ORIGINAL ARTICLE

A comparison of three-point shooting effectiveness in the Euroleague and NCAA DI basketball

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ABSTRACT

Shooting is a fundamental basketball skill that critically influences game outcomes. The purpose of the present study was to compare the effectiveness of three-point shooting between the Euroleague and NCAA Division I during the 2020-21 season, evaluating factors such as shooting accuracy, player position, type of offense, and timing of shot execution. The analysis was based on the recording of 3,249 shots from 70 games. Results demonstrated higher shooting percentages in the Euroleague (38.4%) compared to the NCAA (35.1%). Differences were observed in the type of offense, with the NCAA exhibiting a higher proportion of fast-break (transition) plays, whereas the Euroleague primarily focuses on organized set plays. Shot execution timing emerged as the most significant differentiating factor between the two leagues. Player position also influenced effectiveness, with guards being the primary shooters, however, forwards in the Euroleague demonstrated higher efficiency compared to their NCAA counterparts. CHAID analysis confirmed the importance of shot timing, player position, and shooting effectiveness as critical discriminant factors, highlighting the Euroleague's tendency towards more patient and tactically organized offenses in contrast to the faster and more intense style of play in the NCAA. These findings provide valuable insights for analysts and coaches to develop effective offensive tactics tailored to the specific characteristics of each competition.

Keywords: Performance analysis, Basketball, Euroleague, NCAA DI, Three-point shooting, Effectiveness, Players position.

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INTRODUCTION

The importance of shooting in basketball has been a subject of study for analysts for many decades. A significant number of coaches assert that shooting is the most critical, enjoyable, and valuable fundamental skill in basketball, as it largely determines the score and outcome of the game (Gomez et al., 2008; Sampaio et al., 2015). Some coaches argue that scoring is more likely from close range, whereas long-distance shots should never be attempted unless all possibilities to get the ball under the basket have been exhausted (Erčulj et al., 2015). Gjøen et al. (2023) also supported in their study that, given the higher field goal percentage of two-point shots, in some situations players may prefer to attempt two-pointers instead of three-pointers, even though the latter yield more points. When this option is unavailable due to intense defensive pressure, athletes then opt for mid-range or even longer distance shots, particularly three-pointers (O'Donoghue, 2009; Kilcoyne, 2020). According to two recent studies analysing data from Euroleague games and corresponding national leagues (Mikołajec et al., 2021; Plakias et al., 2024), the Effective Field Goal Percentage (eFG%), which incorporates three-point shooting performance, has emerged as one of the most important performance indicators predicting game outcomes. Teams with higher three-point efficiency were found to have significantly increased chances of winning. This factor is critical for the observed increase in long-range shot attempts and corresponding shooting percentages seen over recent decades in the Euroleague (Musin et al., 2020; Foteinakis & Pavlidou, 2024a).

The significance of the three-point shot is further highlighted by its strong correlation with winning outcomes in both NCAA Division I and the NBA (Zajac et al., 2023). Since the establishment of the three-point line in the NCAA in 1987, there has been a substantial increase in attempts (attributable to the numerical advantage of three-pointers over two-pointers), although this has not necessarily translated into increased scoring or offensive efficiency. An excessive emphasis on the three-point shot may prove misguided when undertaken regardless of player ability or at inappropriate moments (Stefani, 2023). Nevertheless, considerable weight should be placed on long-range shooting when a team possesses exceptional three-point shooters or in late-game situations when a team is trailing on the scoreboard (Gou et al., 2022).

Generally, Euroleague players tend to be older with extensive experience either from national leagues or the NBA, compared to NCAA players who are younger and lack professional experience. Significant differences in league regulations also exist (e.g., 30-second shot clock, bonus rules), alongside differences in game structure and style (such as spacing, pick-and-rolls, and tactics) compared to the NCAA, which is significantly influenced by coaching strategies that limit players' freedom of decision-making (Fotinakis et al., 2002; Mandic et al., 2019; Paulauskas et al., 2024; Foteinakis & Pavlidou, 2025).

Three-point shots at the end of games can be decisive, particularly in close contests involving professional players, such as in the Euroleague. The precision leading to effective shooting does not appear to be affected by fatigue (Slawinski et al., 2018). Physical fatigue induced during games does not alter the kinematic variables of the three-point shot in elite basketball players. However, during a game, the complex interaction of fatigue, tactical decisions, score, remaining time, and defensive pressure may affect both the kinematics and accuracy of three-point shots, especially in younger players (Malarranha et al., 2013). Csataljay et al. (2013) demonstrated that winning teams achieved higher three-point shooting efficiency as a result of greater tactical cohesion among teammates. The most significant difference between winning and losing teams was that winners could capitalize on opportunities and score more effectively, not only under no defensive pressure but also in the most challenging situations involving high defensive pressure. According to Zhang et al. (2023), factors such as coordination, balance, and core strength can influence the kinematics and accuracy of long-distance shots.

In modern basketball, offensive plays are executed in three primary forms: transition situations (including fast breaks and early options), organized plays such as set plays, and a third category encompassing various other plays when the former two types are not applied, for example, second-chance plays following offensive rebounds (Selmanovic et al., 2015; Selmanovic et al., 2019). Research on the effectiveness of shots following offensive rebounds has shown that shooting accuracy increases by 67% compared to first-phase attempts. Winning teams were observed to be more effective than losing teams in scoring following offensive rebounds, which was attributed to better shot decision-making relative to their opponents (Cadenas & Ibanez, 2017; Stamiris et al., 2022). Teams that excel at offensive rebounding can significantly impact the game by converting missed shots into second-chance opportunities (Foteinakis et al., 2024).

The rapid expansion of performance analysis in basketball has led to the production of significant literature examining technical and tactical characteristics as well as efficiency indicators of players and teams across various competitions-leagues. However, literature systematically comparing the Euroleague and NCAA Division I remains extremely limited. This gap represents a significant research need, especially in areas related to decision-making, offensive tactics, and the timing of executions, such as three-point shooting. The purpose of the present study was to investigate potential differences in three-point shot execution in the Euroleague and NCAA Division I during the 2020-21 season, concerning variables such as effectiveness, type of offensive execution, timing of shot, player position, and the game period during which the shot occurred.

MATERIAL AND METHODS

Participants

The sample of the study consisted of 70 games from the Euroleague Championship (n = 35) and the NCAA Division I men's college basketball championship (n = 35). A total of 3,249 three-point shot sequences were recorded (Euroleague n = 1,774; NCAA Division I n = 1,475) during the 2020–2021 regular season. The selection of the championships was based on the highly competitive level of the participating teams, while the specific games were randomly selected from a predefined pool of games. Since this was an observational study conducted in a naturalistic setting without any experimental intervention, and all data were obtained from publicly available sources, obtaining informed consent from the athletes was not required (American Psychological Association, 1992).

Procedures

Initially, the game videos were recorded in MP4 format using a laptop with the Windows 10 operating system. Subsequently, the videos were imported into the SportScout STA software, where an analysis scheme was created based on the examined data. The coding of the sequences was performed independently by two trained analysts to ensure reliability. To assess inter-observer reliability, weighted Cohen's Kappa correlation coefficients were used. The results ranged from 0.78 to 0.84, indicating high agreement (Altman, 1991). The analysed variables included: league (Euroleague and NCAA DI), three-point shot effectiveness (successful and unsuccessful shots), type of offensive execution (transition, second chance from offensive rebound and set plays), time i.e., the timing of the three-point shot within the offensive possession, categorized as beginning (first 6 seconds), middle (7-18 or 7-24 seconds), and end (last 6 seconds) of the possession, player position (guard, forward, and pivot/center), and the half in which the shot was attempted (first and second half).

Analysis

Data processing and statistical analysis were conducted using the SPSS software package version 29. To determine whether differences existed among the examined variables in relation to three-point shot

effectiveness and game outcomes, Crosstabulation Analysis with the Chi-square (χ^2) test was employed, with a significance level set at $p < .05$. Since the χ^2 test measures possible differences between observed and expected values, the Adjusted Standardized Residual was used to identify the specific cell contributions to the independence of variables. Values of the residuals exceeding ± 1.96 ($p = .05$) indicate significant deviations from expected frequencies, pinpointing where significant associations occur within the contingency tables.

RESULTS

Overall, the three-point shooting accuracy reached 36.9% (n = 3249). The Euroleague demonstrated the highest shooting percentage, with 38.4% (n = 1774), while the NCAA Division I recorded a shooting accuracy of 35.1% (n = 1475). To compare the variable league (Euroleague vs. NCAA Division I) in relation to the observed variables, Crosstabulation Analysis with the Chi-square (χ^2) distribution was conducted. Statistically significant differences were identified among the categories of the variable type of offensive execution, $\chi^2(2) = 20.84$, $p < .001$. Fast-break plays and early options accounted for 17.4% of all offensive executions, second-chance opportunities following offensive rebounds accounted for 7.4% and organized offensive sets (set plays) represented 75.3% of all attempts. Specifically, the NCAA Division I demonstrated a higher frequency of transition plays (9.4%) compared to the Euroleague (8%), within the total 17.4% of transition-based attempts. However, this trend did not correspond to shooting efficiency. The shooting percentage in transition was notably lower in NCAA Division I (32.8%) compared to the Euroleague (39%) as presented in Figure 1. Shooting effectiveness in second-chance attempts after offensive rebounds was similar across both leagues (38.3%). However, in set-play situations, Euroleague teams achieved higher shooting accuracy (38.4%) compared to their NCAA counterparts (35.5%).

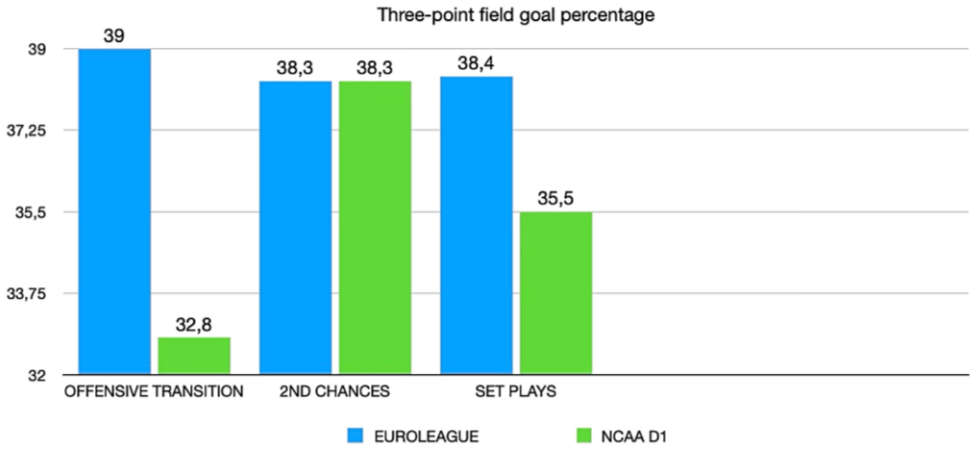

Figure 1. Comparison of three-point shooting percentages between Euroleague and NCAA Division I based on offensive execution type.

Similarly, regarding the timing of the three-point shot within the offensive possession, statistically significant differences were identified ($\chi^2(2) = 206.52$, $p < .001$). Three-point shot attempts were distributed as follows: 13.1% at the beginning of the offense, 61.5% in the middle phase, and 25.5% at the end of the offense.

Notably, in the Euroleague, 19.4% of the shots occurred at the end of the possession compared to only 6.1% in the NCAA, despite both showing lower shooting effectiveness in this phase (33.9% and 32.3%, respectively). Conversely, shot attempts at the beginning of the offense accounted for 6% in the Euroleague

and 7.1% in the NCAA, with respective shooting percentages of 39.7% and 33.5%. For both leagues, the middle phase of the offensive possession yielded the highest shooting efficiency, with 41.2% for the Euroleague and 36.1% for the NCAA Division I (Figure 2).

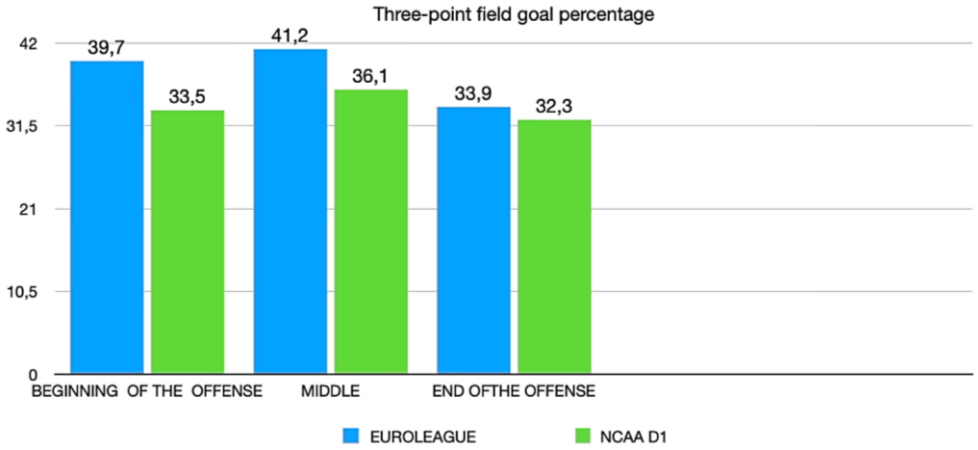

Figure 2. Comparison of three-point shooting effectiveness between Euroleague and NCAA Division I according to shot timing within the offensive possession.

Regarding the categorical variable of player position, statistically significant differences were also found ($\chi^2(2) = 30.79$, $p < .001$). Guards accounted for 59.7% of all three-point shot attempts, with shooting percentages of 38.3% (Euroleague) and 36.4% (NCAA), respectively. Forwards executed 35.8% of the total attempts, while pivots/centers contributed only 4.4% of the shots. In terms of shooting effectiveness, Euroleague forwards recorded the highest percentage with 39.3%, whereas NCAA forwards exhibited the lowest with 33.4% (Figure 3).

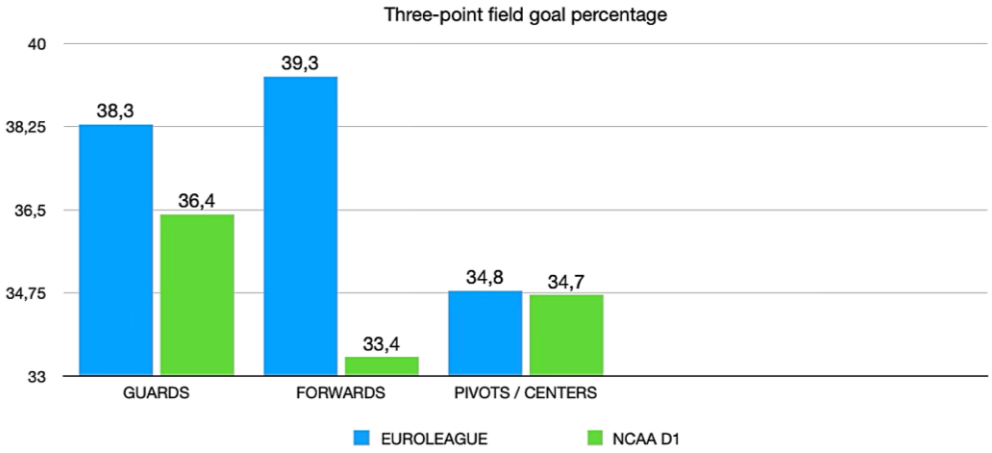

Figure 3. Comparison of three-point shooting effectiveness between Euroleague and NCAA Division I by player position (guard, forward, center).

Concerning the variable game half (first or second half), statistically significant differences were observed ($\chi^2(1) = 5.26$, $p = .032$), as more three-point shot attempts were recorded in both halves of Euroleague games compared to NCAA games.

When examining the relationship between three-point shot effectiveness (successful vs. unsuccessful attempts) and the variable type of offensive execution, no statistically significant differences were found ($\chi^2(2) = 0.636$, $p = .728$), nor were there significant associations with position of the player ($\chi^2(2) = 0.806$, $p = .668$) or game half ($\chi^2(1) = 2.96$, $p = .085$). However, statistically significant differences were observed with respect to the variable timing of the three-point shot within the offense ($\chi^2(2) = 6.34$, $p = .042$), as unsuccessful shot attempts were predominant across all stages of the offensive sequence.

The CHAID analysis (Figure 4) revealed that the championship leagues (Euroleague or NCAA) are significantly differentiated based on the timing of the shot, the player's position, and shot effectiveness. Specifically, timing of the three-point shot within the offense emerged as the most decisive discriminating factor ($p < .001$), showing that three-point attempts executed during the final seconds of the possession were associated with the Euroleague in 76.1% of cases, compared to only 23.9% in NCAA games. This finding suggests a more controlled and patient offensive approach in Euroleague games. In contrast, shots taken during the early or middle phases of the offensive possession were more frequently observed in NCAA games (52.7%) compared to Euroleague games (47.3%), suggesting distinct tempos and shot timing strategies between the two leagues. Furthermore, among shots taken in the early or middle phases, player position also proved to be a significant distinguishing factor ($p < .001$). Guards displayed a relatively balanced distribution between the leagues (Euroleague: 51.7%, NCAA: 48.3%), while forwards and pivots/centers were markedly more involved in NCAA attempts (59.0%) compared to Euroleague (41.0%).

Lastly, within the subset of forwards and pivots/centers, shot effectiveness further differentiated outcomes ($p = .011$). Missed attempts were more frequent in NCAA games (62.0%) compared to Euroleague (38.0%), while successful attempts were more evenly distributed (NCAA: 53.8%, Euroleague: 46.2%).

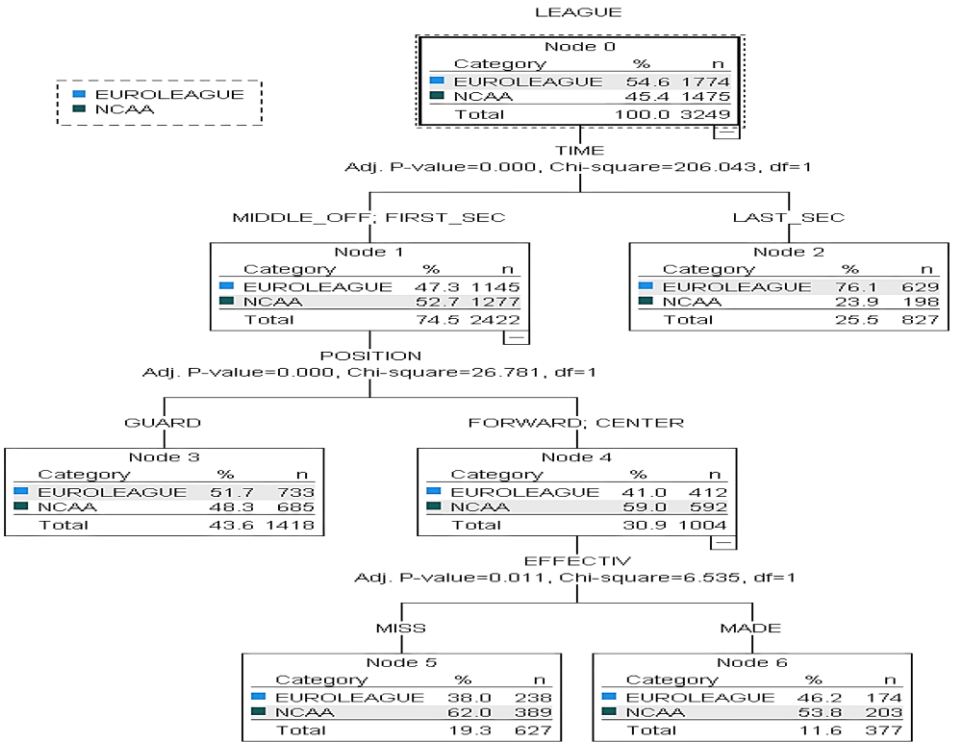

Figure 4. CHAID decision tree analysis identifying key predictors that distinguish between Euroleague and NCAA Division I, with a focus on shot timing, player position, and shooting effectiveness.

DISCUSSION

The findings of the study demonstrated a distinct divergence between the Euroleague and NCAA Division I regarding tactical approaches and the effectiveness of three-point shooting. These results reflect distinct basketball philosophies across the two competitions-leagues, which appear to influence the frequency, timing, and efficiency of offensive executions.

The timing of the three-point shot within the offense emerged as the most significant differentiating factor, confirming that Euroleague teams tend to attempt more three-point shots at the end of possessions compared to their NCAA counterparts. The higher shooting frequency at the end of possessions (19.4%), combined with a shooting percentage of 33.9%, supports the notion that European teams adopt more structured and patient offensive strategies, a finding also reported by Csataljay et al. (2013). In contrast, NCAA teams are more likely to execute shots during the early or middle phases of possessions, likely due to the up-tempo pace and greater emphasis on the transition game (Oliver, 2004). In other words, Euroleague offenses are marked by greater patience and deliberate shot selection, while NCAA teams show a tendency toward quicker, earlier options.

The results also demonstrated that the player's position influences the type and efficiency of three-point shots. While guards account for the largest share of shot attempts, a finding that coincides with a previous study (Foteinakis & Pavlidou, 2024b), Euroleague forwards exhibited the highest efficiency (39.3%), which may indicate a tactical preference for high-quality, well-selected shooting situations. Conversely, the higher frequency of attempts by forwards and pivots/centers in NCAA games, combined with their lower shooting percentages, may reflect the developmental nature of the collegiate competition (Ibáñez et al., 2018) or emerging trends in the modern game (Oliver, 2004).

Differences related to the variable type of offensive execution indicated that NCAA teams rely more heavily on transition game, characterized by an open, up-tempo pace, compared to Euroleague teams, despite being less effective in converting those opportunities. Nonetheless, both leagues demonstrated a clear predominance of organized offensive structures (set plays), indicating a coaching-driven approach in offensive design.

The CHAID analysis further confirmed the critical importance of shot timing, player position, and shooting effectiveness as key discriminators between leagues. The hierarchical structure of the decision tree revealed that missed three-point attempts by forwards and pivots/centers during early offensive phases were more strongly associated with NCAA play, in contrast to the more targeted and efficient shooting patterns observed in the Euroleague. Guards demonstrated similar performance patterns across both leagues. Overall, the decision tree findings suggest that Euroleague teams are characterized by patience and precision in their offensive possessions, with a tendency to shoot later in the shot clock. In contrast, NCAA teams exhibited higher intensity and up-tempo, with more early shot attempts, especially from taller players, who displayed lower levels of shooting efficiency (Oliver, 2004).

This present study has two main limitations: first, its focus on a single competitive season (2020–21), based on the analysis of 70 games; and second, the coding of selected possessions, although reliable and conducted by two trained researchers, may still involve interpretative discrepancies.

CONCLUSIONS

This study identified significant differences between the Euroleague and NCAA Division I in terms of execution strategies and the effectiveness of three-point shooting. The analyses demonstrated that the timing of the shot, the player's position, and shooting efficiency were key differentiating factors between the two leagues. Specifically, the Euroleague relied heavily on structured offensive schemes, with an increased emphasis on set plays and higher shooting accuracy when the shot was taken at the end of the possession. In contrast, the NCAA was characterized by more immediate offensive execution, with a higher frequency of transition game and lower overall effectiveness in three-point shooting, particularly when shots were taken early in the possession by forwards and pivots/centers.

These findings align with the broader theoretical framework suggesting that European basketball emphasizes tactical discipline and offensive patience, whereas the NCAA tends to adopt a more open and dynamic style of play. From a practical standpoint, the results can serve as valuable insights for coaches, performance analysts, and sports scientists in optimizing offensive strategies and guiding player development based on the distinct profiles and demands of each competition - league.

In summary, further investigation of the differences between the Euroleague and NCAA Division I may enhance knowledge exchange between the two leagues and consequently contribute to the overall development of the sport at a global level.

AUTHOR CONTRIBUTIONS

G. Karamousalidis design of the study, data analysis and writing the manuscript. A. Kourtis-Doulkeridis & G. Konstantinidis data collection and review. P. Foteinakis & D. Kifonidis review and manuscript preparation. S. Symeonidou & P. Foteinakis statistical analysis. All authors have approved the final version of the manuscript.

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No potential conflict of interest was reported by the authors.

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