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Beyond The Starting Five: Roster Depth, Player Rotation, and Team Performance in Youth Men's Basketball

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Abstract

Managing team rosters and player rotation is an important coaching issue that may influence team performance and competitive success in youth basketball. This study examined differences in team performance, roster size, and player rotation patterns between playoff-qualifying and non-qualifying teams across seasons of the Turkish Basketball Youth League (Boys Category). Fifty-nine teams competing during the 2017–2018, 2018–2019, and 2019–2020 seasons were included. Team performance was assessed using the Hollinger Efficiency Rating, whereas playoff qualification represented competitive success. In addition, the number of players receiving 5–10 minutes of playing time per game represents bench utilization, whereas the number of players receiving 10 or more minutes represents the team's core rotation. Descriptive statistics, two-way ANOVA, and independent-samples t-tests for simple main effects were performed. Two-way ANOVA revealed that no significant seasonal differences were found in team performance, roster size, or player rotation patterns ($p > .05$). However, playoff teams demonstrated significantly higher team performance, larger roster sizes, and a greater number of players who played 5–10 minutes compared with non-playoff teams ($p < .05$). Furthermore, no interaction effects were found for team performance, roster size, or the number of players who played 5–10 minutes. Conversely, a significant interaction effect was found between playoff status and season for the number of players who played 10 or more minutes ($p < .05$), indicating that core rotation depth differed according to competitive season. These findings suggest that successful youth basketball teams tend to combine larger rosters with greater player involvement in limited playing-time roles, while season-specific differences exist in the depth of the core playing rotation. Together, these rotation characteristics may reflect different coaching approaches to player utilization across competitive contexts. Establishing standardized roster regulations may therefore contribute to competitive balance, league sustainability, and long-term athlete development.

Keywords: Roster Management, Team Squad, Core Rotation, Bench Utilization, Young Basketball Players.

Özet

İlk Beşin Ötesinde: Genç Erkek Basketbolunda Kadro Derinliği, Oyuncu Rotasyonu ve Takım Performansı

Takım kadrolarını ve oyuncu rotasyonunu yönetmek, genç basketbolunda takım performansını ve rekabetçi başarıyı etkileyebilecek önemli bir koçluk konusudur. Bu çalışma, Türkiye Genç Basketbol Ligi (Erkekler Kategorisi) sezonları boyunca finallere kalan ve kalmayan takımlar arasındaki takım performansı, kadro büyüklüğü ve oyuncu rotasyon modellerindeki farklılıkları incelemiştir. 2017–2018, 2018–2019 ve 2019–2020 sezonlarında mücadele eden 59 takım çalışmaya dahil edilmiştir. Takım performansı, Hollinger verimlilik oranları kullanılarak değerlendirilirken, takımların finallere kalıp kalmamaları takım başarısı olarak kabul edilmiştir. Buna ek olarak, araştırmada maç başına 5-10 dakika arası süre alan oyuncu sayısı yedek oyuncu kullanımını temsil ederken, 10 dakika veya daha fazla süre alan oyuncu sayısı takımın temel rotasyonunu temsil etmektedir. Analizlerde betimleyici istatistikler, iki yönlü ANOVA ve basit ana etkiler için bağımsız örneklem t-testleri uygulanmıştır. İki yönlü ANOVA, takım performansı, kadro büyüklüğü veya oyuncu rotasyon modellerinde sezonlar arasında anlamlı bir fark bulunmadığını ortaya koymuştur ($p > .05$). Bununla birlikte, finale kalan takımlar, finale kalmayan takımlara kıyasla anlamlı derecede daha yüksek takım performansı, daha büyük kadro büyüklükleri ve 5-10 dakika oynayan daha fazla oyuncuya sahip olduklarını göstermiştir ($p < .05$). Ayrıca, takım performansı, kadro büyüklüğü veya 5-10 dakika oynayan oyuncu sayısı için herhangi bir etkileşim etkisi bulunmamıştır. Buna karşılık, finale kalma durumu ile sezon arasında 10 dakika veya daha fazla oynayan oyuncu sayısı için anlamlı bir etkileşim bulunmuştur ($p < .05$), bu da temel rotasyon derinliğinin sezona göre farklılık gösterdiğini göstermektedir. Bu bulgular, başarılı genç basketbol takımlarının daha büyük kadroları, sınırlı oyun süresi rollerinde daha fazla oyuncu katılımıyla birleştirme eğiliminde olduğunu, ancak temel oyun rotasyonunun derinliğinde sezona özgü farklılıkların bulunduğunu göstermektedir. Bu bulgular birlikte değerlendirildiğinde, bu rotasyon özelliklerinin rekabetçi bağlamlarda oyuncu kullanımına yönelik farklı koçluk yaklaşımlarının faydalarını yansıtabileceği düşünülmektedir. Bu nedenle, kadro düzenlemelerinin oluşturulması rekabet dengesine, ligin sürdürülebilirliğine ve uzun vadeli sporcu gelişimine katkı sağlayabilir.

Anahtar Kelimeler: Kadro Yönetimi, Takım Kadrosu, Temel Rotasyon, Yedek Oyuncu Kullanımı, Genç Basketbolcular.

INTRODUCTION

Youth leagues aim to expand the pool of athletic talent and promote athlete development (1). Some of the major structural barriers to this aim in basketball are the unequal distribution of roster depth and the need to optimize rotations (2,3). Elite teams often have many exceptional players with their financial resources (4), leaving other teams with very limited roster options. This structural difference forces coaches into a challenging tactical dilemma: to rotate to involve more bench players or rely on a condensed group of starters. By identifying these performance thresholds, coaches can more effectively navigate the dilemma between condensed and expanded rotations and clarify the distinct contributions of starting lineups versus bench units (5). In this competitive environment, deciding how to manage roster sizes and allocate playing time—specifically through bench utilization and core rotation depth—becomes a critical strategy for winning games for the youth team coaches (6,7).

In contemporary sports analytics, basketball organizations worldwide, including the NBA (National Basketball Association), NCAA (National Collegiate Athletic Association), and TBF (Turkish Basketball Federation), extensively track and evaluate team and player profiles through performance metrics that condense complex box scores into a singular holistic efficiency rating. John Hollinger's efficiency formulation stands as a diagnostic tool within this analytical framework, integrating multiple statistical actions to capture the operational value of on-court statistics (8). In Turkish basketball literature, this methodological framework has proven highly versatile for uncovering competitive trends across various institutional levels. Specifically, scholars have successfully deployed Hollinger's formulation to capture systematic performance shifts across dynamic seasonal calendars in the men's senior professional league (9), to show performance differences across playing positions (10), and to identify efficiency discrepancies separating different professional tiers (11). Furthermore, PER has been used to evaluate the relationship between relative age effects and team performance during international tournaments hosted in Türkiye (12) and to decode selection dynamics across age cohorts within youth women's basketball frameworks (13). However, despite prior studies in basketball,

no research has integrated the PER with roster size, bench utilization, and playing rotations in youth male development leagues.

In this research, team roster refers to the group of licensed players on a team, including both those on the match roster (active players) and those not on it (inactive players) (6). Player rotation refers to changes in the players on the team roster based on coaches' preferences (7). Existing studies have primarily evaluated rotation using a single indicator, typically the number of players receiving substantial playing time(2,3,6,7). Following previous research (7), which operationalized core playing rotation as players receiving at least 10 minutes of playing time, the present study also recorded the number of players receiving 5–10 minutes to characterize limited bench utilization and to provide a more comprehensive assessment of player rotation patterns. Bench utilization refers to the tactical strategy and frequency of deploying reserve players who see limited playing time—typically brief, high-intensity shifts (e.g., 5–10 minutes per game)—to support the primary starting lineup. A study in the literature that examines the relationship between player rotation and team performance and success through sports statistics focuses on professional basketball (7). This research, which examines the advantages and disadvantages of both large and small rotations, shows that a large player rotation positively affects game results.

Building on this foundation, the present study examines how team performance, roster size, and player rotation patterns differ between playoff-qualifying and non-qualifying teams in an elite youth basketball league. In this context, four hypotheses were proposed for this purpose as follows:

H_1: There is a significant interaction effect of playoff status and seasons on team performance.

H_2: There is a significant interaction effect of playoff status and seasons on the team roster.

H_3: There is a significant interaction effect of playoff status and seasons on bench utilization.

H_4: There is a significant interaction effect of playoff status and seasons on player rotations.

METHOD

Study design

This research employed a causal-comparative study (14) to examine differences in team performance, team roster size, and player rotation patterns between playoff-qualifying and non-qualifying youth male basketball teams. Causal-comparative research is a methodology that aims to identify the causes and consequences of differences between the groups without intervening in the conditions or participants (14). Accordingly, no experimental intervention was applied, and all variables were measured as they naturally occurred within the competitive sport context. Ethical committee approval was received from the Ethics Committee of Ardahan University (Approval no: E-67796128-819-2400012361), Date: 04.04.2024, and the study was conducted in compliance with the Declaration of Helsinki.

Participants

The participants were teams competing in the Turkish Basketball Federation (TBF) Basketball Youth League (BGL) Boys Category. Purposive sampling (14), a non-probability technique, was used to select a specific sports group aligned with the study's main objective. The inclusion criteria were: (a) male basketball teams registered in the TBF Basketball Youth League (BGL) Boys Category, and (b) active participation during the 2017-2018, 2018-2019, and 2019-2020 competitive seasons.

Data collection procedure

The data were gathered from the Turkish Basketball Federation's (TBF) official website's statistics pages at the end of the season (15). Data from 59 teams that participated in the Turkish Basketball Federation (TBF) Basketball Youth League (BGL) Boys Category over three seasons (2017–2018, 2018–2019, and 2019–2020) were checked following data collection. The league's participating teams are given below, along with the number of players on each club. (Table 1). Roster sizes are reported specifically because team squad size is a core analytical variable, providing readers with transparency into squad size variability across clubs.

Table 1. Basketball Youth League Boys Category Teams

	2017-2018 Season (n=300)	2018-2019 Season (n=303)	2019-2020 Season (n=311)
1.	Anadolu Efes (15)	Adatıp Sakarya Büyükşehir Belediye (14)	Afyon Belediyesispor (15)
2.	Bahçeşehir Koleji (17)	Afyon Belediyesispor (13)	Anadolu Efes (16)
3.	Banvit (16)	Anadolu Efes (17)	Arel Üniversitesi Büyükçekmece (15)
4.	Beşiktaş (15)	Arel Üniversitesi Büyükçekmece (14)	Bahçeşehir Koleji (15)
5.	Darüşşafaka Basketbol (14)	Bahçeşehir Koleji (18)	Beşiktaş (17)
6.	Demir İnşaat Büyükçekmece (18)	Banvit Basketbol (18)	Bursaspor (13)
7.	Eskişehir Basket (12)	Beşiktaş (18)	Darüşşafaka Basketbol (15)
8.	Fenerbahçe Doğuş (16)	Darüşşafaka Basketbol (17)	Fenerbahçe Beko (18)
9.	Galatasaray (17)	Fenerbahçe Beko (14)	FMV Işık BB (14)
10.	Gaziantep Basketbol (12)	Galatasaray (18)	Galatasaray (16)
11.	Gelişim Koleji (14)	Gaziantep Basketbol (14)	Gaziantep Basketbol (14)
12.	İstanbul Bbsk (17)	Gelişim Koleji (14)	Gelişim Koleji (16)
13.	Muratbey Uşak Sportif (13)	İstanbul Bbsk (15)	OGM Ormanspor (16)
14.	Pınar Karşıyaka (15)	Pınar Karşıyaka (17)	Pınar Karşıyaka (15)
15.	Sakarya Büyükşehir Basketbol (13)	Selçuklu Basketbol (16)	Tac Nef (17)
16.	Ted Ankara Kolejliler (16)	Tac Nef (20)	Ted Ankara Kolejliler (15)
17.	Tofaş (15)	Ted Ankara Kolejliler (14)	Teksüt Bandırma BK (18)
18.	Trabzonspor (13)	Tofaş (16)	Teşvikiye (14)
19.	Türk Telekom (15)	Türk Telekom (16)	Tofaş (17)
20.	Yeşilgiresun Belediyespor (17)		Türk Telekom (17)

The data included on-court performance stats, team roster sizes, teams' playoff status, and player rotations. John Hollinger's efficiency rating (PER) was used as a measure of team performance, calculated from on-court performance stats, while whether the teams played in the playoffs was used as a measure of team success. The Hollinger PER (16) was employed as a performance indicator to derive a single score from both positive and negative player metrics (17). The PER was used as an analytic tool to assess both players' and teams' performances in some studies (9,10). In the present study, the team collective efficiency rating was determined by aggregating the cumulative seasonal efficiency metrics for all registered players on each team. To account for differences in the total number of matches contested between teams, the cumulative team efficiency rating score was standardized by dividing it by each team's total number of games played, yielding a per-game team efficiency rating. PER has 12 variables with different coefficients, as shown: Player Efficiency Rating = Points + 0.4 × Field Goal − 0.7 × Field Goal Attempt − 0.4 x (Free Throw Attempt − Free Throw) + 0.7 x Offensive Rebound + 0.3 × Defensive Rebound + Steal + 0.7 × Assist + 0.7 × Block − 0.4 × Foul − Turnover.

Player rotation patterns and bench utilization were conceptualized as consisting of two complementary dimensions. Following the approach of Clay & Clay (7), player rotation patterns were operationalized using playing-time distributions. The number of players receiving 10 or more minutes per game was used as an indicator of the team's core rotation size/depth (rotation width), whereas the number of players receiving 5–10 minutes per game was used as an indicator of limited bench utilization. The latter variable was introduced to complement the assessment of player rotation by capturing meaningful, yet limited, participation beyond the team's core rotation. Together, these two indicators were used to characterize team player rotation patterns. Because players receiving fewer than five minutes of playing time are less likely to represent the team's rotation patterns, they were not included in this conceptualization

Statistical analysis

All statistical analyses were performed using SPSS 26 software. Differences in team performance, team roster size, and player rotation patterns between playoff-qualifying and non-qualifying youth male basketball teams across three seasons were tested using a two-way analysis of variance (ANOVA). A two-way ANOVA was preferred because youth basketball categories experience near-complete annual roster turnover and age-group transitions. Additionally, as a follow-up test, a further independent-samples t-test for simple effects was conducted whenever the interaction effect was significant (18). To evaluate the assumptions of parametric testing, tests for homogeneity (Levene's test) and normality (Shapiro-Wilk test) were performed. All data were found to be homogeneous and normally distributed ($p > .05$). Cohen's (19) effect sizes (ESs) were analyzed

using partial eta square to compare the magnitude of the differences in performance parameters (PER) between seasons and playoff status using thresholds of .00, .06, and .14 as benchmarks for small, medium, and large effect sizes, respectively. A significance level of 0.05 and a 95% confidence level were set for all tests.

FINDINGS

The mean and standard deviation values regarding team performance, team roster, and player rotation patterns are presented in the table below (Table 2).

Table 2. Descriptive statistics for team performance, team roster, and player rotations

Variables	Seasons	Playoff Status				Total	
		Playoff Teams		Non-Playoff Teams			
		n	M ± SD	n	M ± SD	n	M ± SD
Team Performance	2017-2018	12	54.57±9.24	8	36.41±8.48	20	47.31±12.62
	2018-2019	12	54.26±9.11	7	32.92±5.51	19	46.40±13.14
	2019-2020	12	59.04±17.07	8	51.70±35.97	20	56.11±25.67
	Total	36	55.96±12.22	23	40.67±22.65	59	50.00±18.47
Team Roster	2017-2018	12	15.42±1.31	8	14.38±2.26	20	15.00±1.78
	2018-2019	12	16.33±1.87	7	15.29±2.06	19	15.95±1.96
	2019-2020	12	16.33±1.23	8	14.63±.92	20	15.65±1.39
	Total	36	16.03±1.52	23	14.74±1.79	59	15.53±1.74
Bench Utilization (5-10 min.)	2017-2018	12	2.92±1.38	8	1.75±1.04	20	2.45±1.36
	2018-2019	12	4.08±1.73	7	2.14±1.73	19	3.37±1.95
	2019-2020	12	3.33±1.97	8	2.88±1.36	20	3.15±1.73
	Total	36	3.44±1.73	23	2.26±1.42	59	2.98±1.71
Core Rotation (10+ min.)	2017-2018	12	11.33±1.50	8	10.50±1.07	20	11.00±1.38
	2018-2019	12	10.42±1.16	7	11.71±1.25	19	10.90±1.33
	2019-2020	12	11.42±1.31	8	10.00±1.60	20	10.85±1.57
	Total	36	11.06±1.37	23	10.70±1.46	59	10.92±1.41

M = Mean; SD = Standard Deviation

Two-way (2x3) ANOVA results for team performance, team roster, and player rotation patterns are presented in the table below (Table 3).

Table 3. Two-way (2x3) ANOVA results for team performance, team roster, and player rotation patterns

Variables	Source	df	Mean Square	F	p	η2
Team Performance	Playoff Status	1	3413.21	**12.22****	.00	.19
	Seasons	2	751.73	2.70	.07	.09
	Playoff Status*Seasons	2	252.20	.90	.41	.03
	Error	53	279.26			
Team Roster	Playoff Status	1	22.43	**8.41*****	p < 001	.14
	Seasons	2	3.98	1.49	.24	.05
	Playoff Status*Seasons	2	.70	.26	.77	.01
	Error	53	2.67			
Bench Utilization (5-10 min.)	Playoff Status	1	19.78	**7.72****	.00	.13
	Seasons	2	3.79	1.48	.24	.06
	Playoff Status*Seasons	2	2.53	.99	.38	.04
	Error	53	2.56			
Core Rotation (10+ min.)	Playoff Status	1	1.41	.80	.38	.02
	Seasons	2	.60	.34	.72	.01
	Playoff Status*Seasons	2	9.30	**5.24****	.00	.17
	Error	53	1.77			

***p < .001, **p < .01, *p < .05, p > .05; df= degrees of freedom; η^2_P= partial eta-squared**

A statistically significant difference was found in team efficiency ratings between playoff-qualifying teams (M±SD = 55.96 ± 12.22) and non-qualifying teams (M±SD = 40.67 ± 22.65) [F (1, 53) = 12.22, p < .01, η^2_P = .19], representing a large effect size based on Cohen's benchmarks (η^2_P≥14$). Conversely, no significant difference was found in efficiency scores across seasons [F (2, 53) = 2.70, p > .05]. Furthermore, the interaction

effect between playoff status and seasons on teams' efficiency scores was not statistically significant [F (2, 53) = .90, p > .05] (Table 3).

The analysis revealed a statistically significant difference in team roster size between playoff-qualifying teams (M±SD = 16.03 ± 1.52) and non-qualifying teams (M±SD = 14.74 ± 1.79) [F (1, 53) = 8.41, p < .01, η^2_P = .14], also indicating a large effect size. However, no significant difference was found in team roster sizes across seasons [F (2, 53) = 1.49, p > .05]. Moreover, the interaction effect between playoff status and seasons on team roster size was not statistically significant [F (2, 53) = .26, p > .05] (Table 3).

The analysis indicated a statistically significant difference in limited bench utilization, reflected by the number of players receiving 5–10 minutes between playoff-qualifying teams (M±SD = 3.44 ± 1.73) and non-qualifying teams (M±SD = 2.26 ± 1.42) [F (1, 53) = 7.72, p < .01, η^2_P = .13], approaching a large effect size (.06 < η^2_P< .14). In contrast, no significant difference was found in the short-duration player count across seasons [F (2, 53) = 1.48, p > .05]. Additionally, the interaction effect between playoff status and seasons on the number of players with 5–10 minutes of playing time was not statistically significant (5–10 min.) [F (2, 53) = .99, p > .05], which corresponds to a large effect size (η^2_P≥14$) (Table 3).

Regarding the core playing rotation, represented by the number of players receiving 10 or more minutes, no statistically significant difference was found in the number of players who played 10+ minutes between playoff-qualifying teams (M±SD = 11.06 ± 1.37) and non-qualifying teams (M±SD = 10.70 ± 1.46) [F (1, 53) = .80, p > .05, η^2_P = .02]. Moreover, no significant difference was found in player rotations (10+ min.) across seasons [F (2, 53) = .34, p > .05]. In contrast, the interaction effect between playoff status and seasons on the number of players reaching 10+ minutes of playing time was statistically significant [F (2, 53) = 5.24, p < .01, η^2_P = .17] (Table 3).

Simple main effects results for player rotation (10+ min.) in seasons are presented in the table below (Table 4).

Table 4. Independent samples t-test results for player rotation (10+ min.) in seasons

Seasons	n	Playoff Teams (M±SD)	n	Non-Playoff Teams (M±SD)	t	p	95% CI	η2
2017-2018	12	11.33 ± 1.50	8	10.50 ± 1.07	1.35	.19	[-0.46, 2.13]	.09
2018-2019	12	10.42 ± 1.16	7	11.71 ± 1.25	**-2.28***	.04	[-2.50, -0.10]	.23
2019-2020	12	11.42 ± 1.31	8	10.00 ± 1.60	**2.17***	.04	[0.04, 2.79]	.21

*****p < .001, **p < .01, *p < .05, p > .05; M = Mean; SD = Standard Deviation; CI=Confidence Interval; η^2_P = partial eta-squared**

Simple main effects analysis revealed that the number of players who played more than 10 minutes was significantly lower in playoff qualifying teams than in non-qualifying teams in the 2018–2019 season (t = -2.28, p = .036, η^2_P = .23). Conversely, the number of players who played more than 10 minutes was significantly higher in playoff qualifying teams than in non-qualifying teams in the 2019-2020 season (t = 2.17, p = .044, η^2_P = .21).

DISCUSSION AND CONCLUSION

The purpose of this causal-comparative study was to examine differences in team performance, roster size, bench utilization, and player rotation patterns between playoff-qualifying and non-qualifying teams across seasons of the Turkish Basketball Youth League (Boys Category). Four hypotheses were proposed for this purpose. By testing these hypotheses, this research found that H_1, H_2, and H_3 were rejected, whereas H_4 was not, and clarified how playoff-qualifying teams differentiate themselves from other teams between seasons in performance, roster size, bench utilization, and player rotation patterns.

The findings indicated that H_1 was rejected, as there was no significant interaction effect between playoff status and seasons on team performance. Moreover, the findings showed a main effect of playoff status, with qualifying teams exhibiting significantly higher team performances than non-qualifying teams (M±SD = 55.96±12.22 vs. M±SD = 40.67±22.65). These findings indicate that, regardless of the specific competitive season, the efficiency gap between playoff teams and non-playoff teams remains a stable requirement for success. In practical basketball terms, this substantial 15.29 PER disparity represents an enormous difference in collective

execution. Rather than reflecting minor statistical variances, a 15-point gap in team efficiency translates to superior offensive efficiency, sharper shot selection, dominant rebounding margins, and significantly fewer unforced turnovers per game. In youth development leagues, such a difference demonstrates that playoff teams may maintain high tactical performance and quality possession throughout the entire 40 minutes, whereas non-qualifying teams may suffer performance drop-offs when executing set plays or under high defensive pressure. This outcome aligns with research emphasizing that efficiency scores are significant determinants of success in competitive youth structures (12,13)

The findings indicated that H_2 was rejected, as there was no significant interaction effect between playoff status and seasons on team roster sizes. Furthermore, a significant main effect indicated that playoff-qualifying teams (M±SD = 16.03±1.52) consistently had larger team roster sizes than non-qualifying teams (M±SD = 14.74±1.79). These findings suggest that talent concentration and maximizing active-roster width are useful strategies for top-tier youth programs. In elite youth development frameworks, a larger team squad indicates that teams try out more players throughout the season, which helps them build institutional depth and a wider pool of athletic talent. Previous research has shown that it is possible to build teams while considering financial resource management and competitive constraints using performance index ratings (20). In line with this research, the findings highlight the importance of maximizing team roster size during team building while considering financial constraints and competition restrictions. In addition, these findings show that keeping team rosters as large as possible can help teams reach a similar level of winning experience. This will enhance the playing experience for young athletes, which was the goal in establishing the league (21).

The findings indicated that H_3 was rejected, as there was no significant interaction effect between playoff status and seasons on bench utilization. Additionally, a significant main effect indicated that playoff teams deploy a greater number of players with limited bench utilization (M±SD = 3.44±1.73) than non-playoff teams (M±SD = 2.26±1.42). The lack of interaction main effects indicates that this bench deployment dynamic does not vary across seasonal contexts and is characteristic of winning organizations. This finding reflects the competitive advantage documented in elite basketball, where teams that flatten the distribution of playing time across a broader set of players consistently secure wins and achieve higher defensive efficiency (6,7). Beyond tactical advantages, this structured 5–10 minutes deployment holds critical developmental value for youth athletes. Brief, high-intensity shifts provide a vital transition bridge between practice drills and live competition, exposing developing players to authentic game speed, psychological pressure, and decision-making under fatigue. Moreover, previous research highlights that a lack of substantial playing time or limited bench utilization results in players missing training stimuli, necessitating tailored compensatory training to ensure long-term adaptations (22). Taken together, these results indicate that bench utilization provides both performance and success advantages, while also mitigating the disadvantages of a lack of training.

The findings indicated that H_4 was not rejected, as there was a significant interaction effect between playoff status and seasons on player rotations. This significant interaction indicates that the core rotation strategy changed from one season to the next. To understand how this interaction varied across years, a follow-up simple main effects analysis was performed to examine the differences in this interaction for each season. The findings of these simple main effects analyses not only confirm the interaction effect suggested by H_4 but also elaborate on its details across seasons. The analysis revealed no statistically significant difference in the core playing rotation between playoff teams (M±SD = 11.33 ± 1.50) and non-playoff teams (M±SD = 10.50 ± 1.07) during the 2017–2018 season. However, during the 2018–2019 season, playoff teams used a significantly smaller core rotation (M±SD = 10.42 ± 1.16) than non-playoff teams (M±SD = 11.71 ± 1.25), indicating a clear coaching preference for a core lineup in which primary starters absorb heavy workloads. Conversely, this pattern inverted during the 2019–2020 season, with playoff squads deploying a significantly larger number of core rotation players (M±SD = 11.42 ± 1.31) than non-qualifiers (M±SD = 10.00 ± 1.60). Ultimately, these contrasting results illustrate a strategic tug-of-war between quality and quantity in youth roster management. The optimal balance between relying on elite operational quality (in 2018–2019) and expanding the quantitative width (in 2019–2020) remains a coaching dilemma that must be solved across competitive seasons. In other words, these results showed that the tactical width of a winning core rotation is highly variable dynamically from year to year. Successful coaches do not adhere to a rigid template; rather, they adjust the balance between a condensed core and a distributed lineup based on the specific generational talent or immediate competitive context of each season. From the perspective of decision-making and rationality in

sports coaching (6,7), this temporal shift reflects how youth coaches adapt tactical options to external constraints and cohort-specific talent distribution. In seasons marked by a talent drop-off among primary prospects (as observed in 2018–2019), coaches exhibit loss aversion by concentrating minutes on a compact, high-efficiency core to secure immediate playoff qualification. Conversely, in cohorts with greater overall depth or during seasons with compressed match schedules (such as the 2019–2020 pre-pandemic calendar), coaches adopt a distributed-load strategy, extending double-digit minutes to 11–12 players to maintain defensive-pressing intensity and mitigate cumulative fatigue. These different patterns reveal that elite youth coaching strategies operate on an adaptive spectrum between tactical specialization and load distribution, depending on the immediate generational talent profile. Furthermore, these simple main-effects analyses showed that both narrow and wide rotations confer performance advantages in basketball (7). From a sports management standpoint, the validation of H_4, combined with the main effects of H_2 and H_3, suggests a structural imbalance in which elite clubs hold a disproportionate share of talent. Implementing standardized caps on youth rosters would protect league sustainability, restore competitive balance, and ensure that developing athletes receive meaningful playing time across all tactical dimensions.

In conclusion, this causal-comparative research suggests that while successful youth clubs consistently separate themselves through on-court performances, larger roster sizes, and active short-duration bench utilization (5–10 min.), winning core rotations do not follow a static template. Instead, the significant interaction effect reveals a strategic tug-of-war between quality and quantity, in which the width of the core playing lineup varies dynamically from season to season in response to changing competitive contexts. Taken together, these results suggest that the league inadvertently functions as an asymmetric mechanism of selection, where elite clubs leverage their resource depth to hoard talent and manipulate rotation boundaries. Without structural interventions—such as implementing standardized caps on team rosters—development leagues may continue to reinforce institutional inequalities and favor well-funded organizations, rather than ensuring optimal talent development and long-term sustainability across youth basketball. In other words, from a governance perspective, the combined findings of larger roster sizes (H_2) and dynamic rotation strategies (H_4) highlight a clear competitive imbalance within the league. While introducing standardized roster caps could serve as a direct regulatory tool to balance squad sizes and prevent excessive concentration of talent in top clubs, sports administrators must consider potential disadvantages. Simply limiting roster sizes might reduce total participation opportunities for young athletes across the league while failing on its own to guarantee that reserves receive sufficient on-court match experience. Therefore, federations could consider complementary playing-time guidelines alongside basic roster regulations. For instance, establishing developmental rotation standards—such as encouraging a minimum participation threshold (e.g., 5 minutes) for active bench players during regular-season games—could promote broader on-court involvement without restricting total squad sizes. Such targeted regulations would help balance competitive fairness with the core developmental mission of youth basketball leagues.

There are four potential limitations of the present study. First, during the 2018–2019 season, a total of 19 teams competed after Trabzonspor withdrew from the league (23). Second, the 2019–2020 season was cut short due to emergency measures implemented in the COVID-19 pandemic (24). To minimize statistical bias due to these limitations, team performance was calculated by dividing each team's data by the total number of games played. Third, this study examined only male youth cohorts; therefore, caution is warranted when generalizing these rotation and squad dynamics to female developmental leagues. Finally, John Hollinger's Performance Efficiency Rating (PER) was originally formulated for senior professional basketball contexts. Although widely used in youth analytics, PER primarily captures box-score execution and may not fully capture youth-specific developmental nuances, tactical discipline, off-ball positioning, or defensive skills. Future research is recommended to identify on-court statistics that effectively distinguish successful teams from unsuccessful ones with respect to roster configurations and player rotations in youth basketball.

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