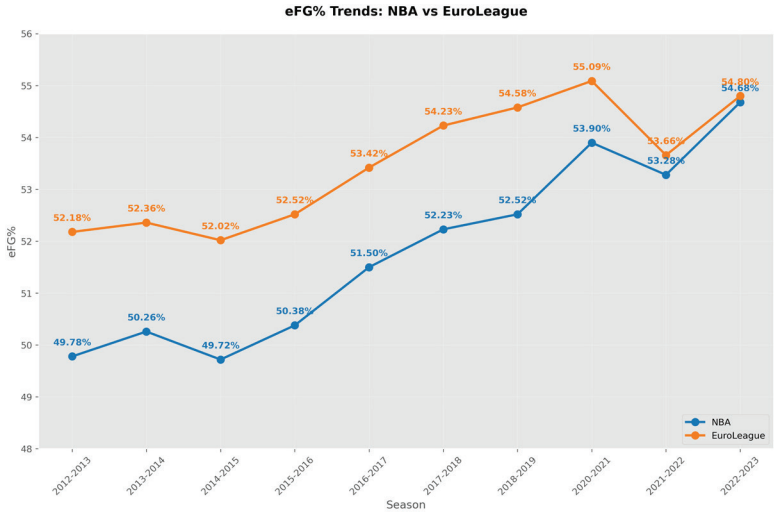

Figure 5. eFG% comparison between NBA and EuroLeague across the seasons.

icant, it is relatively small in practical terms. Both leagues showed an upward trend in 2P% over the years, with the EuroLeague's 2P% revealing a steadily increasing trend, while the NBA's 2P% showed a more pronounced increase (Figure 4).

Similarly, 3P% was marginally higher in EuroLeague (M=36.38%) compared to NBA (M=35.62%), U=64.091, $p<0.001$, although the effect size was negligible ($r=0.040$). Both leagues displayed relatively stable 3P% over the decade (Figure 4), with a slight upward trend until 2020-2021, followed by a minor decline. EuroLeague generally maintained slightly higher averages over the seasons.

Correspondingly, eFG% followed the upward trend, with EuroLeague recording higher values (M=53.58%) compared to NBA (M=51.81%), U=69.827, $p<0.001$, $r=0.132$. Regarding the evolution of eFG% across the seasons (Figure 5), both leagues showed significant improvement, with the NBA showing more substantial improvement and closing the gap, whilst the EuroLeague consistently maintained higher eFG% until recent convergence.

Discussion

Sports analytics has fundamentally transformed basketball strategy and shot selection patterns in recent years. This study highlights notable shooting trends and efficiency differences between the NBA and EuroLeague, particularly in three-point field goal shooting.

The evolution of the three-point shot in the NBA has been significant, emphasizing its importance as a fundamental aspect of the game (Freitas, 2021; Jaguszewski, 2020; Kilcoyne, 2020; Rocha da Silva & Rodrigues, 2021; Wang & Zheng, 2022). However, the findings of this study indicate that the EuroLeague relies even more heavily on three-point shooting. This trend aligns with previous research indicating that the EuroLeague has adopted three-point-oriented offenses that surpass those of the NBA (Mandić et al., 2019; Fotinakis, Laparidis, Karipidis & Taxildaris, 2004). Several factors contribute to the preference for perimeter shooting in European basketball. The slightly smaller court dimensions in the EuroLeague and the shorter distance of the three-point line create different spacing dynamics compared to NBA courts (Ibáñez, García-Rubio, Gómez & Gonzalez-Espinosa, 2018). Furthermore, the focus on structured team play and systematic offensive strategies in the EuroLeague consistently generates opportunities for three-point field goals (Mandić et al., 2019). The ongoing trend of offensive strategies focusing on three-point shooting in the EuroLeague is consistent with previous studies (Durmuş & Erdeveciler, 2023; Foteinakis & Pavlidou, 2024).

Despite decreasing trends in both leagues, the NBA maintains higher 2PA volumes, influenced by factors such as the superior athleticism of NBA players, which enables more drives to the basket and mid-range scoring opportunities (Zhang, Lorenzo, Gómez, Liu, Gonçalves & Sampaio, 2017). Furthermore, the influence of star players and isolation-heavy play styles contribute to the league's preference for 2PA (Conte, Tessitore, Smiley, Thomas & Favero, 2016). The NBA's defensive three-second rule also shapes its offensive strategies, encouraging paint-based scoring by limiting defensive presence in the key. The NBA's higher 2PA and 2PM per 100 possessions can also be attributed to its faster pace of play, greater emphasis on transition offense, while the EuroLeague's steadier decline may reflect its more structured and team-oriented style of play, which has historically relied on ball movement. Additionally, the EuroLeague's smaller court size and lack of a defensive three-second rule make it harder to score inside, further accelerating the shift away from 2-point shots.

The higher shooting efficiency observed in EuroLeague across multiple metrics (2P%, 3P%, and eFG%) presents an interesting outcome. While the NBA is widely considered the premier basketball league globally, the EuroLeague's superior shooting percentages suggest that shot selection and offensive execution might be more controlled in European basketball. EuroLeague teams emphasize ball movement and creating open shots, focusing on maximizing shot quality that boosts overall shooting efficiency. This finding supports research by Marmarinos, Apostolidis, Kostopoulos & Apostolidis (2016) and Foteinakis, Pavlidou & Stavropoulos (2024), who found that EuroLeague teams typically emphasize systematic offensive structures, achieving higher efficiency with teamwork-oriented strategies over individual creation. This contrasts with the faster-paced NBA style, where offenses are often built on star players and isolation plays leveraging the athleticism and the scoring skills of elite scorers.

Moreover, the study results revealed that both leagues revealed an upward trend in 2P% and 3P% across the years, reflecting strategic adaptations as teams balance inside and

perimeter shooting. Increases in the efficiency of the 2PA can be attributed to several reasons, such as rule changes like banning hand-checking, which allowed offensive players to score more efficiently (Wang & Zheng, 2022) or clear path fouling (Mandić et al., 2019). Additionally, the pace has increased over time, signifying an increase in transition opportunities, in which teams focus on getting to the basket for a layup or locating shooters for open three-pointers (Kilcoyne, 2020). These findings emphasize the necessity for coaches to balance inside and outside gameplay while actively recruiting players who can effectively collaborate and perform as a cohesive unit (Foteinakis & Pavlidou, 2024).

In terms of three-point shooting efficiency, both leagues have exhibited relatively stable 3P% over the past decade, showing a slight upward trend. The EuroLeague, in particular, has generally maintained slightly higher averages throughout the seasons. This increase in 3P% can be attributed to a strategic shift known as "positionless basketball." In this approach, players who were traditionally seen as post players are now effectively shooting three-pointers (Zając et al., 2023). Bi et al. (2011) found that traditional inside or outside specialists have gradually diminished, with many tall players increasingly positioning themselves on the perimeter, leveraging their physical attributes to create better outside scoring opportunities. Furthermore, the number of 3PA has risen dramatically, which has allowed players to become more comfortable and skilled in long-range shooting.

Analytics also play a crucial role in understanding the value of different shot types. Analysts can examine shot selection data to determine which shots yield the highest success rates (Wang & Zheng, 2022). For example, advanced tracking technologies enable teams to assess the effectiveness of 3PA compared to mid-range jumpers, prompting a strategic shift away from less efficient shot types (Kilcoyne, 2020). Analytics also revealed that the teams increasingly favor corner three-point shots over mid-range jumpers due to their higher scoring potential and efficiency. (Pelechrinis, & Goldsberry, 2021).

Conclusions

This study identified key differences in shooting trends between the NBA and the EuroLeague, with the EuroLeague demonstrating a greater reliance on perimeter play and slightly higher shooting efficiency. While the NBA has seen a rise in 3PA, it still maintains a higher frequency of 2PA compared to the EuroLeague. Both leagues have exhibited upward trends in shooting efficiency over the years. These trends signify shifting tendencies in offensive play in basketball, where innovation and technology play integral roles in shaping offensive strategies. This paper discusses the factors driving these changes.

Overall, this study contributes to a more sophisticated understanding of worldwide basketball trends, offering valuable insights for coaches, analysts, and players seeking to adapt their strategies in response to progressing offensive norms. These insights provide a foundation for future research into the tactical evolution of basketball and its growing reliance on data-driven decision-making. It would be beneficial to examine other influential factors, such as roster composition, defensive systems, and in-game decision-making, which may further impact shooting patterns in both leagues. Future research could explore the comparative performance of teams prioritizing three-point shooting versus those with a more balanced offensive approach, how defensive strategies have evolved to counter the rise in three-point attempts, and position-specific trends in three-point shooting, particularly the shifting roles of traditional big men in perimeter play. Additionally, as basketball continues to globalize, exploring how leagues in other regions are adapting to the three-point evolution could provide a broader perspective on basketball's development.

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